The EEAG Report

on the European Economy

2008

EUROPE IN A GLOBALISED WORLD

ECONOMIC OUTLOOK
THE FALLING DOLLAR
GLOBALISATION AND JOBS
GLOBALISATION AND INDUSTRIAL POLICY
GLOBAL WARMING

EEAG
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FOREWORD

This edition marks the seventh annual report of the European Economic Advisory Group (EEAG) at CESifo. This year, the report focuses on the chances and challenges of globalisation. After providing a somewhat clouded business forecast for Europe and the world, the report discusses, among other things, the impact of globalisation on the European labour markets, public policies against global warming and the role of industrial policy in globalised goods markets. Non-partisan as the Group is, it can offer fresh and unconventional views for policymakers that are nevertheless all firmly based on sound economic reasoning.

The EEAG, which is in toto responsible for this report, consists of a team of seven economists from seven European countries. This year, the Group is again chaired by Lars Calmfors (Institute for International Economic Studies, Stockholm University) and includes Gilles Saint-Paul (University of Toulouse, vice chairman), Giancarlo Corsetti (European University Institute, Florence), Michael Devereux (University of Oxford), Jan-Egbert Sturm (KOF Swiss Economic Institute, ETH Zurich), Xavier Vives (IESE Business School) and myself. The members of the Group as a whole are responsible for all chapters. They all participate on a personal basis and do not represent the views of the organisations they are affiliated with.

As always, the report benefited greatly from the support of the Ifo Institute, which provided the European business forecast, as well as from help provided by the Center for Economic Studies of the Economics Faculty of Ludwig–Maximilian University. I wish to thank the members of the group for investing their time in a challenging project and I gratefully acknowledge valuable assistance provided by Tobias Seidel (research co-ordinator), Maximilian von Ehrlich (research assistant), Oliver Hülsewig, Wolfgang Nierhaus and Timo Wollmershäuser (business forecast), Paul Kremmel (editing), as well as Elsita Walter (statistics and graphics) and Elisabeth Will (typesetting and layout). Moreover, I wish to thank Swiss Re and the Netherlands Institute for Advanced Study in the Humanities and Social Sciences (NIAS) for hosting two of our meetings.

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Munich, 20 February 2008

SUMMARY

This is the seventh report on the European economy by the European Economic Advisory Group (EEAG). For the first time, the contents of the report have been summarised under a common title: *Europe in a globalised world.* All chapters deal in one way or another with the growing interdependence between Europe and the rest of the world. This applies both to the first two chapters, which as in earlier years deal with short- and medium-term macroeconomic issues, and the subsequent three chapters, which deal with longer-term issues.

- *Chapter 1* presents our macroeconomic forecast and analyses monetary and fiscal policy in Europe. Because of the uncertainty about macroeconomic developments in the US and how they will be transmitted to the rest of the world as well as the uncertainty about how decoupled growth in emerging economies has become from the US cycle, a global perspective is more relevant than ever. A crucial issue for macro developments in Europe is how large and persistent the depreciation of the US dollar against the euro will be. *Chapter 2* offers an in-depth analysis of this.
- Chapters 3–5 all deal with various long-term aspects of globalisation. *Chapter 3* analyses the impact of increased economic integration with low-wage economies on Western European jobs: the message is that when taking all effects into account, globalisation is more likely in the end to raise rather than to reduce employment, because it will help making labour markets more flexible. The challenge for policy is to counter adverse income distribution effects, but to do so in a way that employment is not harmed. *Chapter 4* argues against using industrial policy to protect European firms from international competition because of the long-run costs that are likely to arise. Industrial policy should be horizontal rather than sector-based and it should be located mainly at the regional and EU level, but cut back at the national level. *Chapter 5* addresses one of the most long-term issues

for mankind: global warming. The chapter points out that most existing analyses have neglected the supply side. Without a proper analysis of supply-side effects, demand-reducing measures, which are generally regarded as self-evident solutions (such as emission permits, taxes on fossil fuels and the subsidisation of alternative energy sources) risk being ineffective and in fact counterproductive.

Chapter 1: Macroeconomic outlook and policy

Despite the turbulence in the financial markets caused by the US subprime mortgage crisis, the world economy developed strongly last year. For the fourth year in a row, world GDP grew by around 5 percent. During the second half of last year the risks for a slowdown of the world business cycle increased considerably. The main reasons are the still lasting turbulence in financial markets and the slowdown of the US economy. Together with high energy and food prices, this will restrain the world economy especially in the short run. Nevertheless, firm profits and labour market developments will remain favourable overall.

After approximately three years of continued high growth, the US economy started to cool down markedly at the end of 2005 when the US housing market began to deteriorate. Residential investment has been falling for eight subsequent quarters and real estate prices have dropped and thereby deteriorated the wealth position of home owners. The latter factor, which boosted consumption in the past, now works in the reverse direction. During this year, we will continue to see home owners turn insolvent and house prices to decrease further. However, in view of the still strong world economy and the continued weakness of the US dollar, exports will support US growth. The 2008 performance of the US economy is difficult to predict due to the declining house prices and the subprime crisis, the full impact of which is still unclear. Although recent stock market developments signal grave concerns about cyclical developments, it is not in our view very likely that the US

economy will fall into recession. Recessionary tendencies will be counteracted by both low interest rates and a substantial fiscal stimulus programme. Our forecast is that US GDP will grow by 1.7 percent in 2008. Nevertheless, continuing falls in US real estate prices and enduring turbulence in international financial markets remain substantial downward risks.

The contribution of *Asia* to world economic growth has increased substantially over time. The emerging economies of Asia posted superb GDP growth rates last year, notwithstanding the growth slowdown in the US and the turbulence in international financial markets. Over time, domestic demand has turned into the main engine of growth. Affected by the slowdown in US import demand, exports from the region have already lost some momentum. But domestic demand in the Asian economies remains strong and will probably be able to buffer some of the slowdown in the world economy. So far, the sub-prime crisis in US financial markets has not affected the Asian banking sector. Bank credit supply has continued to be accommodating and the spread between firm and government bonds has hardly widened.

The European economy

For the second year in a row, the *European Union* managed to grow at a rate of close to 3 percent in 2007. In particular, growth dynamics in Germany, Spain and the UK helped achieve this positive result. On a country level, strong domestic demand was usually the main contributing factor. Non-residential investment remained an important factor behind demand growth. Because of positive labour market developments, consumption gained momentum again. Real wage increases last year were small and below those of the US and Japan. But because of the exchange rate developments, the cost competitiveness position of European countries deteriorated substantially. Nevertheless, net exports again contributed positively to GDP growth in the euro area.

After the outbreak of the credit crisis, producer confidence in the EU has started to crumble. Because of the appreciation of the euro and the consequent reduction of US imports, growth in the European Union will fall during the first half of this year, bringing economic growth back to its potential. Also a slower expansion of investment in Europe is con-

tributing to lower growth. The output gap, however, will remain positive allowing employment to increase further. But since inflation will remain high, especially during the first half of this year, and wage increases are likely to stay moderate, private consumption will increase more or less at the same pace as last year. Overall, GDP growth will level off to 2.1 and 1.8 percent this year in EU27 and the euro area, respectively.

Over the last two decades there has been a very significant fall in the rate of wage increase in most EU countries. These low wage increases are often seen as a major cause of weak private consumption. We find that the main causes of the decline in nominal wage growth are lower inflation (associated with low-inflation policy of central banks) and lower productivity growth. Declining union density in many countries and moves towards more corporatism in some have also contributed somewhat.

The economic upswing in 2007 continued to reduce fiscal deficits and government debt throughout Europe last year. Although total government expenditures did increase somewhat, tax revenues grew even more. In a majority of countries, the consolidation of public finances continued. In particular in Germany, but also in Hungary, Italy and Portugal, measures were implemented to reduce the structural budget deficit. In the two years to come, fiscal policy will, however, turn expansionary again.

In the euro area, the monetary conditions have tightened over the last two years. This is explained by the steady increase in the main refinancing rate of the ECB (in eight steps since December 2005 – two of which took place in March and June last year) and the appreciation of the euro during the same period. During the course of 2007, the euro appreciated by more than ten percent against the US dollar. Despite this tight monetary policy stance, inflation has surged in recent months. During the last two months of 2007, the annual inflation rate went above three percent. Also during the first months of 2008, inflation will remain well above the ECB target of two percent. The restrictive monetary policy stance will bring inflation back to around two percent in 2009.

Real estate markets and the financial system

The real estate crisis in the US and its repercussions worldwide play a prominent role in the assessment

of the current and future business cycle developments in the world. Not only do real estate prices affect the profitability of building houses and thus residential investment, they are also a fundamental determinant of household wealth and hence of private consumption. Furthermore, and as suggested by developments during the past months, developments associated with real estate markets can jeopardise the stability of the financial system. A sharp rise in home foreclosures and defaults on subprime mortgages in the US during last summer led to a re-evaluation of related mortgage-backed securities. As it was – and to some extent still is – unclear to what extent and where most of the losses from the US mortgage loans will hit the banking sector, banks became reluctant to lend to each other. To prevent interbank money markets from becoming illiquid, central banks around the world had to step in. Although banks report that recent tensions are hampering their access to funding and are causing a tightening of credit standards, at least up until now, interest rates for non-financial corporations and households loans in Europe do not appear to have been affected by much. Neither have credit volumes so far. Because of the robust growth in other parts of the world economy and the interventions of central banks worldwide, the repercussions from the real estate crisis in the US are likely to be much less severe than has recently been suggested in much of the press.

Chapter 2: How far could the dollar fall?

How much dollar depreciation should Europe and the world expect in the future as a consequence of the US external imbalance? To what extent will the dollar fall be accompanied by a global realignment of Asian currencies, supposedly reducing the pressure on the euro? Early on, leading economists concluded that eliminating a current account deficit of five percent of GDP in an economy like the US would require a real exchange rate depreciation of between 35 and 50 percent. Meanwhile, from its peak in 2002 to the beginning of 2007, the dollar lost almost one third of its value in real terms (CPI-based). Against the major currencies the fall was much more pronounced, about 40 percent in real terms: against the euro the fall has been almost 50 percent in real terms.

Assessments of the real dollar depreciation required to correct the large current account imbalances of the US play an important role in the debate, as they can provide a natural anchor for expectations of the value of the dollar in the medium and the long run. The world has already experienced ample swings in the dollar-euro exchange rate. Early on in the decade, this rate almost reached 80 dollar cents per euro; under current circumstances one cannot rule out a fall to as low a level as 1.60 dollars per euro. But can the exchange rate be expected to remain persistently at such a level? Or is the current development of the dollar exchange rate yet another example of dramatic overshooting in currency markets? This chapter addresses these questions by reconsidering in detail the specific mechanisms by which real dollar depreciation is an essential step towards global adjustment.

First, we argue that the largest estimates of real dollar depreciation (in the range of 35–50 percent in real terms) usually assume a very strong adjustment in the *domestic* relative prices of non-tradable goods (services) within the US and abroad. The experience of the 1980s and econometric evidence suggest that strong movements in these relative prices are not plausible. Most of the adjustment works through international relative prices: the terms of trade (export relative to import prices) and the real exchange rate (domestic relative to foreign consumer prices) move closely together.

Second, we discuss recent contributions that, building on general-equilibrium trade models, actually predict much milder scenarios of real dollar depreciation. Real depreciation between 10 and 20 percent may well be enough to achieve sustainable current account adjustment.

What does this mean for Europe? Early assessments of the equilibrium exchange rate between the euro and the dollar, especially the ones based on purchasing power parity, by and large pointed to values between 0.90 and 1.30 dollars per euro. In early 2008, at 1.48 dollars per euro, the dollar has probably already overshot the value that would be required for global rebalancing – especially if Asian countries end their (explicit or implicit) pegs to the dollar. This does not, however, by any means rule out the possibility that the dollar could fall much more in the short and medium term, especially if central banks in countries with large dollar reserves started shifting out of them. If so, there could be a further severe deterioration of the cost competitiveness of the eurozone, which could reinforce any slowdown.

Chapter 3: Globalisation and jobs

Much of the Western European debate on globalisation has focused on the risk that increased competition from foreign workers with low wages will cause job losses. This could occur because of import competition, outsourcing or labour immigration. The fears in the public debate stand in stark contrast to the views of most economists, who tend instead to stress the long-run welfare gains from international integration.

Unemployment and labour market rigidities

The unemployment risks from globalisation arise mainly because labour markets in Western Europe may not be flexible enough. If globalisation leads to a fall in demand for labour as a whole or for certain categories of labour such as the unskilled, employment will suffer in the presence of rigidities that prevent downward wage adjustments. Increased trade with low-wage economies leads to a contraction of labour-intensive sectors in advanced economies and to an expansion of skill- and capital-intensive sectors. But if wages are rigid, there will be an overexpansion of the skill- and capital-intensive sectors and too large a contraction of labour-intensive sectors. The result is then unemployment, especially among the low-skilled. Such unemployment would prevent the aggregate gains from increased international integration from being realised.

However, in a complete analysis one should not take rigidities in Western European labour markets as given. Instead, the extent of trade integration and international factor mobility are probably important determinants of these rigidities. So, to gauge the long-run effects one must analyse how the rigidities themselves are affected by globalisation. We argue that globalisation could increase labour market flexibility to such an extent that adverse employment effects are unlikely in the longer term. It might even be the case that globalisation promotes employment when one takes all effects into account. If so, globalisation will not be a curse for employment in Western Europe; instead it could turn out to be a blessing.

Six arguments why globalisation might be good for employment

We analyse a number of mechanisms through which globalisation might help raise employment in Europe by reducing market imperfections:

1. International outsourcing to low-wage economies (imports of intermediary inputs) imply cost savings, which give rise to positive *scale effects* on domestic labour demand. This could very well outweigh the negative labour demand effects resulting from substitution of foreign for domestic labour via such imports.

2. Increased trade integration implies *stronger competitive pressures* and thus larger sensitivity of product demand to prices. This tends to reduce firms' price-cost mark-ups and increase the demand for output and thus also the labour demanded by producers.

3. An increased sensitivity of product demand to prices also has the indirect effect of increasing the *sensitivity of labour demand* to wages. The larger possibilities of substituting intermediary inputs produced by foreign labour for domestic labour works in the same direction. A higher sensitivity of labour demand to wages raises the costs in terms of employment losses of high wages and therefore strengthens trade union incentives for wage moderation.

4. The potential threat that employers can offshore production and close down domestic production facilities improves the *relative bargaining position* of employers vis-à-vis unions. Hence, the outcome of wage negotiations will be closer to the bargaining goals of employers.

5. Globalisation may trigger changes in *labour market institutions*. By reducing the market power of domestic firms, the rents to be shared between owners and unions become smaller. This reduces the gains from collective bargaining for employees and could therefore contribute to deunionisation. In addition, the political incentives to uphold government regulation supporting high wages (generous unemployment benefits, rules allowing unions wide scope for strike action, favourable conditions for union membership etc.) are likely to be weakened by globalisation: when the possibilities of employers to move production abroad to low-wage locations increase, such regulation becomes less effective in securing high wages, as the costs in terms of lower employment rise.

6. Finally, trade with low-wage economies has implied *terms-of-trade gains* for advanced economies, that is increases in export prices relative to import prices. Such a development implies that producer prices increase at a faster pace than the CPI. Hence, real product wages (wages relative to the product prices of domestic firms) tend to rise

more slowly than real consumption wages (wages relative to the CPI), which is beneficial for employment.

Empirical research on globalisation and jobs

Although earlier research had problems substantiating that trade integration with low-wage economies shifts demand away from the low-skilled to the high-skilled, more evidence in favour of this has been accumulating in the more recent literature on international outsourcing. Less interest has been devoted to the issue of how overall employment in advanced economies is affected by trade integration. There are only a few studies of overall labour demand, which on the whole fail to find adverse effects when scale effects are taken into account.

The problem with labour demand studies is that they examine the relationship between employment and wages, but do not take possible wage responses to globalisation into account. We instead make an attempt to capture the "general-equilibrium" effects of globalisation on unemployment and employment. This is done by augmenting conventional regressions of these variables on a number of labour market institutions (the unemployment benefit replacement rate, the tax wedge, the degree of corporatism etc.) with variables such as trade openness, import dependence, and the extent of capital mobility vis-à-vis low-wage economies. The exercise is crude and should be interpreted with caution. Yet, it is noteworthy that we fail to find adverse employment effects of globalisation if we control for labour market institutions and the business cycle. If anything, the results suggest positive effects instead.

What to do and what not to do

An absence of adverse employment effects – or the possible existence of positive effects – does not imply that economic policy-makers should not respond to globalisation. It is likely to raise wage inequality and shift the functional income distribution in favour of capital. So, an important task of economic policy is to try to allocate the aggregate gains from globalisation in a "fair way" and see to it that groups which might otherwise lose out (or receive only small gains) also share the benefits. It is this, rather than to prevent employment losses, that

is the likely main challenge to economic policy from globalisation.

However, redistribution policies should be pursued in such a way that they support – and do not counteract – the general policy objective of raising employment. This speaks strongly against such policies as rises in unemployment benefits and the imposition of minimum wages (as are now being implemented in Germany). Measures such as retraining schemes, government support to displaced workers through severance pay, wage insurance (for displaced workers taking up a new lower-paid job), and employment tax credits to low-wage earners in general are more promising. They serve to compensate potential losers from globalisation for wage losses, but do not distort the incentives for employment. At the same time, such attempts to ensure a fair sharing of the gains from globalisation also have costs. So, although some policy interventions to deal with the income distribution consequences of globalisation are justified, one should carefully weigh the benefits of this against the costs.

Chapter 4: Globalisation and industrial policy

Fears of globalisation and deindustrialisation have given rise to new demands for industrial policy intervention. The background is the emergence of new international players like China and India, and the greater competition worldwide, which calls for significant restructuring in advanced economies. Proposals for targeted industry aid and the promotion of "champions" have become frequent. France has been at the forefront of this approach. These arguments have come on top of the traditional ones of aid and protection for strategic industries related to national security. This raises a number of issues. What role should industrial policy play in the face of globalisation? Is there still scope for traditional sector-based policy? Must EU industry be defended? And at what levels of government should industrial policy be formulated?

The objectives of industrial policy

The Lisbon Agenda of the EU states that: "The main role of industrial policy at EU level is to proactively provide the right framework conditions for enterprise development and innovation in order to make the EU an attractive place for industrial investment and job creation, taking account of the fact

that most businesses are small and medium-sized enterprises (SMEs)." A broad interpretation of industrial policy would include microeconomic policies (antitrust, innovation and internationalisation policies), the provision of broad infrastructures (in transport, telecommunications, education, science and research) and sector-based aid to companies. In a narrower sense, industrial policy refers only to the sector measures directly aimed at companies and industries.

We believe that the most important challenge of industrial policy in the EU is to foster the competitiveness of its companies and the productivity of the economy in order to raise the welfare of European citizens. With this aim in mind we recognise that there are several arguments that favour an active sector-based industrial policy. Such arguments include: providing suitable incentives for companies to enter and exit the market; helping to achieve a strategic edge in the international market; assisting in efficient (and fair) restructuring of declining industries; leveraging positive external effects; helping to coordinate investment; and alleviating imperfections in the capital market.

Adverse side effects of industrial policy

However, although it is easy to find strong *theoretical* arguments that can justify sector-based industrial policy and state aid, the implementation *in practice* is associated with very large problems likely to undo the potential benefits and result in net welfare losses. Sector-based interventions

- require highly detailed information on the industry, which is unlikely to be available;
- can trigger strategic behaviour from rival countries with potential spiralling trade reprisals;
- are often captured by specific interests for the purpose of rent seeking;
- can restrict competition to the detriment of consumers and damage production efficiency with long-run adverse effects on international competitiveness; and
- are often costly to the public both because of the direct tax costs and because of the indirect costs as higher taxes induce distortionary behavioural responses.

These considerations argue strongly against letting globalisation pressures lead to a revival of traditional sector-based industrial policy. In particular, we argue that protection of productive sectors must be limited in time with credible and irrevocable commitments, and must maintain a healthy level of competition between companies. This applies especially to declining industries where established interests tend to prolong protection well beyond what is required in terms of efficiency and fairness. These considerations are particularly important as the fast pace of globalisation is likely to strengthen the demand for such protection, at the same time as the costs of locking resources into declining sectors and thus relinquishing – or postponing – the gains from reallocation of resources to more productive uses have probably become much larger.

The case for horizontal industrial policy

European countries still allocate an important – though shrinking – portion of their spending to sector-based policies (for example, in steel, shipbuilding and coal). However, an increasing share is allocated to so-called horizontal policies that affect various sectors more equally. Such policies include support for R&D activities, training of human capital, provision of infrastructure, promotion of internationalisation (brand image, sales networks, etc.) and aid for SMEs.

A microeconomic framework that maintains efficient functioning of markets is crucial for competitiveness. In most EU countries, there appears to be plenty of margin to increase competition in the services industry: in transportation, telecoms, healthcare, the energy sector, professional services, retail trade, and also in the knowledge industry (universities and research centres).

There are many good reasons for the establishment of regulations, such as the protection of the labour force or the environment. Regulation should also be established in situations where competition is not workable, such as with natural monopoly segments like transport or distribution in electricity and gas markets. In general, though, regulation should be non-intrusive and, in particular, the "cost of doing business" in a country should be kept low. It is worrying that the costs of doing business appear to be high in some Southern European countries, such as Greece and Italy, and also in some new EU countries, such as Romania, the Czech Republic, Slovenia, Hungary and Poland. These countries would be well advised to introduce much lighter regulation

as in the UK, Ireland, the Nordic countries, Estonia and Lithuania.

The appropriate level for industrial policy

A final important issue is the level of government at which industrial policy should be located. For several reasons, we believe that where possible, policy should be formulated at the regional level. First, there are information advantages at a regional level: regional government can monitor economic activity in more detail than can be done at the national or supra-national level. Second, it is inevitable that production and consumption externalities are felt most strongly at the regional level. Third, lobbying and capture is probably less prevalent at the regional level. Fixed costs of lobbying mean that lobbyists tend to concentrate their resources on those policy makers who have most influence over resources, that is at the national level. Lobbying at the level of individual regions is likely to offer much smaller returns.

Competition between regions to attract firms can generate information and limit capture. It can produce efficient outcomes when the deadweight loss of taxation is low and regions are asymmetric in the sense that external benefits of firms' location are unevenly distributed. This seems indeed to be the case, as there is substantial diversity in the performance of EU regions, which is not diminishing over time (despite convergence across nation-states).

But there is also an important role for the EU to play in providing a framework of common rules to internalise externalities and limit rent-shifting incentives. For example, it could be argued that European funds (such as R&D support) should be allocated on a merit basis through competitive bidding procedures which should be decided by committees of experts insulated as much as possible from political pressures. The model of the European Research Council to allocate funds to science, modelled after the US National Science Foundation, is a good example.

The EU is well placed to determine general horizontal industrial policy measures that respond to the challenges posed by globalisation. This is partly because it is capable of internalising the externalities that cross national borders, and which are becoming increasingly more relevant. Perhaps more importantly, the EU can benefit from greater economies of scale in addressing the issues which arise as a result of globalisation. An example would be to set a common energy policy that diversifies supply sources and the portfolio of technologies in a large integrated EU energy market.

In sum, we believe that the national level is in many cases the most unsuitable one for deciding industrial policy. Rather policy should be set at either the regional level or the EU level. For a number of reasons, these two levels are generally in a better position to design policy measures to confront globalisation. This is so because of the strong local external effects and information advantage at the regional level and because of the economies of scale that can be exploited at the EU level.

Chapter 5: Global warming

To date, the public policy discussion of climate change has focused on the reduction of demand for fossil fuels, the implicit assumption being that lower demand will automatically lead to less use of these fuels and therefore to less of CO_2 emissions into the atmosphere. For example, this way of thinking characterises the celebrated Stern report. The flaw in this reasoning is that it neglects the supply side. As in other markets, the extraction of fossil fuels is determined by the interaction of demand and supply. A fall in demand, leading to lower prices of fossil fuels, will be translated into a fall in extraction only to the extent that market supply shrinks after a price decline. For this reason, proper policies to fight global warming require an analysis of the supply side. Such analysis has so far been more or less neglected.

The consumption-reducing measures by some Western countries will be in vain if owners of fossil fuel resources do not cut back their supply. Without supply cuts, world energy prices will fall so much that other countries consume and burn exactly the quantities not demanded by the "green" countries. Countries doing little with regard to climate protection will enjoy an implicit subsidy on their energy demand resulting from the restraint of the green countries. China and India will continue to step up their CO_2-intensive growth policies and Americans will drive even more SUVs than they would otherwise do.

The supply of fossil deposits that nature has made available is independent of the price reactions that the consumer countries can influence. If the market supply that resource owners make available from nature's total supply is also independent of such price

reactions, improvements in housing insulation, the conversion to bio diesel and the construction of cars with lower fuel consumption will be useless from the point of view of reducing CO_2 emissions. California's windmills and solar-panelled roofs and France's nuclear reactors will make no contribution to addressing global warming as they are supplied only in addition to fossil energy. Thus, what happens to global warming depends on how the resource owners behave. Unfortunately, it is not elected leaders in stable democracies, such as Arnold Schwarzenegger or Angela Merkel, who will determine the pace of climate change, but people like Hugo Chávez, Mahmoud Ahmadinejad, Putin's oligarchs and the Arab oil sheiks.

The time path of extraction and demand-management policies

The difficulty of predicting the behaviour of resource owners results from the fact that their supply decisions are inherently *intertemporal* ones, which are governed by different economic considerations than the supply decisions of producers of reproducible commodities. The insight that it is not only current prices, but also expected future prices, that influence the rate of extraction of non-renewable resources is key to analysing the supply of fossil fuels. The supply reactions that do occur will depend on the whole future time path of prices. The decision problem of resource owners can be characterised as one where they choose between (i) extracting the resource now and investing the proceeds in financial markets to earn a future financial return; and (ii) keeping the stock in the ground and benefiting from future price rises as the resources turn scarcer.

The time path of fuel fossil prices expected by suppliers will depend on how they expect policies designed to affect demand to develop over time. If today's demand restrictions are not expected to continue in the future, then suppliers will defer extraction. If future restrictions are expected to be stricter, then suppliers have an incentive to extract more now. Suppliers' decisions will depend on both demand restrictions implemented at present and the expectations of future restrictions.

It follows that measures to reduce the demand for fossil fuels may not work. For resource extraction to be slowed today, it is not enough with such demand-reducing measures today. In addition, sup-

pliers must expect these measures to be loosened over time such that it becomes profitable to defer extraction until a future date when prices will be higher than would otherwise be the case. But such a development is extremely unlikely. Instead, the opposite evolution of demand restrictions is almost certain. As global warming increases, the calls for measures to address climate change will likely grow louder, resulting in increasingly strict demand-reduction policies in the future. (Also, the difficulties to agree internationally on such policies and the desire to give both producers and consumers time to adjust give a strong incentive to phase in all demand-reducing measures slowly over time.) As resource providers anticipate such developments, they will intensify extraction today. This *green paradox* may be one of the reasons why world consumption of fossil fuels and output of carbon dioxide has increased unabated in recent years, despite the Kyoto Protocol.

What might work?

In light of this "green paradox" of environmental policies, the measures currently demanded by governments that ratified the Kyoto Protocol have little in common with policy efforts that would be truly effective in reducing global warming. Meaningful measures would have to be of other types.

One useful measure – not immediately obvious to most people – could be the introduction of worldwide withholding taxes on capital income along with a closing of tax havens. The consequence would be a deterioration of the investment alternatives of resource owners, which would increase the relative profitability of keeping fossil fuel resources in the ground.

This would counteract the current tendency to overextraction that results from "insecure property rights", that is the uncertainty on the part of current resource owners (mainly with respect to oil in politically unstable countries) regarding whether they – or their "dynasties" will be there to reap the returns from extraction in the future. It would thus also help slow down global warming. Doing this would be advisable even in the case of secure property rights, as markets in general tend to neglect the negative externalities resulting from global warming and to extract fossil fuels more rapidly than what would be socially efficient. (Slowing down global warming would make it possible to improve the living stan-

dard of future generations without reducing the living standard of current generations, by tilting the portfolio composition of bequests from man-made capital above ground to natural capital under ground.)

If an emissions trading system is to work, it must become truly comprehensive. This means it would have to include all customer countries and be without any loopholes such that demand reductions in one part of the world do not lead to price reductions that only stimulate demand elsewhere. The implication would be that customer countries form a worldwide *monopsony* that can dictate quantities and force the resource exporters to supply the desired amounts.

What remains as policy options goes beyond the attempts to modify supply and demand for fossil fuels but seeks the solution in storing CO_2-generated by combustion processes away from the atmosphere. There are two promising alternatives. The first one is to exploit the technical possibilities of *sequestering* carbon dioxide, that is storing it in liquid form underground. The second one, which should be given top priority, is *reforestation*, as forests are the largest absorbers of carbon under human control. Currently, deforestation is leading to the release of more carbon dioxide than that emitted by the whole transportation sector. If reforestation were to replace forest destruction, global warming could be slowed down significantly.

The economics of climate change and the economics of exhaustible resources are closely intertwined, for in essence the problem of global warming is the problem of gradually transporting the available stock of carbon from underground into the atmosphere, with useful oxidisation on the way. Unfortunately, most policy proposals ignore this insight and seek to reduce carbon demand without concern for the price path of carbon and the corresponding supply reactions. This oversight may result in the green paradox of measures actually increasing the fossil fuel extraction they are intended to reduce. To find useful policies that mitigate the problem of global warming, we must remember that economics teaches us to pay attention to both demand and supply.

THE EUROPEAN ECONOMY: MACROECONOMIC OUTLOOK AND POLICY

1. Introduction

Despite the turbulence in the financial markets caused by the problems in the US subprime mortgage market, in 2007 the world economy was in a global upswing for the fourth year in a row and growth only fell slightly as compared to 2006.

The US is experiencing a clear slowdown this winter. Although exports still support US economic expansion, private consumption growth is deteriorating noticeably. House prices have fallen in the last year and the fall has accelerated. Residential construction declined sharply and will continue to shrink at least for some time. Sales of newly constructed residential homes have decreased by more than 50 percent since their peak in 2005. Without the strong cuts in interest rates that have been made and the announced fiscal stimulus programme, the US economy might have fallen into a recession. With these policy measures, we believe it more likely that a recession can be avoided.[1] Nevertheless, the decline in private wealth due to house price reductions and enduring turbulence in international financial markets remains a substantial downward risk. It is unclear to what extent and where most of the remaining losses from the US mortgage loans will hit the banking and insurance sector. At the time of writing, negative news is accumulating. For this reason, we abstain from making forecasts for 2009.

For the second year in a row, the European Union managed to grow at a rate of close to 3 per-

cent in 2007. To a large extent growth was driven by domestic demand. Not only private consumption continued to increase notably in most European countries, private investment was almost as important for demand growth in the past two years.

The EU is expected to grow by 2.1 percent in 2008. Beside the slowdown of the world economy, especially a slower expansion of investment in Europe is causing this growth reduction. Growth contributions of private (and government) consumption will remain of a similar order of magnitude as last year. Positive labour market developments in the past few years and associated higher wage income will continue to raise aggregate demand. Should the US move into a recession, this will probably affect Europe and the rest of the world with a delay of several quarters.

2. The current situation

2.1 The global economy

The world economy developed strongly last year. For the fourth year in a row, world GDP grew by around 5 percent when using purchasing-power-parity adjusted figures (see Figure 1.1), or by roughly 3.5 percent

Figure 1.1

Economic growth and Ifo economic climate for the world

a) World GDP growth based on national growth rates reported in October 2007 WEO and aggregated using revised PPP weights. Country weights are based on new statistical calculations of purchasing power parity (PPP) exchange rates published in December 2007 by the International Comparison Program (IPC).
b) Arithmetic mean of judgements of the present and expected economic situation.

Sources: IMF, World Economic Outlook Database October 2007: Update January 2008 (GDP 2007 and 2008, IMF forecast); Ifo World Economic Survey (WES) IV/2007.

[1] Note that we define a recession to be a situation in which GDP growth turns negative for at least two quarters in a row.

Figure 1.2

North America
Economic situation[a)]

1995=100

long-term average 1990-2006

92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

a) At present.

Source: Ifo World Economic Survey (WES) IV/2007.

Western Europe
Economic situation[a)]

1995=100

long-term average 1990-2006

92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

a) At present.

Source: Ifo World Economic Survey (WES) IV/2007.

Asia
Economic situation[a)]

1995=100

long-term average 1990-2006

92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

a) At present.

Source: Ifo World Economic Survey (WES) IV/2007.

During the second half of last year the risks for a slowdown of the world economy increased considerably. The main reason is the still lasting turbulence in financial markets, especially within the banking sector (see Box 1.1). The economic climate indicator of the Ifo World Economic Survey, conducted among over 1000 economic experts (but mainly active in the financial sector, that is, the sector most clearly hit by the financial turbulence) in about 90 countries, deteriorated clearly in the fourth quarter of last year (see Figure 1.1). The judgement of the current economic situation fell a bit, and the expectations for the first quarter of 2008 fell considerably. Nevertheless, the indicator still reached similar levels as in 2005, when world economic growth turned out to be 4.4 percent. Hence, this indicator suggests that the world economy passed its peak during the middle of last year and will continue to decelerate in the months to come. However, growth is still expected to remain above average. The reduction in the world economic climate as reported by the Ifo World Economic Survey mostly concerns North America, but is also reflected in responses from participants in Western Europe (see Figure 1.2).

Oil prices have increased substantially again since early 2007 (see Figure 1.3). The daily spot price of Brent Crude reached a new peak of 98.45 US dollars on January 3rd this year, having stood at around 55 US dollars per barrel in January 2007. The main cause of the current high oil price is the continuingly strong increase in energy demand of emerging economies like China and India. As the OPEC countries do not appear willing to expand the supply of crude oil, prices are likely to remain high in
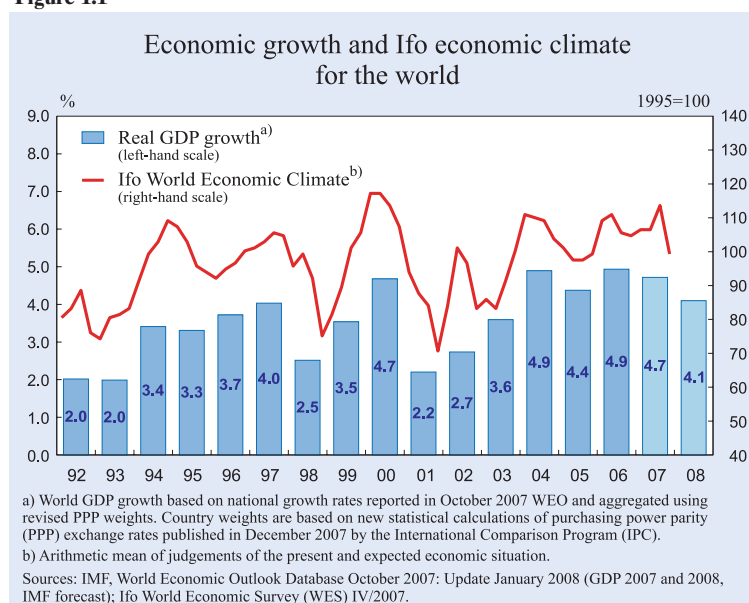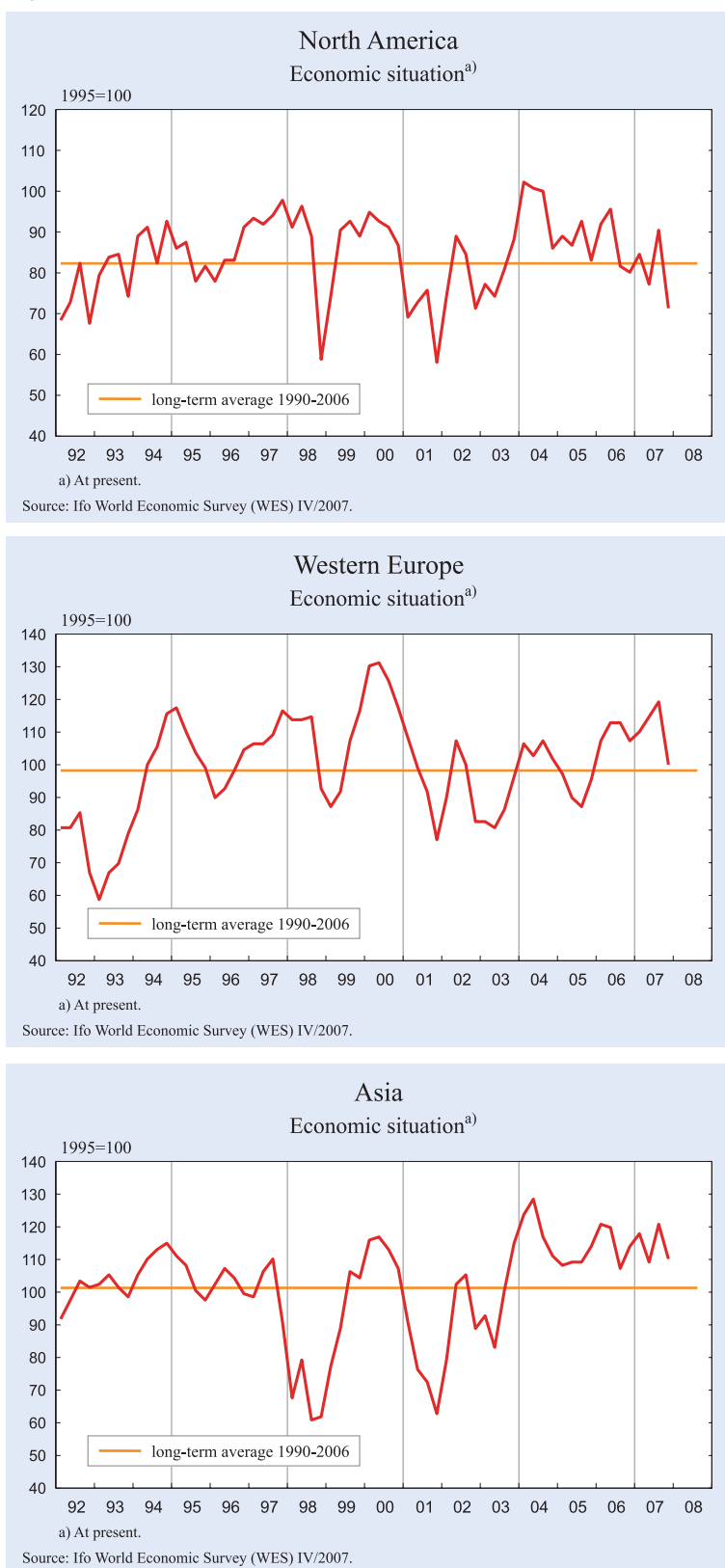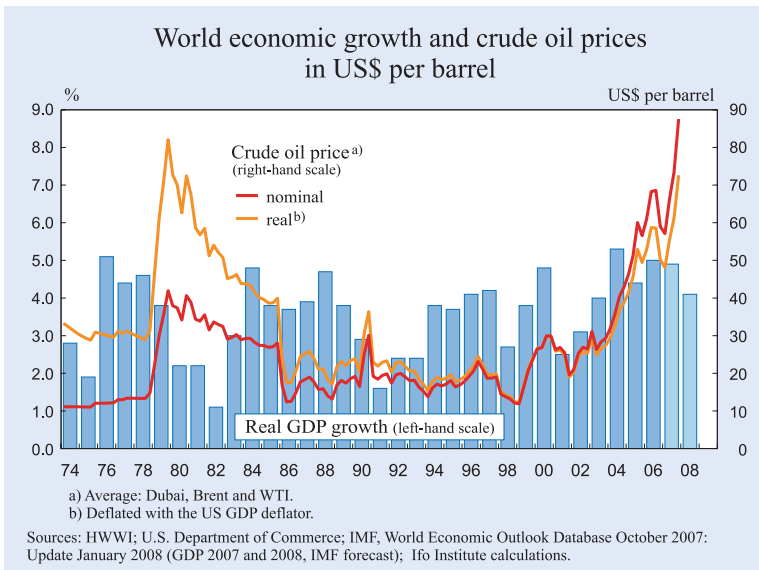
when using market exchange rates (see Table A.1). Except for the US, all regions outperformed our forecast in last year's report. This holds in particular for the fast emerging regions China, India, Russia and Eastern Europe.

Figure 1.3

World economic growth and crude oil prices
in US$ per barrel

a) Average: Dubai, Brent and WTI.
b) Deflated with the US GDP deflator.

Sources: HWWI; U.S. Department of Commerce; IMF, World Economic Outlook Database October 2007:
Update January 2008 (GDP 2007 and 2008, IMF forecast); Ifo Institute calculations.

the near future. Only when based on consumer prices in the advanced economies, the real oil price also reached an all-time high, surpassing the previous record reached in 1980; using the US GDP deflator, however, it has still not reached that level yet. In Chapter 5 of this year's EEAG report we take a long-term perspective on future oil price developments.

The increased production of bio fuels contributes to the upward pressure on agricultural prices. These developments have already raised inflation during the course of last year. Nevertheless, with an overall inflation rate of 2.1 percent in the industrialised world, consumer prices developed perfectly in line with our forecast in last year's report.
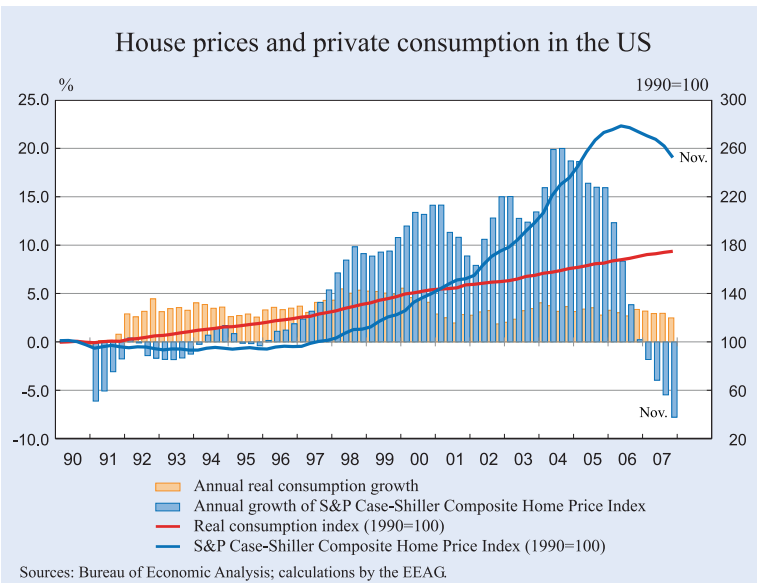
US still reached a growth rate of 2.2 percent in 2007 (as compared to 2.9 percent in 2006).

As concerns the real estate crisis, there is still no sign that the worst is over. Residential investment has been falling for eight quarters in a row, pulling down GDP growth by approximately 1 percentage point last year. Real estate prices have been falling and thus deteriorating the wealth position of home owners. Nevertheless, continued strong increases in real disposable income allowed private consumption to increase by 2.9 percent in 2007, which helped keep up GDP growth. Supported by continued high capacity utilisation rates of firms, industrial construction above all, but also investment in machinery and equipment, have contributed positively to economic growth. Negative effects of the worsening of credit conditions caused by the subprime crisis have so far hardly materialised. The largest growth contribution came from exports last year. Continued high growth of the world economy together with the strong depreciation of the US dollar has boosted foreign demand for US products and services.

Except for most of 2005, the US dollar has been depreciating against the euro since the physical intro-

2.2 United States

After approximately three years of continued high growth, the US economy started to cool down markedly at the end of 2005, that is, at the same time the US housing market began to deteriorate. Especially during the first quarter of last year, growth levelled off, reaching only an annualised 0.6 percent. In the subsequent two quarters, however, growth increased strongly again (3.8 and 4.9 percent). Annualised growth in the fourth quarter, by contrast, was again low: only 0.6 percent. Overall,

Figure 1.4

House prices and private consumption in the US

Sources: Bureau of Economic Analysis; calculations by the EEAG.

Box 1.1

The real estate crisis in the US

The real estate crisis in the US and its worldwide consequences play a prominent role in the assessment of the current and future business cycle developments in the world. Not only do real estate prices affect inflation by influencing (implicit) rents, they also have large effects on total demand. Furthermore, and as suggested by developments during the past months, the peculiarities of real estate finance markets can jeopardise the stability of the financial system as a whole. This box discusses the latter two aspects.

The US real estate market has gone through two opposite phases since 1995. Whereas sales of single-family dwellings, residential investment and real estate prices all increased substantially until the end of 2005, a clear correction phase has been observed since. With rates of minus 16 percent in a year-on-year comparison, especially the decline in residential construction has been quite severe. Sales of newly constructed homes declined by more than 50 percent since the peak in 2005. Despite the reduction in building activities, there is still a large excess supply in the real estate market. Whereas it took on average four months to sell a house in 2005, owners now need approximately ten months. Given that private capital is in general tied for long periods of time in housing, excessive residential investment in the past is likely to result in long adjustment processes.

Not only residential investment has deteriorated substantially; house prices have also fallen. According to the Standards & Poor's Case-Shiller Composite Home Price Index – which covers the 22 largest urban regions in the US – prices have fallen by on average 6 percent since the peak in the first half of 2006 (see Figure 1.4), and the decline seems to have accelerated recently.

At least in two distinct ways, developments in the real estate market can affect the real economy. First of all, residential investment forms a direct part of the investment component of GDP. Second, house price developments affect private consumption indirectly by changing the wealth position of consumers. According to theory, increasing house prices stimulate private consumption as they increase the wealth of home owners. Following the same principle, falling house prices should then lead to a reduction in consumption. So far, however, consumption has hardly been affected by the slowdown in house prices since 2006 (see Figure 1.4). According to Case, Quigley and Shiller (2005), a reduction of 10 percent in the residential wealth of households nevertheless reduces private consumption by about one percent. At present, this does not warrant a severe reduction in private consumption in the US, but it may be too early to assess the full extent of this effect.

The above-mentioned information was already largely known before the outbreak of the US subprime loans crisis. Our reports in the past few years have also expressed worries about the US real estate market. Nevertheless, the crisis has led to problems both in the US outside that sector and outside the US in a way that has surprised most observers. Looking backward, two elements appear to have been detrimental. First of all, the increase in mortgage loans during the years 2004–2006 to a large extent took place within the segment of subprime mortgages.[1] Subprime mortgages expanded very substantially and in the autumn of last year totalled 14 percent of the overall mortgage market in the US.[2] Second, large shares of these mortgages were securitised, that is, transformed into bonds whose returns are based on the payments of a collection of individual mortgages.[3] In that way they entered international financial markets and in principle have a wider spread of ownership. Despite securitisation, however, it became clear in August of last year that the risks from mortgage-backed securities continued to be largely contained within the banking sector (instead of a wider variety of investors). Although the real estate crisis did not come as a surprise, the consequences of the real estate problems for the US financial sector were much stronger than expected and revealed themselves in losses reported by banks (including many non-US banks).

The concentration and the lack of transparency within the banking sector induced a strong loss in mutual confidence. Highly liquid financial markets – which we described in past reports – suddenly turned dry as banks were hardly willing any more to lend high-powered money to each other without properly rated securities to back these up as collateral. The associated increases in the risk premiums are still prevalent in many financial markets worldwide.

[1] Subprime loans are associated with high credit risk because the borrower lacks a strong or lengthy credit history or has other characteristics that are associated with high probabilities of default.
[2] See http://www.federalreserve.gov/newsevents/speech/kroszner20071105a.htm
[3] These bonds are called mortgage-backed securities (MBSs) and are often again collected and securitised. Then they are commonly referred to as collateralised debt obligations (CDOs) in case of longer-term debts or structured investment vehicles (SIVs) in case of short- and medium-term debts.
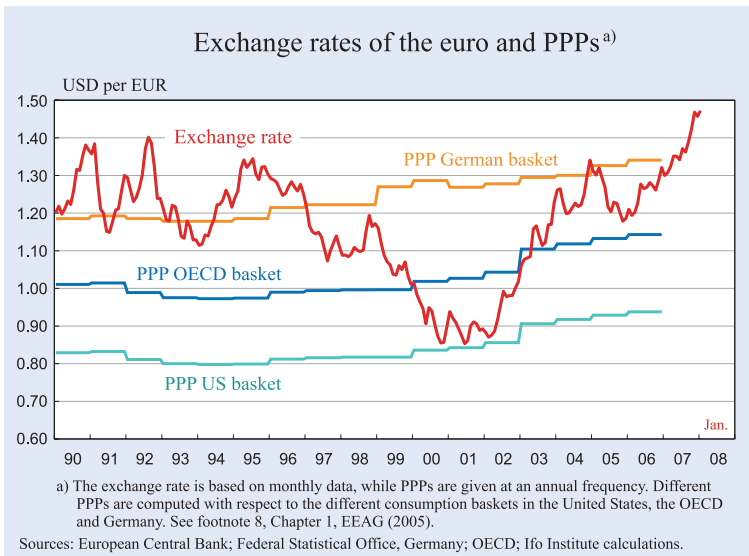
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duction of the latter in 2002 (see Figure 1.5). Although this was associated with a real effective depreciation of the US dollar, US trade and current account imbalances were not reduced until last year. The current account deficit, which amounted to 6.2 percent of GDP in 2006 and thus reached the by far highest level since 1929, fell to 5.6 percent of GDP in 2007. By definition, this reduction implies an increase in national savings relative to investment (see Chapter 2 in the 2006 EEAG Report, Box 1.1 in Chapter 1 of the 2007 EEAG Report and Chapter 2 in this year's report). Last year, this increase was almost solely due to an improved government fiscal balance.

Labour markets continued to develop quite positively. Although employment lost some of its dynamics, the unemployment rate remained at historically low levels at an average of 4.6 percent in 2007. After reaching its trough (with a rate of 4.4 percent) in March last year, it increased to 5 percent in December. Wage and salary disbursements went up by more than 6 percent in 2007, allowing real disposable income to improve by 3.8 percent in the third quarter of last year as compared to the same quarter of 2006.

Increased energy and food prices have contributed to higher CPI inflation, which reached 4.1 percent in December last year. However, the core inflation rate, that is, consumer inflation corrected for price changes of energy and unprocessed food, was hardly affected. It declined to 2.4 percent in December, after its peak in mid 2006. This allowed the Federal

Figure 1.5

Exchange rates of the euro and PPPs[a)]

USD per EUR

Exchange rate

PPP German basket

PPP OECD basket

PPP US basket

Jan.

90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

a) The exchange rate is based on monthly data, while PPPs are given at an annual frequency. Different PPPs are computed with respect to the different consumption baskets in the United States, the OECD and Germany. See footnote 8, Chapter 1, EEAG (2005).

Sources: European Central Bank; Federal Statistical Office, Germany; OECD; Ifo Institute calculations.

Reserve to loosen monetary policy from August 2007 onwards as a reaction to the turbulence in financial markets and the slower output growth. So far, the federal funds rate was lowered in five steps by in total 225 basis points to 3 percent at the end of January 2008. A first step of 50 basis points was taken in September and was then followed by two 25 basis points cuts in October and December. Stock market developments led the Federal Reserve to drop its key interest rate by another 75 basis points at an irregular meeting in mid January. Eights days later, at its regular meeting, a cut of another 50 basis points was decided. Together with the clear depreciation of the dollar, the monetary conditions in the US have thereby been loosened considerably.

The US federal government deficit improved markedly during fiscal 2007 (which ended in September). After reaching 1.9 percent of GDP in 2006, it ended at 1.2 percent of GDP last year. High revenues from income and corporate taxation caused by the strong increases in households' incomes and in corporate profits have been the most important reasons. These additional cyclical revenues have been able to compensate for another round of expenditure increases in the health sector.
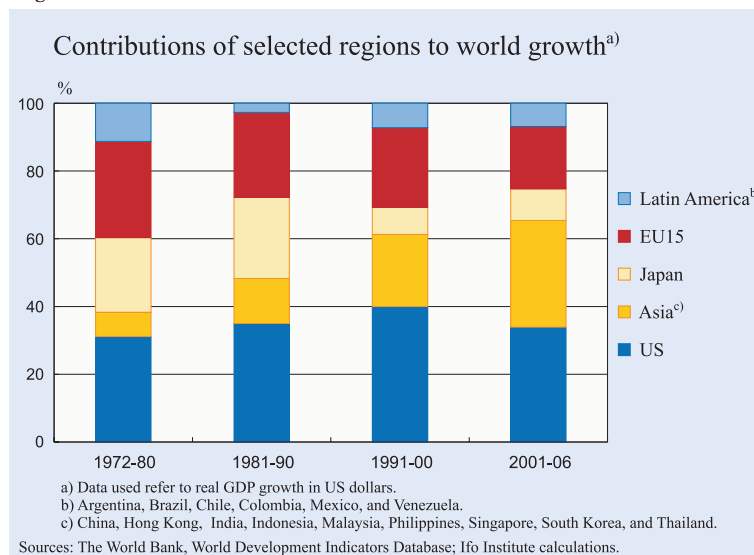
2.3 Japan, China, India and other Asian countries

Up until the beginning of the 1990s the Asian economic developments were largely determined by Japan. The deep and long-lasting recession in Japan and the emergence of especially China as a world economic power has greatly changed this. In particular, when taking purchasing-power-parity adjusted data, the contribution of Asia to world economic growth has increased substantially over time. Measured this way, close to half of world economic growth stems from this region (see Figure 1.1). PPP-adjustments correct for the lower price levels in China and other emerging economies – this correction is warranted from a welfare perspective. However, from a trade perspective, it makes more sense to use actual exchange rates instead. Figure 1.6 decomposes total growth (in US dollars) in the five largest regions of the world: the US, Asia (excluding Japan), Japan, the EU15 and Latin America across time and these regions. Whereas the US remains the largest contributor to growth, the increasing importance of emerging Asia becomes obvious in the diagram.

Though "oscillating", the *Japanese* economy continued to improve slowly. Whereas, for instance, the second quarter last year showed an annualised GDP decrease of 1.8 percent, the third compensated for

Figure 1.6

Contributions of selected regions to world growth[a)]

%

100

80

60

40

20

0

1972-80   1981-90   1991-00   2001-06

Latin America[b)]
EU15
Japan
Asia[c)]
US

a) Data used refer to real GDP growth in US dollars.
b) Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela.
c) China, Hong Kong, India, Indonesia, Malaysia, Philippines, Singapore, South Korea, and Thailand.

Sources: The World Bank, World Development Indicators Database; Ifo Institute calculations.

that with a growth rate of 1.5 percent. Both domestic demand and net foreign demand contributed positively to real GDP growth last year. Until midyear, the yen continued to depreciate further against the US dollar. Exports were stimulated by the still low value of the Japanese yen, especially against the US dollar. Only after July did the yen start to appreciate sharply. After a weak first half year, nonresidential investment expanded strongly during the second half of last year. This could not fully compensate for the drop in residential investment caused by revisions to the Building Standards Law. Overall, the Japanese economy grew by 1.9 percent last year.

At the beginning of 2007, employment in Japan improved strongly, but then over the summer it lost its dynamics. As a consequence, after reaching a low of 3.6 percent in July, unemployment started to increase again. On average, unemployment equalled 3.9 percent last year. As a consequence of the retirement of a sizeable number of baby boomers, average wage levels continuously decreased throughout the year. The inflation rate continued to remain slightly positive during the first nine months of the previous year. Nevertheless, the year ended without any consumer inflation, on average. Producer prices, however, surged during the second half of the year and rose by 2 percent compared to 2006.

So far, the subprime crisis in US financial markets has not affected the Japanese banking sector. The credit supply of the banks continued to be accommodating and the spread between firm and government bonds has hardly widened. Nevertheless, the still vulnerable situation of the economy induced the Bank of Japan to raise its key interest rate (on certificates of deposits with a maturity of 180 days to one year) only once to 0.5 percent in February last year.

Last year, the Japanese government was not able to continue its course of fiscal consolidation. Although government investment fell further, there was an increase in government consumption. Overall, the fiscal policy stance was neutral.

The emerging economies of Asia posted superb GDP growth rates last year, notwithstanding the growth slowdown in the US and the turbulence in international financial markets.

In *China* (including Hong Kong), Asia's growth locomotive, GDP growth last year reached 11.2 percent, which once again was significantly higher than
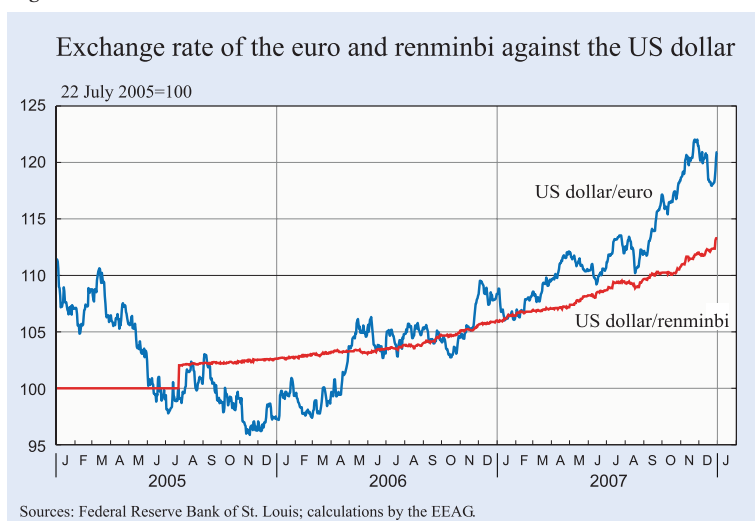
expected. This was despite the fact that growth in exports to the US, which remains the most important export destination, has weakened significantly. As in 2006, exports and investment were the main factors behind the increase in output. Investment growth slowed down somewhat during the beginning of the year, but then again increased to similar levels as last year. Despite the slowdown in exports to the US, overall exports grew very strongly. In October last year, another record current-account surplus, 27 billion US dollars, was reached, implying that capital once again flowed into China. This happened although imports grew faster than exports (because the export volume is considerably larger than the import volume). Also private consumption expanded strongly, but at rates clearly below those of exports and investment.

The inflation rate in China increased from 2.2 percent in January to 6.5 percent in December last year. Especially food prices increased substantially. Money in circulation has grown very fast. This happened despite the fact that the Chinese central bank raised both interest rates and reserve ratios in several small steps. The latter reached the highest level seen in the past ten years. Moreover, several administrative measures were put in place to reduce the extent to which credits were expanded. For example, additional regulations for handing out credits were put in place. Furthermore, price controls for food products were improved. To counter excessive asset price increases, transaction taxes were increased and investment possibilities abroad extended.

Since the People's Bank of China revalued the renminbi against the dollar by 2.1 percent in July 2005 and moved to a managed float against a basket of currencies, it has allowed the renminbi to steadily appreciate against the dollar. Last year it appreciated by 6.9 percent. Given the strength of the euro, this, however, still implies a depreciation against the euro of more than 7.5 percent during last year (see Figure 1.7). Hence, China still seems to artificially undervalue its currency.

At the end of 2007, business cycle dynamics in *India* lost some momentum. Whereas annualised growth equalled 9.2 percent during the first half of the year, it fell below 9 percent thereafter. It is mainly domestic demand that has been increasing strongly. The moderate slowdown is at least to some extent caused by a more restrictive monetary policy stance. The

Figure 1.7

Exchange rate of the euro and renminbi against the US dollar

22 July 2005=100

Sources: Federal Reserve Bank of St. Louis; calculations by the EEAG.

central bank of India has increased its main interest rates in nine consecutive steps from October 2004 onwards. On top of that, it started to increase the reserve ratio from the end of 2006. The bank is attempting to counter an overheating of the economy and inflationary pressures. Inflation decreased from 6.7 percent in January to 2.9 percent in October. However, this should also be attributed to the stabilisation of prices for gasoline, diesel and cooking gas by the government. Another dampening effect on the economy came from the appreciation of the Indian rupee against the US dollar. This has deteriorated the export possibilities for especially industrial products and has already caused export growth to slow down somewhat.

Economic growth in the remaining group of emerging economies of Asia in 2007 was between 4.5 and 9 percent, with 5.5 percent as the average for the group. It includes *Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan* and *Thailand*. In 2006 the aggregate growth rate for this region was 5.3 percent. After a moderate slowdown at the beginning of last year, with aggregate growth somewhat below 5 percent, growth in the region picked up again. The expansion was supported by both domestic and foreign demand. Over time, private consumption has turned into the main engine of demand growth. Investment demand has also increased. Despite a still strong world economic climate, exports have lost some momentum. Due to the continued expansion, unemployment has decreased further. Although to a somewhat lesser extent, employment improved as well. Inflation became higher during the year. This holds especially for Korea and Taiwan. Inflation in Korea

increased to 3.6 percent at the end of the last year, while Taiwan's inflation rate hit a 13-year high of 5.3 percent.

2.4 The rest of the world

Although in *Mexico* economic growth did not manage to reach the levels of the preceding year, business cycle developments in the entire Latin American region were still strong. With GDP growth equal to 5 percent in 2007, the region actually performed slightly better than in 2006 (4.8 percent). The region benefited from being a net exporter of energy, raw materials and food.

Although the appreciation of some of its important currencies has had a moderating effect, increased demand for food has led to relatively high inflation in the region. In particular, in countries like *Argentina* and *Venezuela*, which keep their currencies undervalued, inflation is turning into a problem. In *Brazil*, the surge in inflation has induced the central bank to stop reducing interest rates further: its main refinancing rate has been held at 11.25 percent.

Whereas in the past years high growth of exports led to an accumulation of foreign exchange reserves, since mid 2006 increased capital inflows have caused appreciations of local currencies. Favourable cyclical conditions and a turn to sustainable macroeconomic policies have made it possible to reduce government fiscal deficits or to increase surpluses.

In *Russia*, growth remained at a high level in 2007 (7.5 percent). The two most important forces behind this development were larger exports of oil and gas, and growing private consumption, supported by increased disposable incomes. The increased oil and gas exports were mainly a response to higher world market prices and not so much the consequence of increased capacities. During the year, private investment, supported by foreign direct investments, also developed strongly.

An inflation of close to 11 percent in Russia at the end of last year was clearly above the inflation target of 8 percent set by the government. Due to increased world demand, especially food prices have accelerat-

ed. Mainly administrative actions were undertaken to suppress these developments. For instance, export taxes on food were increased, whereas those for imports were reduced. Also, government grain stocks were released and price agreements were made with the most important retail chains.
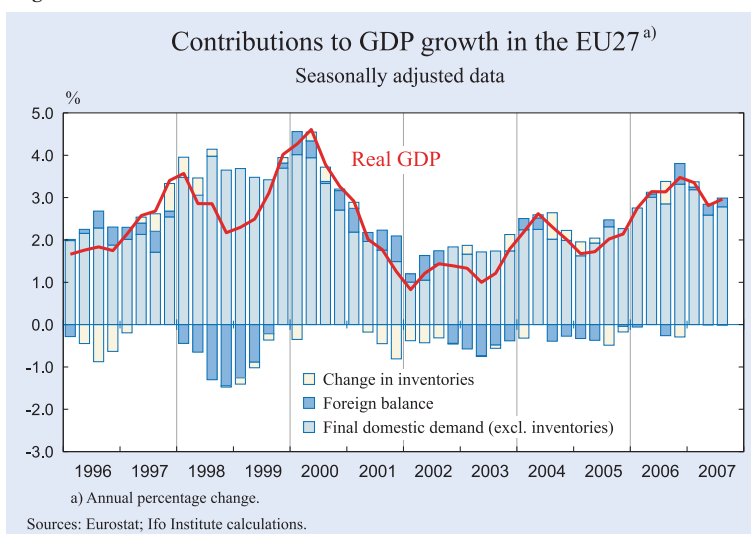
2.5 The European economy

Except for the second quarter of last year, which underperformed partly due to the mild weather conditions at the beginning of the year,[2] the European economy (EU27) remained on its growth path, and with a rate of 2.9 percent performed almost as well as it did the year before. In particular, growth dynamics in Germany, Spain and the UK helped achieve this positive result. Strong domestic demand was usually the main contributing factor (see Figure 1.8).

The strong output growth was already signalled by the Ifo World Economic Survey for Western Europe (see Figure 1.9). In the third quarter especially the assessments of the current situation improved once more. However, the same indicator signals a cooling down of economic activity for this winter. The participants assess that the economic situation will turn less favourable due to higher oil prices, the further appreciation of the euro and the subprime crisis.

Although stagnating in the second quarter, nonresidential investment remained an important factor behind demand growth. Because of positive labour market developments, consumption gained momentum again after it basically stagnated in the first quarter of last year due to the German VAT increase. During the first three quarters, net exports again contributed positively to GDP growth in the European Union (see Figure 1.10).

Above-potential growth led to a further clear and continuous increase in employment and a subsequent reduction in the unemployment rate. The latter fell to an average of 7.1 and 7.4 percent in EU27 and the euro area, respectively. Whereas this implies a reduction of 1.1 percentage points for the EU27 between 2006 and last year, the fall for the euro area countries was, at 0.9 percentage points, somewhat less pronounced.

Despite the improved cyclical conditions, the increase in wages continued to be quite moderate (see Box 1.2 on explaining the downward trend in nominal wage growth). In the euro area, wages grew by 2 percent last year. Up until August last year, the consumer inflation
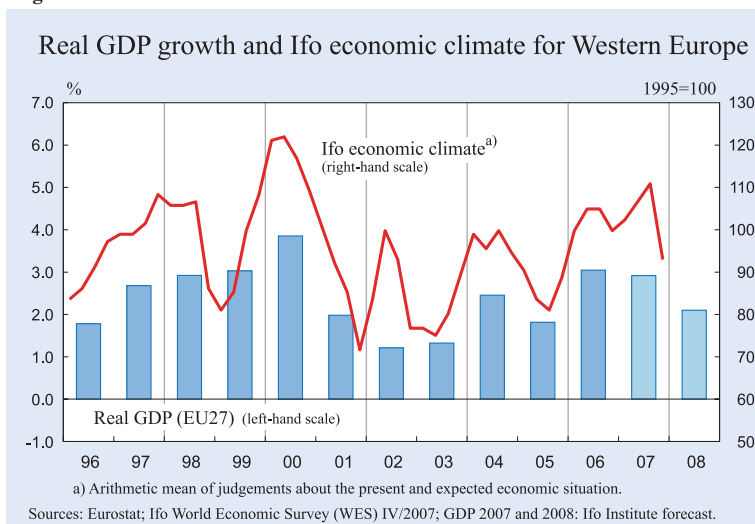
Figure 1.8

Contributions to GDP growth in the EU27[a)]
Seasonally adjusted data

a) Annual percentage change.
Sources: Eurostat; Ifo Institute calculations.

Figure 1.9

Real GDP growth and Ifo economic climate for Western Europe

a) Arithmetic mean of judgements about the present and expected economic situation.
Sources: Eurostat; Ifo World Economic Survey (WES) IV/2007; GDP 2007 and 2008: Ifo Institute forecast.

[2] The mild winter last year caused a strong increase in construction activities during the first quarter of 2007. These pull-in effects led to a sharp decline in investment growth during the second quarter, causing this quarter to clearly underperform.

Figure 1.10

Business cycle developments in the EU27

a) In constant prices, seasonally adjusted and work-day adjusted.

Sources: Eurostat; Ifo Institute calculations.

Figure 1.11

Price developments in the euro area

a) Harmonised Index of Consumer Prices.
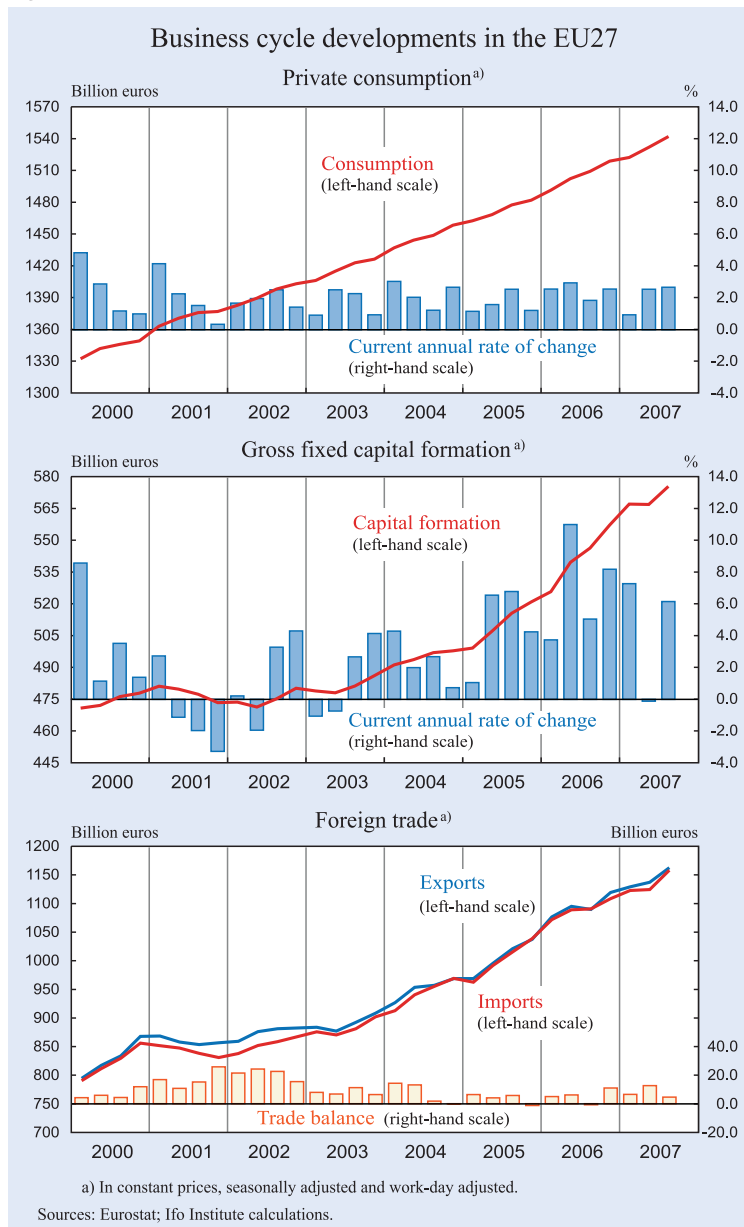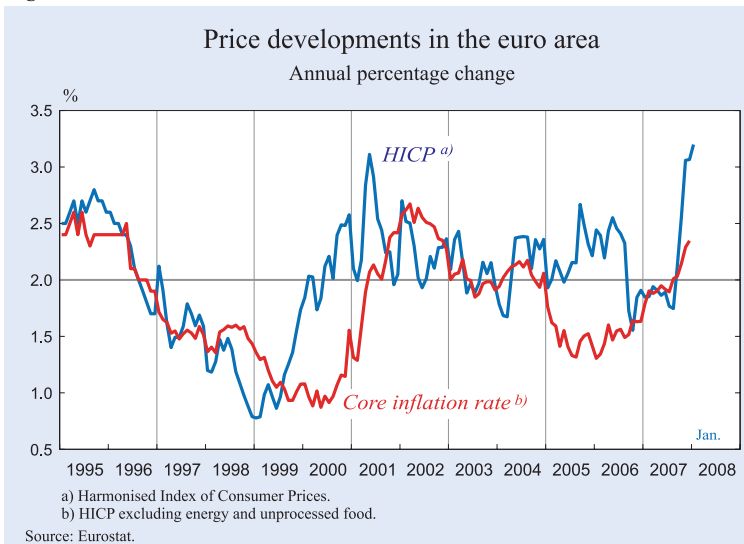b) HICP excluding energy and unprocessed food.

Source: Eurostat.

rate in the euro area remained below 2 percent. Baseline effects, that is, moderate inflation during the second half of 2006, and rapidly rising oil prices after summer 2007 caused inflation to rise throughout the remainder of last year. In November last year it even exceeded the 3 percent level. Although clearly less pronounced, a similar development can be observed in the core inflation rate, that is, the inflation rate corrected for energy and unprocessed food price changes (see Figure 1.11).

From a supply-side point-of-view, the real compensation costs of labour in the private sector barely increased in Europe last year. The increase was below those of the US and Japan (see Table 1.2 on page 26). Especially due to exchange rate developments, the competitiveness-weighted relative unit labour costs in the manufacturing sector in dollar terms appreciated for the euro area as a whole, whereas it depreciated substantially for the US and Japan. Hence, the competitive position of Europe deteriorated substantially.

The *German* economy continued to grow above potential, although its dynamics softened somewhat. Although the increase in the VAT by 3 percentage points in Germany at the start of 2007 did suppress private consumption substantially, the expansionary forces from abroad (and from the business sector via nonresidential investments) were strong enough to keep the upswing alive. The massive appreciation of the euro against the US dollar did not prevent the rest of the world from demanding more German goods. Germany has actually been one of the few

Box 1.2

Globalisation, labour market reforms and wage developments

Over the last two decades, there has been a very significant fall in the rate of wage increases in most EU countries. These low wage increases are often seen as a major cause of weak private consumption and therefore of low aggregate demand as well as of low output and employment growth. The low wage increases are in turn often explained by factors such as monetary policy focusing on low inflation, globalisation and labour market reforms. To cast light on the determinants of wage increases, we have run a number of regressions.

Our analysis builds on a panel data set of the EU15 countries covering the period 1980–2005. The variable to be explained, and which is shown in Figure 1.12, is the yearly growth rate of the nominal hourly wage for production workers in manufacturing and is obtained from the US Bureau of Labor Statistics.[1] As can be seen, nominal wage growth indeed shows a clear downward trend. What are the reasons for this apparent downward trend? Have labour market reforms and/or globalisation contributed to it? Or is the slowdown in inflation the main explanation also for the downward trend in nominal wage growth as is suggested by the absence of any trend in real wage growth (see Figure 1.12)?

As our explanatory variables we include: (a) the growth rate of real labour productivity per hour worked, (b) the inflation rate as measured by the growth rate of the consumer price index and (c) the change in the unemployment rate (see, for example, Franz 2003). The theoretical considerations are straightforward: the higher the growth of real labour productivity, the higher can be the growth of wages without changing the shares of profits and wages in the total value of output. As regards inflation, individuals focus on real wages. The higher is inflation, the more likely employees are to push for increases in nominal wages. Finally, if unemployment increases, the more credible is the threat of employers to dismiss employees and, hence, the weaker is the employees' position in wage bargaining.[2] The main reason for including the change rather than the level of unemployment was that it performed much better empirically: theoretically, the formulation can be seen as an extreme version of the hysteresis hypothesis according to which the equilibrium rate of unemployment changes one to one with the past level of unemployment. To reduce the risk of reverse causality, we include beside the contemporaneous values also the first lags of our explanatory variables.[3]

In a next step, we add a dummy variable measuring whether or not there is a high degree of coordination in wage bargaining. It is well-documented that a high degree of coordination often is associated with lower wage growth (see also Chapter 3 of the 2004 EEAG Report). The Wassenaar Agreement in the Netherlands in 1982 is a clear example of this. Another variable describing the institutional set-up of wage setting is union density. Here, theory suggests that a more unionised labour force has a better bargaining position.[4]

Subsequently, we include a number of variables that might reflect labour market reforms: the extent of employment protection,[5] the average unemployment benefit replacement rate and the degree of product market regulation.[6] Finally, variables measuring globalisation are added. Here, we in particular use the "KOF Index of Globalization". It measures the economic, social and political dimensions of globalisation, which are then aggregated to an overall index of globalisation.[7] Although total trade openness (export and imports as a percentage of GDP) and total FDI openness (inward and outward FDI flows as a percentage of GDP) are both included in the KOF index, we also show regressions using these two more traditional measures of globalisation.

Table 1.1 summarizes our regression results.[8] All of the classic wage equation variables behave as hypothesised. The implied coefficient estimates are quite plausible. For instance, over time a one percentage point fall in inflation leads to a 0.8 percentage point fall in nominal wage growth, that is, inflation is largely but not fully compensated by nominal wage growth.[9] Hence, the recent focus of monetary authorities to lower inflation appears rather to have led to higher real wage growth. A one percentage point rise in productivity growth is associated with only a 0.4 percentage point rise in nominal wage growth. This suggests that over time lower productivity growth – as is on average the case in our sample – has tended to increase real wage growth and reduce the profit share. Finally, if the unemployment rate decreases by one percentage point, this will over time lead to an increase of nominal wage growth of 0.75 percentage points.

Both centralised wage bargaining and union density have the expected signs and are highly significant (columns 2–6). Countries with centralised bargaining systems have on average 0.9 percentage points lower yearly nominal wage increases than countries with decentralised bargaining.[10] Although significant, the effect of a higher union density rate is quite small; a fall in this rate by ten percentage points will ultimately lead to 0.15 percentage points lower nominal wage growth.

In column (3) of Table 1.1 three variables associated with market-oriented reforms are added: a measure of employment protection, the unemployment benefit replacement rate and an indicator of product market reform. None of these variables show any significant impact on nominal wage growth. Including these variables one at a time does not change this result (not shown). Hence, controlling for "economic" variables and indicators directly related to the wage bargaining process, our estimations do not reveal any significant effects of market-oriented reforms on wage developments.

Finally, we experimented with different globalisation variables. Although the KOF index of globalisation reveals a negative impact, it is not statistically significant at conventional levels (column 4). This result does not change when splitting up this aggregate index into its three major components. With respect to the traditional globalisation variables, trade and FDI shares, we once more do not find any significant effects.

The general conclusion is that the main causes of the decline in nominal wage growth in EU15 are lower inflation and lower productivity growth. Declining union density in many countries and moves towards more corporatism (in Ireland and Italy) have also made some (small) contribution. It is hard to find any *direct* indication that either globalisation or recent labour market reform have played an important role in the reduction of nominal wage growth. One explanation might be that different effects work in opposite directions and thereby cancel each other out. Globalisation may also have had indirect effects, working through productivity growth and terms-of-trade changes. These issues are discussed at some length in Chapter 3.

continued Box 1.2

[1] We have started out from a measure of compensation costs "including (1) hourly direct pay (before payroll deductions of any kind) and (2) employer social insurance expenditures and other labor taxes" (United States Department of Labor, US Bureau of Labor Statistics, International Comparisons of Hourly Compensation Costs for Production Workers in Manufacturing, 2005, Press Release, November 30, 2006, p. 7) and then corrected this variable for the non-wage labour costs using data from the same source. We have also experimented with using compensation costs and including non-wage labour costs on the right-hand-side of the equation. The results are virtually identical.
[2] We also experimented with terms-of-trade variables. These were, however, usually not significant in our specifications and are therefore not included in the equations shown.
[3] Note that higher wage growth enforced by unions might lead to more dismissals. This would suggest a positive correlation between unemployment and wages. Hence, if anything, there will be a positive bias in our estimates of the effect of unemployment on wages. This will reduce the absolute value of the estimated (negative) coefficient.
[4] See, for example, Chapter 3 of the 2004 EEAG Report. The data source used here is Bassanini and Duval (2006).
[5] We use the OECD summary indicator of the stringency of Employment Protection Legislation as described in OECD (2004).
[6] Product market regulation is captured by a summary indicator of regulatory impediments to product market competition in seven non-manufacturing industries. It covers regulations and market conditions in seven energy and service industries: gas, electricity, post, telecoms (mobile and fixed services), passenger air transport, railways (passenger and freight services) and road freight. Its original source is Conway et al. (2006).
[7] The index makes it possible to compare degree and changes in globalisation over a large number of countries and for more than 30 years. The "KOF Index of Globalization" and its three sub-indices are calculated using principal components analysis based on in total 24 distinct variables all capturing different dimensions of the concept of globalisation. See http://www.kof.ethz.ch/globalization and Dreher et al. (2008) for additional information.
[8] Tests reveal that country dummies are not required. Thus, we estimate a pooled OLS model with heteroskedasticity-robust standard errors. There appear to be no structural breaks in our sample. Furthermore, when comparing the columns across the table, changes of the specification do not alter the conclusions with respect to the baseline variables. Hence, the results point to a robust and over time stable relationship.
[9] The long-run effect of a one percentage point change in inflation is calculated by taking the sum of the inflation coefficients (0.33 + 0.19) and dividing this by one minus the coefficient of the lagged dependent variable (0.37). The long-run effects of the other explanatory variables are calculated in an analogous way.
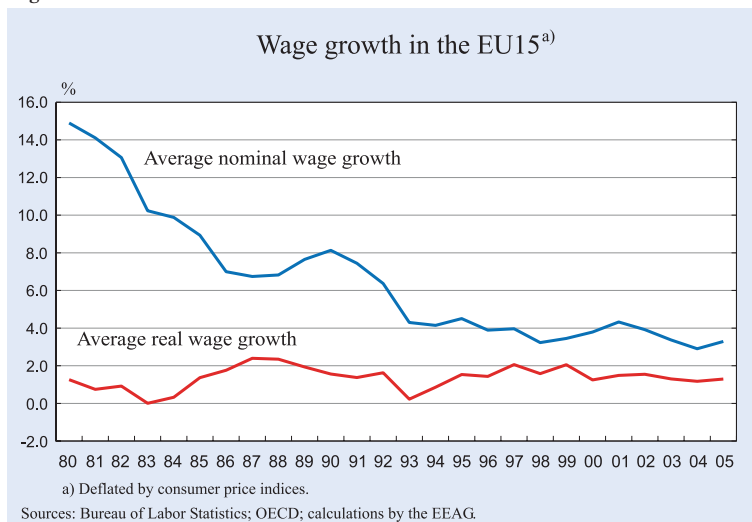[10] This variable is quite stable over time and therefore largely reflects cross-country differences.

countries inside the euro area that kept on improving its export performance as measured by the ratio between export volumes and export markets.[3] Despite the strong appreciation of the euro, Germany has managed to reduce its relative unit labour costs for four years in a row now. Nevertheless, export growth of somewhat more than 8 percent did not match the level of 2006 (12.5 percent). The contribution of net exports to GDP growth was about 1.5 percentage points last year. Also, increases in both non-residential and residential investment (with rates of 8 and 3 percent, respectively) contributed significantly to a GDP growth of 2.5 percent last year, which was slightly below the average of the euro countries (2.6 percent). One of the reasons why equipment investment was able to keep its dynamics is pull-in

effects caused by the imminent worsening of depreciation allowances in German tax laws.

In sharp contrast to most other European countries, the largest spending component, private consumption, did not take off in Germany. From a cyclical point of view, the improved labour market conditions and the wage increases would normally have stimulated consumption. However, the massive VAT increase and later on the increase in food prices and another surge in oil prices reduced the purchasing power of households considerably. Consumer confidence even deteriorated in the course of the year. The willingness of consumers to buy durable goods plummeted. As a consequence the savings rate increased.

In the *UK*, the largest European economy outside the euro area, the economic upturn continued unabated. GDP grew by 3 percent last year and thereby by almost 1/2 percentage point more than the year before. The main demand increases came from a rise in private consumption caused by higher disposable incomes. Although its growth diminished somewhat over time, investment remained an impor-

Figure 1.12

Wage growth in the EU15[a]

a) Deflated by consumer price indices.

Sources: Bureau of Labor Statistics; OECD; calculations by the EEAG.

[3] The calculation of export markets is based on a weighted average of import volumes in each exporting country's markets, with weights based on trade flows in 2000.

tant second pillar of demand growth. On the other hand, the trade balance deteriorated last year, with exports falling faster than imports.

While employment stagnated, the unemployment rate in the UK fell from 5.5 percent in January to 5.3 percent at the end of summer. The same figures apply when comparing the average for 2006 with the average of last year. The inflation rate, as measured by the harmonised index of consumer prices, fell from 2.7 percent in January to 2.1 percent in December last year. Also, the core inflation rate came down after a temporary surge between February and June.

Together with Italy and Portugal, *France* turned out to be the laggard in Europe, with an overall growth rate just below 2 percent. In particular, private consumption did not live up to its expectations and lost some of its dynamics towards the end of the year. The consumption of durable goods, like automobiles and domestic appliances, fell at the end of the year. Nevertheless, with a growth rate of about 2 percent for the entire year, private consumption remained the most important factor behind French demand growth. Investment also recovered strongly from its slump in the second quarter.

The increase in employment in France continued throughout the year. The standardised unemployment rate fell significantly from an average level of 9.2 percent in 2006 to 8.3 percent last year. Nominal wages increased by 3 percent in 2007. Given an inflation rate of 1.6 percent, these developments contributed to a substantial increase in real disposable income.

After a strong increase in GDP in the last quarter of 2006, the *Italian* economy weakened considerably in the course of last year. Although private consumption, as a consequence of higher employment, expanded at a rate somewhat above 2 percent, investment only rose moderately. The contribution of international trade to GDP growth remained positive, but with only 0.5 percentage points clearly less than the years before. Labour market conditions clearly brightened. The unemployment rate dropped from 6.8 percent in 2006 to 6 percent on average last year. So far this has not triggered higher wage increases. Wages rose on average by 2.1 percent last year. The international competitiveness of the Italian economy, however, continued to deteriorate. For the tenth year in a row, relative unit labour costs increased in 2007. The increase, this time at 2.1 percent, was at about the euro area average and therefore more moderate than in the

past (see Table 1.2). But there was still a further loss in market shares (see Chapter 2 of the 2007 EEAG Report for more details on the Italian macroeconomic adjustment process). Albeit with a slight upward trend, inflation also remained relatively moderate. Whereas in January inflation stood at 1.9 percent, it increased to 2.8 percent in December.

With a growth rate of 3.9 percent *Spain* was able to continue its high-growth path last year. The main cause of the economic expansion in recent years has been buoyant domestic demand. Residential investment continued to increase and by now covers about 8 percent of GDP. This could not prevent house prices from surging. A growing population, demand from abroad and historically low real interest rates all contributed to this development. Nevertheless, the Spanish economy slowed down somewhat in the autumn of last year. In particular, consumption growth fell considerably. To a lesser extent the same holds for (residential) investment. At the same time, the rise of real estate prices softened somewhat. Only the growth contribution of international trade increased as export growth outperformed import growth.

Although the number of employees continued to grow, a growing labour force kept the reduction in the Spanish unemployment rate rather small. The average unemployment rate fell only from 8.5 percent in 2006 to 8.3 percent last year. The rate of inflation remained high. In December it reached 4.3 percent after 2.7 percent in September. In January 2007 it was still 2.4 percent. Nevertheless, as compared to 2006, when the average inflation rate was 3.6 percent, an average of 2.8 percent in 2007 was still a significant improvement.

The economies of the new EU members developed dynamically last year. GDP increased by approximately 6 percent.[4] Consumption in *Poland* as well as in the *Czech Republic* and *Slovakia* increased strongly. Especially in Poland investment increased considerably. On the other hand, exports weakened whereas imports grew strongly in some countries.

The *Hungarian* economy slowed down considerably during 2007. The consequences of the restrictive fiscal policy intended to reduce the budget deficit did not, however, restrain the economy as much as feared by

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[4] The new EU members included here are Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia.

Table 1.1

Regressions explaining the yearly rate of nominal wage growth

	(1)	(2)	(3)	(4)	(5)	(6)
Number of observations	261	261	261	261	261	261
Adjusted R^2	0.831	0.835	0.834	0.836	0.835	0.834
Constant	0.62	0.66	0.76	2.40	2.31	0.75
	(2.80)	(2.52)	(1.47)	(1.65)	(1.37)	(2.57)
Lagged nominal wage growth	0.37	0.33	0.33	0.32	0.31	0.33
	(5.56)	(5.08)	(5.14)	(4.84)	(4.84)	(5.03)
Labour productivity growth	0.15	0.16	0.17	0.15	0.15	0.17
	(2.24)	(2.54)	(2.58)	(2.28)	(2.01)	(2.55)
Lagged labour productivity growth	0.08	0.10	0.10	0.09	0.08	0.10
	(1.44)	(1.71)	(1.69)	(1.59)	(1.40)	(1.76)
CPI inflation	0.33	0.34	0.35	0.33	0.32	0.34
	(3.23)	(3.32)	(3.34)	(3.26)	(3.16)	(3.33)
Lagged CPI inflation	0.19	0.19	0.20	0.17	0.16	0.19
	(1.76)	(1.81)	(1.91)	(1.54)	(1.53)	(1.80)
Change in unemployment	− 0.20	− 0.17	− 0.18	− 0.16	− 0.14	− 0.18
	(− 1.88)	(− 1.68)	(− 1.68)	(-1.47)	(− 1.32)	(− 1.69)
Lagged change in unemployment	− 0.32	− 0.33	− 0.32	− 0.33	− 0.32	− 0.33
	(− 3.11)	(− 3.26)	(− 3.19)	(− 3.27)	(− 3.03)	(− 3.28)
Coordinated wage bargaining		− 0.59	− 0.64	− 0.59	− 0.58	− 0.53
		(− 2.82)	(− 2.76)	(− 2.83)	(− 2.67)	(− 2.09)
Union density		0.01	0.01	0.01	0.01	0.01
		(2.15)	(1.92)	(2.27)	(2.27)	(2.16)
Employment protection			− 0.14			
			(− 0.37)			
Average replacement rate			0.01			
			(0.73)			
OECD indicator of product market reforms			− 0.06			
			(− 0.71)			
KOF index of globalisation				− 0.02		
				(− 1.22)		
KOF index of economic globalisation					0.00	
					(0.30)	
KOF index of social globalisation					− 0.02	
					(− 1.20)	
KOF index of political globalisation					− 0.01	
					(− 0.38)	
Total trade openness						0.00
						(− 0.50)
Total FDI openness						0.00
						(− 0.06)

Notes: Robust t-statistics are within parentheses. All regressions include 13 EU countries (the EU15 without Greece and Luxembourg) and cover the years 1982–2003. Total trade openness is the sum of exports and imports of goods and services measured as a share of GDP. Total FDI openness is the sum of the absolute values of inflows and outflows of foreign direct investment recorded in the balance of payments financial account as a share of GDP.

Sources: Bassanini and Duval (2006); KOF Swiss Economic Institute; OECD; US Bureau of Labor Statistics; calculations by the EEAG.

many. As compared to 2006, the fiscal deficit was reduced by almost 3 percentage points of GDP; still growth fell by less than 2 percentage points to 2.1 percent last year.

The economies of the three Baltic states continued to expand strongly, with growth rates close to 10 percent for *Estonia* and *Latvia*, and about 8 percent for *Lithuania*. Also *Romania* and *Bulgaria*, which both entered the European Union at the beginning of 2007, showed high growth rates (slightly above 6 percent).

At same time inflation rates are high. In particular, in Latvia an inflation rate of 10.1 percent indicates an overheating of the economy.

3. Fiscal and monetary policy in Europe

3.1 Fiscal policy

The public finance situation in both the euro area as well as the whole EU27 area improved markedly last
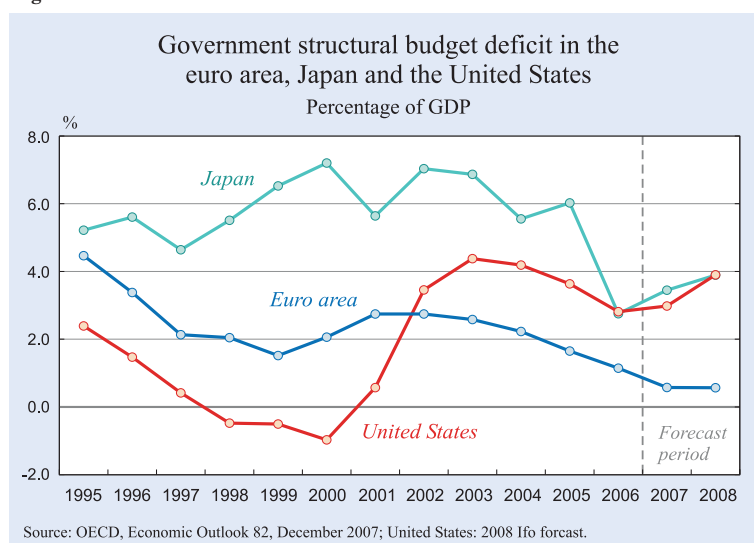
Table 1.2

The development of various measures of wages and wage costs

	Compensation per employee[a]		Real compensation cost[b]		Labour productivity[c]		Unit labour cost[c]		Relative unit labour cost[d,e]		Export performance[f]	
	2004–06	2007	2004–06	2007	2004–06	2007	2004–06	2007	2004–06	2007	2000–06	2007
Austria	2.3	2.4	0.4	0.2	2.1	2.7	0.7	1.2	– 0.1	0.3	– 1.7	– 1.2
Belgium	2.2	2.7	– 0.1	0.7	1.5	0.9	0.9	1.7	0.5	0.9	– 3.6	– 0.3
Denmark	3.2	3.9	0.7	1.9	2.0	– 0.4	1.3	2.7	0.4	4.1	– 1.7	– 2.4
Finland	3.2	2.7	2.4	1.3	2.6	2.1	0.8	2.8	– 2.3	– 3.5	– 1.3	0.7
France	3.5	3.3	1.6	1.1	1.6	0.9	1.5	1.9	– 0.2	3.9	– 4.0	– 2.3
Germany	0.4	1.3	– 0.4	– 0.5	1.2	1.0	– 1.0	1.1	– 2.7	– 2.8	1.0	1.9
Greece	3.6	6.1	0.3	3.2	2.0	2.4	3.2	4.1	5.2	4.8	– 3.6	– 0.7
Ireland	5.2	4.4	2.8	2.3	1.2	2.1	5.0	3.5	1.8	3.2	– 2.2	3.3
Italy	2.6	2.1	0.3	– 0.5	0.2	0.5	3.2	2.9	3.4	2.1	– 6.1	– 4.6
Luxembourg	4.2	3.5	0.1	0.5	2.3	1.2	1.9	1.4	2.3	– 0.8	1.0	0.5
Netherlands	2.2	2.6	0.6	1.2	1.8	1.4	0.1	2.6	– 0.7	1.7	– 1.0	0.9
Portugal	2.1	3.2	– 0.6	0.4	0.8	1.9	2.4	1.5	– 0.9	– 2.1	– 3.2	1.0
Spain	1.6	2.3	– 2.5	– 1.0	– 0.2	0.4	2.7	3.2	2.4	2.1	– 3.6	– 0.5
Euro area	1.6	2.4	– 0.4	0.2	0.8	1.0	1.1	2.1	0.7	2.1	na	na
Czech Republic	5.6	7.6	3.7	4.1	4.8	4.5	1.1	2.9	– 1.3	– 0.6	5.7	3.6
Hungary	8.9	7.6	5.5	1.8	4.3	1.7	3.9	4.0	0.7	9.9	5.8	7.5
Japan	– 0.2	0.0	0.9	0.6	1.9	1.5	– 1.6	– 0.9	– 7.1	– 9.0	0.2	1.6
Poland	1.3	8.1	– 1.5	4.6	2.7	1.9	0.8	5.3	1.5	0.4	1.6	– 0.5
Slovakia	7.1	7.1	3.4	5.7	5.4	7.1	0.6	1.1	– 1.8	6.5	3.5	6.9
Sweden	3.1	4.7	2.0	1.6	3.1	0.8	– 0.2	2.6	– 4.0	4.2	– 0.3	– 1.1
UK	4.2	3.6	1.7	0.4	1.7	2.6	2.7	0.7	4.6	2.2	– 0.7	– 10.1
US	3.9	5.0	0.9	2.4	1.7	1.1	2.4	2.2	– 5.5	– 6.1	– 1.0	1.3

Notes: All figures are annual percentage changes. [a] Compensation per employee in the private sector. – [b] Compensation per employee deflated by GDP deflator. – [c] Total economy. – [d] Manufacturing sector. – [e] Competitiveness-weighted relative unit labour cost in dollar terms. – [f] Percentage change in the ratio between export volumes and export markets for total goods and services. A positive number indicates gains in market shares and a negative number indicates a loss in market shares.

Source: OECD Economic Outlook database.

Figure 1.13

Government structural budget deficit in the
euro area, Japan and the United States
Percentage of GDP

Source: OECD, Economic Outlook 82, December 2007; United States: 2008 Ifo forcast.

the lowest level since 2000. In contrast to Japan and the US, the structural budget deficit in the euro area also decreased last year (see Figure 1.13).

In a majority of countries, the consolidation of public finances continued. In particular in Germany, but also in Hungary, Italy and Portugal, measures were implemented to reduce the structural budget deficit. In Belgium, Ireland and the Netherlands, which exhibited fiscal surpluses in 2006, expansionary policies were undertaken.

year. Although total government expenditures did increase somewhat, tax receipts increased even more. The fiscal deficit as a percentage of GDP decreased from 1.6 to 1.1 percent for the EU27 and from 1.5 to 0.8 percent in the euro area. For both regions, this is

Last year, the budget deficit of the *German* government improved substantially for the second year in a row (see Table 1.3). For the first time since 1989, except for 2000 when the government experienced a windfall profit from selling UMTS licences, the

Table 1.3

Indicators of the public budgets in the EU27

	Gross debt[a]				Fiscal balance[a]			
	2005	2006	2007	2008	2005	2006	2007	2008
Germany	67.8	67.5	64.7	62.6	-3.4	-1.6	0.1	-0.1
France	66.7	64.2	64.3	64.1	-2.9	-2.5	-2.6	-2.6
Italy	106.2	106.8	104.3	102.9	-4.2	-4.4	-2.3	-2.3
Spain	43.0	39.7	36.3	34.6	1.0	1.8	1.8	1.2
Netherlands	52.3	47.9	46.8	44.8	-0.3	0.6	-0.4	0.5
Belgium	92.2	88.2	84.6	81.7	-2.3	0.4	-0.3	-0.4
Austria	63.4	61.7	60.0	58.4	-1.6	-1.4	-0.8	-0.7
Greece	98.0	95.3	93.7	91.1	-5.1	-2.5	-2.9	-1.8
Ireland	27.4	25.1	25.2	26.9	1.2	2.9	0.9	-0.2
Finland	41.4	39.2	35.7	32.4	2.7	3.8	4.6	4.2
Portugal	63.7	64.8	64.4	64.7	-6.1	-3.9	-3.0	-2.6
Slovenia	27.4	27.1	25.6	24.5	-1.5	-1.2	-0.7	-1.0
Luxembourg	6.2	6.6	6.6	6.0	-0.1	0.7	1.2	1.0
Cyprus	69.1	65.2	60.5	53.3	-2.4	-1.2	-1.0	-0.8
Malta	70.8	64.7	63.1	61.3	-3.1	-2.5	-1.8	-1.6
Euro area	**70.3**	**68.6**	**66.5**	**65.0**	**-2.5**	**-1.5**	**-0.8**	**-0.9**
United Kingdom	42.1	43.2	43.6	44.8	-3.3	-2.7	-2.8	-3.0
Sweden	52.2	47.0	41.1	35.7	2.4	2.5	3.0	2.8
Denmark	36.3	30.3	25.0	20.9	4.6	4.6	4.0	3.0
Poland	47.1	47.6	46.8	47.1	-4.3	-3.8	-2.7	-3.2
Czech Republic	30.2	30.1	30.2	30.3	-3.5	-2.9	-3.4	-2.8
Hungary	61.6	65.6	66.1	66.3	-7.8	-9.2	-6.4	-4.2
Romania	15.8	12.4	12.5	12.8	-1.4	-1.9	-2.7	-3.2
Slovakia	34.2	30.4	30.8	30.7	-2.8	-3.7	-2.7	-2.3
Lithuania	18.6	18.2	17.7	17.2	-0.5	-0.6	-0.9	-1.4
Bulgaria	29.2	22.8	19.3	15.9	2.0	3.2	3.0	3.1
Latvia	12.5	10.6	10.2	7.8	-0.4	-0.3	0.9	0.8
Estonia	4.4	4.0	2.8	2.3	1.9	3.6	3.0	1.9
EU27	**62.7**	**61.4**	**59.5**	**58.3**	**-2.4**	**-1.6**	**-1.1**	**-1.2**

[a] As a percentage of gross domestic product; definitions according to the Maastricht Treaty.

Source: European Commission.

government budget will not be in deficit. It may even exhibit a slight surplus. The improvements are partly explained by increased tax revenues due to the VAT increase, reductions in subsidies and tighter means-testing for unemployment benefits. Besides these more structural changes, the cyclical upswing also caused a clear reduction in, for instance, disbursed unemployment benefits and other expenditures related to the business cycle. Hence, part of the budget improvement is structural and part of it cyclical. The 1.5 percentage point reduction of the deficit-to-GDP ratio is almost equally divided between the two parts. Whereas total government revenues increased by approximately 5 percent last year, government spending only rose by 1 percent. Part of the spending increase concerns public investment. Especially local governments started to catch up on a backlog of infrastructure projects accumulated over the years.

The situation of public finances in the *UK* worsened somewhat during the course of last year. The increase in government spending could only partly be compensated for by additional tax receipts. The deficit as a percentage of GDP increased from 2.7 percent in 2006 to 2.8 percent last year.

The *French* government continued its expansionary fiscal policy during 2007. The fiscal deficit worsened from 2.5 percent of GDP in 2006 to 2.6 percent in 2007. The debt-to-GDP ratio remained at a high level of 64 percent.

In *Italy*, public finances clearly improved last year. Whereas the deficit-to-GDP ratio stood at 4.4 percent in 2006, it was reduced to 2.3 percent in 2007. Although government spending rose, tax revenues also increased substantially. This was partly for cyclical reasons, but the increased tax progressivity implemented early in 2007 also contributed. Hence, also the structural deficit improved last year.

Fiscal policy in *Spain* was expansionary last year. Despite an income tax reduction there was a fiscal surplus of 1.8 percent of GDP.

The public finance situation in the new EU member states is quite heterogeneous. On the one hand, *Hungary* shows a very large budget deficit. On the other hand, the Baltic states report surpluses. For several new member states – and in particular for *Poland*

and Hungary – the fiscal situation is a clear obstacle to entering the euro area.

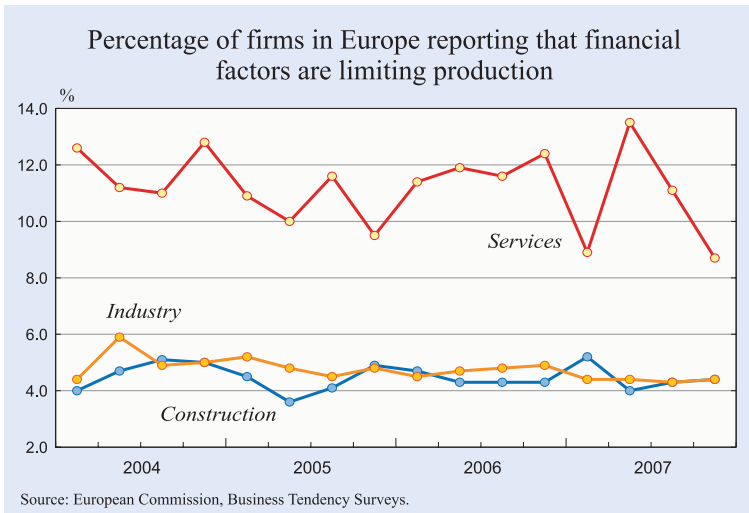### 3.2 Monetary conditions and financial markets

The financial turmoil

In August last year, international financial market turbulence was triggered by announcements that the German bank IKB Deutsche Industriebank AG and the French bank BNP Paribas were in trouble because of losses on investments in assets backed by US subprime loans. A sharp rise in home foreclosures and defaults of subprime mortgages in the US earlier last year led to a re-evaluation of related mortgage-backed securities. International trade in these types of assets associated with substantial credit risks had expanded strongly in recent years. At the end of last year, financial institutions had acknowledged subprime-related losses or write-downs exceeding 80 billion US dollars. However, credit loss estimates are still being revised upwards.[5]

As a consequence, financial institutions have started to worry about the quality of the assets offered as collateral by potential borrowers and their own need to finance affiliated investment funds. In particular, in the interbank money markets this led to a severe loss in mutual confidence and banks became reluctant to lend to each other. To prevent these markets from becoming illiquid, central banks around the world had to step in. Nevertheless, this credit crunch in the interbank money market could not prevent the three-month money market interest rate in the euro area from rising substantially above the marginal lending rate of the ECB. By the end of October, money markets seemed to be calming down. However, at the end of November banks started to stagger again, forcing the Federal Reserve, the Bank of Canada, the ECB and the Swiss National Bank to come up with some new tools to prevent money markets from drying out.[6] As long as it remains unclear which financial institutions are involved and to what extent, the turbulence is bound to continue. Hence, the releases of

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[5] To put this in some perspective, though, a one percent fall in the composite index of the New York Stock Exchange implies a loss of about 190 billion US dollars in total market capitalisation.
[6] The Federal Reserve introduced the so-called Term Auction Facility (TAF) to auction reserve funds to American banks. The Bank of Canada and the Bank of England expanded the collateral they were willing to accept in their open market operations. Finally, the Federal Reserve set up swap agreements with the ECB and the Swiss National Bank. This was the first time ever that non-US central banks were thereby offering US dollars in their open market operations.

Figure 1.14

Percentage of firms in Europe reporting that financial factors are limiting production

Source: European Commission, Business Tendency Surveys.

growth to non-financial corporations remains at a historically high level (with an annual rate of increase of 14 percent in the second half of 2007). Only for mortgages have the growth rates been decreasing since spring 2006. Year-to-year growth rates for these types of loans nevertheless still equalled 7.6 percent in November last year (see Figure 1.16).

So far, there appears no evidence in favour of a credit crunch scenario. That, however, does not imply that there is none (or that one will not develop in the near future). As already noted, the data shown concern equilibrium values and do not indicate the extent of under-supply or over-demand of loans. Surveys explicitly asking for how difficult it is to receive funding from banks, or how restrictive banks are when it comes to supplying credits, may shed more light on this issue.

In the business tendency surveys published by the European Commission each quarter, firms in the manufacturing, services and construction sectors are asked to report the factors that are currently limiting production. One of the potential answers is the existence of financial constraints. Figure 1.14 shows that on a European level the share of firms indicating that financial constraints are hampering their production possibilities has hardly changed over time. If anything, there appears to be a downward
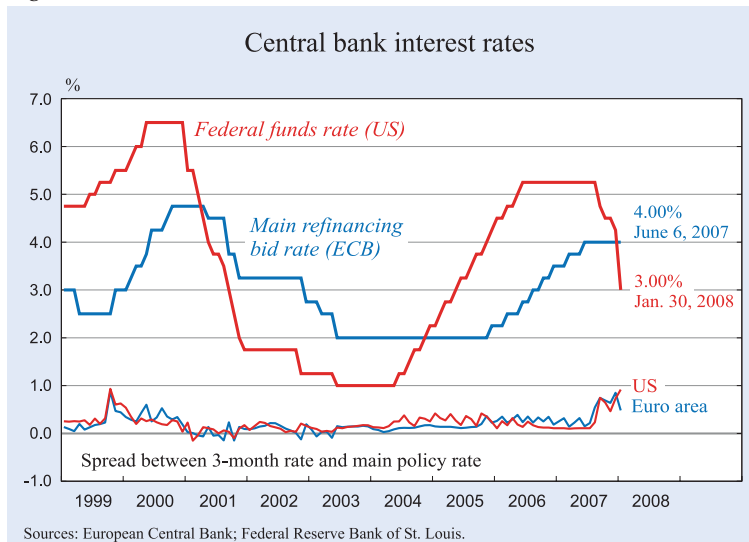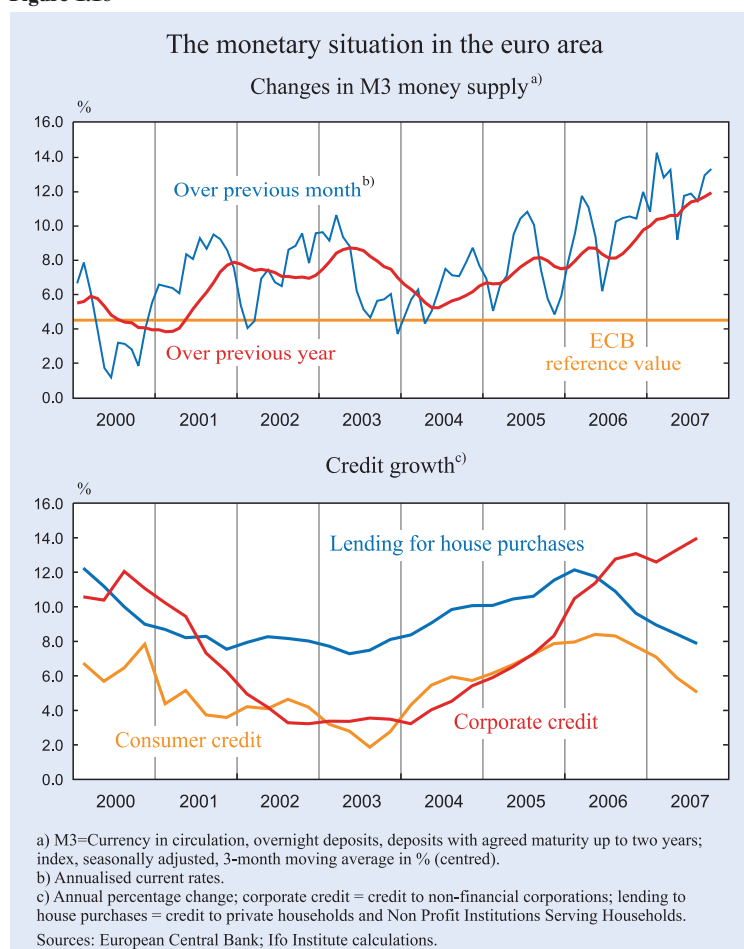
banks' annual reports will trigger much attention in the months to come.

The question remains to what extent these liquidity problems in the interbank money market have restricted or will restrict the credit supply of banks to firms and households and thereby affect the real economy. In general, it is always difficult to find statistical evidence that clearly refutes or proves the existence of a credit crunch. In theory, we need a way to estimate the over-demand or under-supply of credits, whereas we normally only observe the actual quantity together with its price, that is, the interest rate. A credit crunch does not necessarily show up in higher interest rates. If it does not, one would expect a clear reaction in the credit volumes though.

In the euro area, the interest rates for new loans have been slowly increasing since early 2006, the time at which the ECB started its interest rate increase cycle. Especially for loans with maturities of more than five years, which constitute more than half of the total credit volume, interest rates have remained stable since the outbreak of the subprime crisis. After a short-lived rise in August and September, short-term consumer credit rates fell back to the level prevailing in July.

Turning to credit volumes, there is also not a clear change in pattern visible since August last year. In the euro area, credit

Figure 1.15

Central bank interest rates

Sources: European Central Bank; Federal Reserve Bank of St. Louis.

Figure 1.16

The monetary situation in the euro area

Changes in M3 money supply[a)]

Credit growth[c)]

a) M3=Currency in circulation, overnight deposits, deposits with agreed maturity up to two years; index, seasonally adjusted, 3-month moving average in % (centred).
b) Annualised current rates.
c) Annual percentage change; corporate credit = credit to non-financial corporations; lending to house purchases = credit to private households and Non Profit Institutions Serving Households.
Sources: European Central Bank; Ifo Institute calculations.

trend for especially the services sector, which now reports that 8.7 percent of the surveyed firms face financial constraints. This is the lowest value since this survey question has been asked. For the manufacturing and construction sectors, the latest surveys in the fourth quarter of last year report a value of 4.4 percent each.

Finally, we turn to the Bank Lending Surveys conducted by the ECB among the private banks within the euro area. The main objective of the survey is to enhance the Eurosystem's knowledge of financing conditions in the euro area and hence to help the Governing Council of the ECB assess monetary and economic developments as an input into monetary policy decisions. The survey is designed to complement existing statistics on retail bank interest rates and credit with information on supply and demand conditions in the euro area credit markets and the lending policies of euro area banks.

The results of the October 2007 bank lending survey, which refer to the third quarter of the year, indeed started to indicate a net tightening of the credit stan-

dards for loans to enterprises and housing loans. This follows a period in which standards remained basically unchanged or eased slightly. The subsequent survey of January 2008 – referring to the last quarter of 2007 – saw a further increase in net tightening of credit standards. Both surveys point towards a deterioration of the economic outlook as a driving factor. However, the tightening of standards probably also reflects the worsening of global credit market conditions.

Both the October and January surveys contained a set of ad hoc questions addressing the effect of the US subprime crisis on credit standards and lending in the euro area. According to these surveys, loans and credit lines to (especially large) enterprises were more affected than loans to households. Although a vast majority of the respondents notes that the recent turmoil in the credit markets had, and will basically have, no impact on their credit standards for most loan types,[7] the share that expects it to have an effect on credit standards in the future is still somewhat larger than the share that states it already had an impact during the third and fourth quarter of last year.

Summing up, banks report that the recent tensions have hampered their access to funding – and especially to those related to the securitisation of loans for house purchases – and that this will probably continue for the next few months. As a consequence, it has become more difficult for banks to supply loans to firms and households. Furthermore, the bank lending survey does report that credit standards at least to some extent have been and will continue to be tightened. Part of this development might indeed be due to the recent financial turbulence. Nevertheless, at least up until now, interest rates for non-financial corpora-

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[7] The only clear exception are loans and credit lines to enterprises intended for mergers and acquisitions and for corporate restructuring. Here banks reported that the recent turmoil in financial markets contributed somewhat to a tightening of credit standards.

tions and households loans do not appear to have been affected by much. Neither have credit volumes. The situation might change should the write-offs in annual accounts necessitated by the subprime crisis destroy substantial fractions of bank equity. To protect their tier-one ratios, banks would then have to curtail their loans even if debt capital were amply provided by central banks.

Monetary conditions in Europe

In the euro area, the monetary conditions were clearly tightened in the course of 2007. Not only did the two interest rate increases of 25 basis points by the ECB in March and June, raising the main refinancing rate to 4 percent, contribute to this (see Figure 1.15). Also the appreciation of the euro was very important (see Figure 1.20). On top of that, the turbulence in financial markets caused severe liquidity problems in the European interbank market. As a consequence, the three-month interbank rates increased well beyond the main refinancing rate. During September and October the spread was approximately 70 basis points. After falling slightly in November, it again surged to an average of 85 basis points in December. This development made the ECB refrain from further interest rate hikes in the second half of last year.

The annual growth of money supply, as measured by M3, increased to an unprecedented level of more than 12 percent at the end of last year (see Figure 1.16). The turmoil in financial markets and the associated flight to more liquid assets was the driving force behind this. However, it was not the only force as also credits to firms continued to expand strongly throughout 2007. Last year was the seventh consecutive year in which M3 growth exceeded the ECB reference value of 4.5 percent. Looking at the more narrowly defined M1, money growth fell to a more or less stable level of about 6.5 percent throughout the entire year.
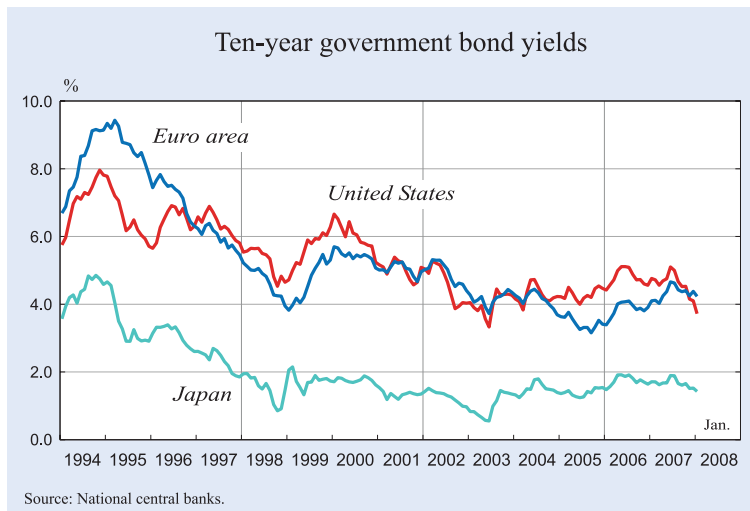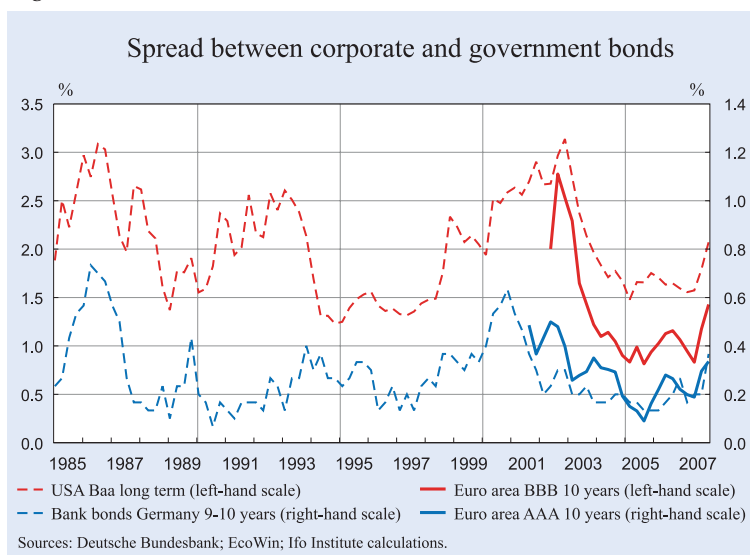
During the first half of last year, the Bank of England continued its sequence of interest rate increases to counter the inflationary risks. In January, May and June the bank increased its official bank rate paid on commercial bank reserves in steps of 25 basis points to reach a level of 5.75 percent. Reduced growth and lower inflation forecasts for the future then induced the bank to lower the rate to 5.5 percent in December.

The central banks in the new EU member states followed different monetary policies last year. Whereas in Poland and in the Czech Republic, key interest rates were raised in several steps, they moved in the opposite direction in Hungary and Slovakia. The differences in these policies were at least partly due to differences in inflationary developments.

Figure 1.17

Ten-year government bond yields

Source: National central banks.

Figure 1.18

Spread between corporate and government bonds

Sources: Deutsche Bundesbank; EcoWin; Ifo Institute calculations.

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Bonds, stock and foreign exchange markets

While the return on government bonds followed the upward trend of money market rates during the first half of 2007, there was a decoupling during the second half of the year (see Figure 1.17). The increased demand for safe assets, as caused by the financial turmoil, led to a clear decline of about 40 basis points since mid year for most government bonds of euro area member countries. This reduction was less pronounced for corporate bonds, especially those with lower ratings. Especially in December, increased risk aversion led to a further rise in the interest differential between corporate and government bonds. However, these spreads have not reached the levels seen in 2002, the early 1990s or in 1986 (see Figure 1.18).

Except for a clear set-back in March, stock markets tended to move upward during the first half of the year. But the subprime crisis made share prices drop substantially in July and August. Probably due to the rate cuts by the Federal Reserve and substantial liquidity injections by the ECB, they did recover in the two succeeding months. This could not prevent stock markets from falling again in November and December last year. As a result, the Euro STOXX 50 was at the end of 2007 about 80 points (or about 2 percent) below its level at the start of the turmoil, that is, midyear 2007 (see Figure 1.19). Over the year,
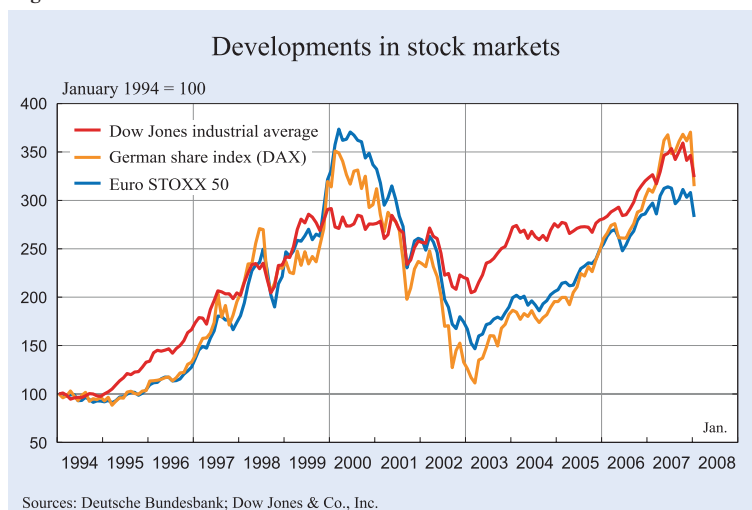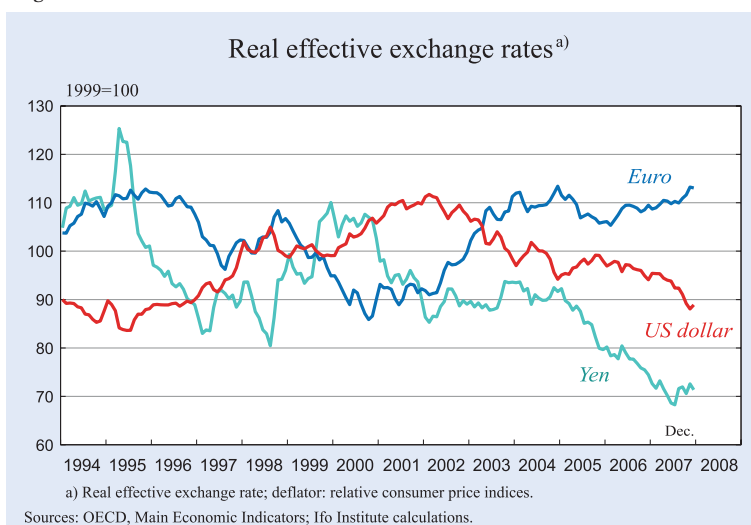
Figure 1.20

Real effective exchange rates[a]

1999=100

a) Real effective exchange rate; deflator: relative consumer price indices.
Sources: OECD, Main Economic Indicators; Ifo Institute calculations.

it nevertheless increased by close to 8 percent, that is, about as much as the US Dow Jones did. The German share index, DAX, clearly outperformed both and grew by more than 22 percent during 2007. A clear deterioration of economic sentiment in particular with respect to the US economy around the turn of the year led to sharp falls in stock market indexes around the world in the beginning of this year.

The US Dow Jones dropped by 6.5 percent in January 2008. Without the 125 basis points cut of the Federal Reserve's key interest rate during this period, the drop would have been even stronger as suggested by the fall in the Euro STOXX 50 and the German DAX by respectively 8.2 and 15 percent during the same period.

Currency markets are in turmoil as well. The US dollar has dropped steeply and reached a new record low vis-à-vis the euro at 1.487 on 27 November 2007. Between the end of 2006 and the end of last year, the euro increased its value against the US dollar by close to 12 percent. Also in real effective terms, the appreciation of the euro, which started in early 2006, continued (see Figure 1.20). Whereas in 2006 the euro area went through a real effective appreciation of about 4 percent, last year it appreciated by as much as 5 percent. Roughly two thirds of this took place in the second half of last year.

Figure 1.19

Developments in stock markets

January 1994 = 100

— Dow Jones industrial average
— German share index (DAX)
— Euro STOXX 50

Sources: Deutsche Bundesbank; Dow Jones & Co., Inc.

4. The economic outlook for 2008

4.1 The global economy

Growth of the world economy will slow down somewhat this year. Firm profits and labour market developments will remain favourable overall. However, increased inflation, high oil prices and the ongoing adjustment process in the real estate market in the US will restrain the world economy especially in the short run.

4.2 United States

In recent years, the most important factor behind demand growth in the US has been private consumption. Traditionally, there has been a strong relationship between private consumption and real disposable incomes of households. In recent years, some extraordinary factors have overshadowed this relationship. Low interest rates, (too) relaxed credit allocation policies of banks, as well as associated increases in housing prices resulted in an extremely favourable consumption climate. As a consequence, consumption growth clearly exceeded income growth. For instance, a 2.2 percent increase in real private consumption per capita went hand in hand with a real income per capita increase of only 0.7 percent in 2005. Parallel to that, the savings rate, that is, personal saving as a percentage of disposable personal income, fell from 2.1 to 0.5 percent, where it has remained since.

Those factors that boosted consumption in the past now work in the reverse direction. The insolvency of subprime mortgages has reduced the willingness of banks to supply credits, mortgage rates are on a higher level than a few years back and real estate prices are falling.

As stressed in previous reports (see, for instance, Chapter 2 of the 2006 EEAG Report), there will be a need for households to increase their savings rates. This means that consumption will have to increase by less than real incomes (or that it could actually fall despite real income growth). Although the unemployment rate has steadily increased up to 5 percent in December last year, labour market conditions are in general still quite favourable and wage income is expected to develop almost as positively as last year. Furthermore, the government's initiative to allow many creditors to refinance themselves under relatively favourable conditions will tend to defuse the real estate crisis as well.[8] Nevertheless, despite the announced tax cut private consumption this and next year will not be able to contribute to demand growth as in recent years. This judgement is backed up by declining consumer confidence according to the surveys of the University of Michigan. The latter assessment of consumer confidence has reached its lowest value since the early 1990s. Consumption growth is therefore expected to fall more than one percentage point from 2.8 percent last year.

During the first half of this year, we will continue to see home owners turn insolvent. Although residential investment has been falling for two years now and is expected to continue to fall this year, the oversupply on the real estate markets will persist. As a consequence, house prices will drop further. The futures contracts for the S&P Case-Shiller Index for the ten biggest cities in the US imply that market participants expect house prices to keep falling until spring 2009. The National Association of Realtors is expecting house prices to fall on average by about 16 percent in 2008. A substantial part of this has already materialised; price declines are from now on expected to diminish from quarter to quarter and – according to this source – stop this summer.

Experience from past real estate problems in other countries shows that the consequences on especially domestic demand can sometimes be quite large. For instance, house prices dropped substantially in Japan, Spain, Sweden and the UK in 1992 and 1993. Whereas for Japan and Spain house prices dropped by more than 10 percent in real terms, they fell by approximately 25 percent in both Sweden and the UK. At the same time these economies underwent a recession. However, we have to consider that the world economy is currently in quite a different shape than it was in the early 1990s. Back then, German unification created an environment in Europe in which the fall of house prices appears to have been a side effect caused by higher interest rates in an already vulnerable environment. This time the reduction in real estate prices can basically only result in a recession in the US – as defined by at least two consecutive months of negative growth – if it creates negative wealth effects strong enough to depress private con-

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[8] The government has expanded the Federal Housing Administration's (FHA) ability to offer refinancing to homeowners who have good credit histories but cannot afford their current payments. By the end of 2008, the FHA expects this programme to help more than 300,000 families. Furthermore, the US government announced in December last year that representatives of Hope Now – a cooperative effort between the US government, counsellors, investors, and lenders to help homeowners – have developed a plan to freeze interest rates for some subprime borrowers who will not be able to make higher payments once the interest rate goes up due to the expiration of earlier discounts.

Box 1.3

An assessment of our forecast accuracy

This year's EEAG Report is the seventh one. Given that we now have quite a number of years to look back on, we are in a position to review the accuracy of our own forecasts. We will not only compare the performance of our forecasts with that of a naïve forecast that simply extrapolates last known values into the future, we will also make a comparison with forecasts as published by the European Commission, the OECD and the IMF. In line with, for instance Barrell and Metz (2006), we clearly find that the reliability of a forecast improves as the forecast horizon becomes shorter. Furthermore, forecast errors appear to be mostly of a random nature, indicating how difficult it is to improve forecast performance.

Given the European focus of the report and the availability of euro area data, we will assess the forecasts for the euro area. We consider forecasts of GDP growth, unemployment and inflation for the years 2002–2006. We compare the forecasts to the first release of official data in February (for unemployment and inflation) and April (for GDP growth) of the following year.[1] Of course, we must be aware that these first releases are subsequently revised a number of times.[2] As these revision processes seem endless, it is difficult to define the final release of a particular observation. Furthermore, given the possibility of so-called benchmark revisions,[3] which will make comparison across different vintages almost impossible, we decide to limit our analysis to the first official release. The forecast error is defined as the forecasted rate minus the official figure as published by Eurostat.

Three other institutions that produce economic forecasts are the European Commission, the OECD and the IMF. All three produce forecasts twice a year. In general the forecasts of the European Commission are released in May and in November, those of the OECD in June and December and those of the IMF in May and October of each year. Hence, with respect to timing none of these nicely coincide with our publication date (the end of February). Figure 1.21 shows how the GDP growth forecasts for 2006 depend upon its release date. Similar graphs can also be shown for other forecasted years and variables; they basically tell the same story. The closer the forecast is to the time the first official release occurs, the higher its quality is. This, of course, does not come as a surprise, as more and better data will be available as time passes.

Table 1.4 reports the average forecast errors for GDP growth, unemployment and inflation for the euro area. Alongside the EEAG errors are errors resulting from a naive forecast and those of forecasts as published before and after our release by the three international organisations. A naïve forecast simply takes the last official annual growth rate available for that particular variable and extrapolates it into the year to be forecasted.

The first column of the table indicates that although GDP growth forecasts have on average been larger than the actual first releases, these differences do not significantly deviate from zero, i.e. there is no systematic bias in any of the GDP growth forecasts. Neither can we find a bias in the unemployment forecasts. For inflation, the story is different. In particular the IMF, but also the European Commission and the EEAG, have systematically underestimated the actual inflation rate before or at the beginning of the year. Apparently, the rises in the oil price have not been captured by any of these forecasters.

Forecast uncertainty is usually judged by calculating the so-called Root Mean Squared Error (RMSE) of the forecast as compared to the official release.[4] It is informative to look at the way the average forecast error, that is, the RMSE, differs among the forecasters and how they change as one approaches the first release date for the variable being forecasted.

Table 1.4 reports the results. Except for some inflation forecasts, all institutions have produced estimates that clearly outperform simple and naïve forecasts. For instance, a naïve forecast of GDP growth has been on average 0.91 percentage points off track; our own EEAG forecast has made an average error of 0.05 percentage points. With respect to the inflation forecasts, we find that up until spring of the year to be forecasted, the naïve forecasts outperform those of the organisations. Of the four organisations considered, the inflation forecasts of the European Commission have clearly been the most accurate. Also with respect to growth forecasts, the autumn releases of the European Commission appear to be the ones to beat.

As to be expected, the quality of the EEAG forecasts lie basically somewhere in between those released in autumn before and spring after we publish our report. The only notable exceptions are our unemployment forecasts. Here our forecasts produced at the beginning of the year referring to the rest of that year outperform those released by the three other organisations during the spring of the same year, that is, as compared to estimates clearly released after ours.

Table 1.4 also highlights that indeed forecast uncertainty, as measured by RMSE, falls over time and approximates zero shortly before the official data are first released by Eurostat. Forecast uncertainties with respect to unemployment and inflation are roughly in the same vicinity, that is, about 0.5 percentage points when the first forecast is released and approaching zero over time. As compared to these, GDP growth, which has an average forecast error of 1.5 percentage points when first published, is clearly more difficult to predict.

[1] Note that our forecast is completed before these new releases are available.
[2] Data on inflation rates are the only exception to this rule, that is, inflation data are hardly revised over time.
[3] A benchmark revision is a revision due to fundamental methodological changes in the way in which national accounts are computed.
[4] It looks at the distance between the forecasted and the actual outcome for each forecasted observation. By squaring this distance it is assured to be always bigger or equal to zero. The closer it is to zero the better a particular forecast has been. Subsequently, averaging these squared errors gives a measure that summarises the past forecast performance into a single number. Finally to get back to the original units, that is, percentages, the square root is taken. Hence, the root mean squared error equals $\sqrt{\frac{1}{N}\sum_{i=1}^{N}(\hat{y}_i - y_i)^2}$, where N stands for the number of forecasts and a hat indicates the forecast.

sumption sharply. Although growth of the latter is in the process of slowing down, there are no signs of it turning negative; wages – as main driver of consumption decisions – are still projected to grow by more than 3 percent, that is, almost as strongly as they did

last year. Furthermore, the recently proposed fiscal stimulus programme implies an increase in disposable income of about 100 billion US dollars this year – which is approximately ¾ percent of GDP. However, as the full effect of declining house prices may still be

Table 1.4

Forecasting performance for the euro area

		Average forecasting errors/Root Mean Squared Errors					
		GDP Growth		Unemployment		Inflation	
		Average		Average		Average	
Release	Source	error	RMSE	error	RMSE	error	RMSE
Spring, t–1	naive forecast	0.34	1.71	0.21	0.68	0.10	**0.22**
	IMF	1.08	1.51	0.00	**0.41**	– 0.54***	0.55
	EC	1.06	1.55	– 0.08	0.46	– 0.44**	0.49
	OECD	0.62	**1.46**	0.02	0.68	– 0.25	0.64
Autumn, t–1	naive forecast	0.15	1.47	0.15	0.69	0.09	**0.20**
	IMF	0.64	1.18	0.12	**0.40**	– 0.44***	0.45
	EC	0.32	**0.80**	0.20	0.40	– 0.18*	0.24
	OECD	0.72	1.36	0.12	0.51	– 0.12	0.40
Winter, t	naive forecast	0.16	1.44	0.16	0.70	0.09	**0.20**
	EEAG	0.24	**0.61**	0.10	**0.26**	– 0.30***	0.32
Spring, t	naive forecast	0.27	1.46	0.19	0.42	0.01	**0.15**
	IMF	0.24	0.54	0.17*	**0.26**	– 0.26***	0.28
	EC	0.33	0.51	0.17	0.30	– 0.17*	0.20
	OECD	0.36	**0.51**	0.07	0.39	– 0.06	0.33
Autumn, t	naive forecast	0.10	0.93	0.14	0.41	0.00	0.14
	IMF	0.04	0.26	0.12*	0.18	– 0.02	0.10
	EC	0.01	**0.16**	0.02	**0.11**	0.06	**0.06**
	OECD	0.43	0.33	0.05	0.15	0.04	0.12
Winter, t+1	naive forecast	0.12	0.91	0.03	0.25	0.00	0.14
	EEAG	0.01	**0.05**	– 0.05	**0.05**	– 0.02	**0.07**

Notes: The years forecasted are 2002–2006. Forecasts are for the euro area. With respect to the null hypothesis that the average equals zero, ***, **, * denote significant values at respectively the 1, 5 and 10 percent levels. RMSE stands for the Root Mean Squared Error. The lowest RMSE value in each block is depicted in bold.

coming there is a considerable uncertainty with regard to the US economy.

In view of the still strong world economy and the continued weakness of the US dollar, exports will support US growth during the entire forecasting horizon. Starting from a currently very high level and given the slowdown of the European economy, export growth will, however, lose some of its momentum. The slowdown in private consumption will keep import growth

at a modest pace, allowing the current account to improve further.

Supported by corporate profits and external demand, equipment and software investment – after having reached a cyclical trough during winter 2006/2007 – will continue to grow. At a rate of close to 4 percent this year, it will outperform last year's growth rate of 1.4 percent. In particular, investment in nonresidential structures will be affected by the fall in consumer confidence. Its high growth in the past years has been largely driven by the construction of hotels. Investment in structures is expected to increase by 5.5 percent this year (after 13.2 percent last year).

Summing up, the 2008 performance of the US economy is difficult to predict due the declining house prices and the subprime crisis, the full impact of which not yet clear. Taking all uncertainties into account, we forecast a significant decline in growth to 1.7 percent for 2008 after 2.2 per-
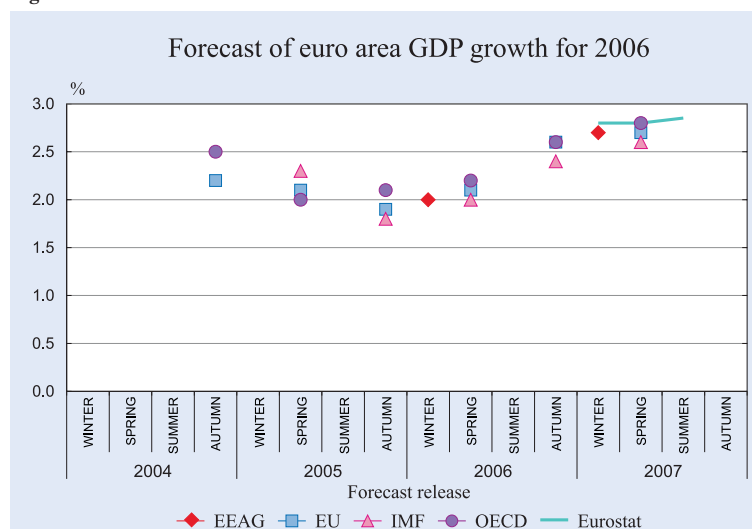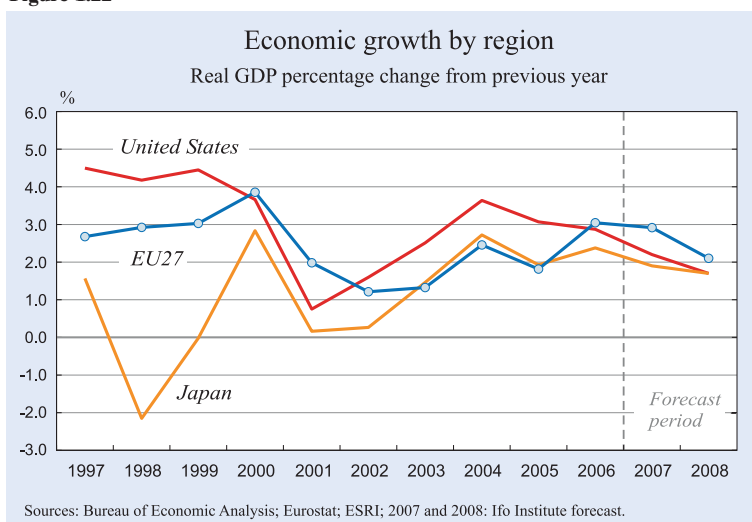
Figure 1.21

Forecast of euro area GDP growth for 2006

Figure 1.22

Economic growth by region

Real GDP percentage change from previous year

Sources: Bureau of Economic Analysis; Eurostat; ESRI; 2007 and 2008: Ifo Institute forecast.

likelihood of recession and turn the anticipated slowdown into a milder one. It will raise real GDP by about one percentage point during the second semester this year, increasing the annual growth rate for 2008 by somewhat more than half a percentage point above what it otherwise would have been. As the present economic sentiment is a bit out of line with actual real economic developments, the most important effect of these measures might turn out to be the psychological boost they give to the economy.

cent last year. This implies that for three consecutive years the US will grow less strongly than the EU27 (see Figure 1.22).

Despite the clear economic slowdown this winter, high energy and food prices will keep inflation high until summer. After that, CPI inflation will moderate again, reaching 2.8 in 2008. Core inflation will hover at around 2.3 percent during our forecast horizon, thereby remaining above the implicit target level of the Federal Reserve. Nevertheless, we assume that, given the strong policy reactions in January, the Federal Funds rate will not be reduced any further and remain at 3 percent this year.

In the current fiscal year 2008, the deficit-to-GDP ratio might increase to about $2^{1/2}$ percent. Beside a clear rise in the military budget (due to expenditures related to the military presence in Afghanistan and Iraq) and continued tax relief, this more expansionary fiscal policy stance is mainly explained by the recently announced economic stimulus programme. Lower corporate profit growth also implies that tax revenues will rise more slowly than last year.

The recent fears for a recession led the US government in January this year to announce a fiscal stimulus plan of about 150 billion US dollars, which is 1.1 percent of GDP. Although the details of the programme are still being worked out at the end of January, it appears that two thirds of this will be distributed as a tax refund for low- and medium-income households (as was done in 2001). The remaining third are tax breaks to firms designed to encourage capital spending. If implemented quickly enough such a programme will further reduce the

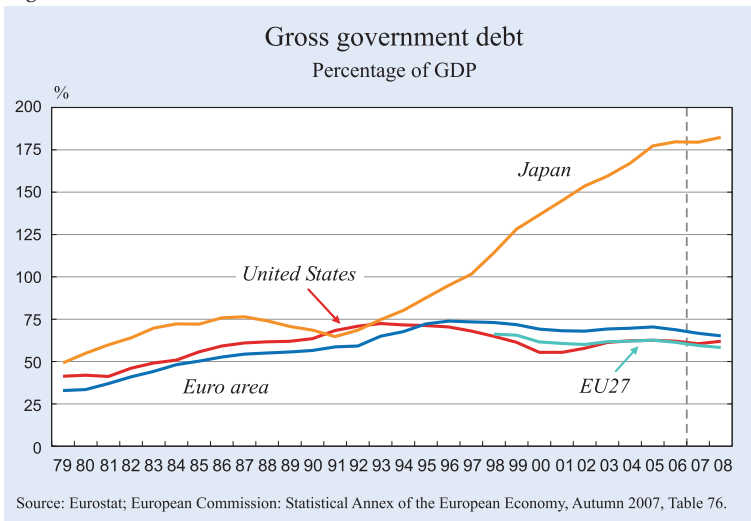### 4.3 Japan, China, India and other Asian countries

Short-term indicators like the Tankan Index and the Ifo World Economic Survey indicate that *Japan* will also face a moderate slowdown of its business cycle this winter. Whereas net exports will not contribute much to economic growth, stronger growth impulses will emerge from domestic demand and in particular nonresidential investment. Also the negative growth effects caused by changes in building laws will peter out. The Japanese economy is expected to grow by 1.7 percent in 2008.

Increased producer price inflation last year will drive up the consumer inflation rate. The latter will increase to 0.5 percent this year. This will also allow the Bank of Japan to normalise its monetary policy stance and increase short-term interest rates during the course of the years.

For the upcoming fiscal year, which starts in April, government expenditure limits are scheduled. This should bring back fiscal policy on a highly required consolidation course: a government debt-to-GDP ratio of about 180 percent is unsustainable in the long run (see Figure 1.23).

Although *Chinese* GDP will continue to develop strongly, lower export increases will weaken growth somewhat. Exports will be affected by the cancellation of specific tax relief, but also by the slowdown in US import demand. The current mild slowdown has already been signalled by the Ifo World Economic Survey: according to it, the current business situation is still being judged as good, but the expectations for

Figure 1.23

Gross government debt
Percentage of GDP

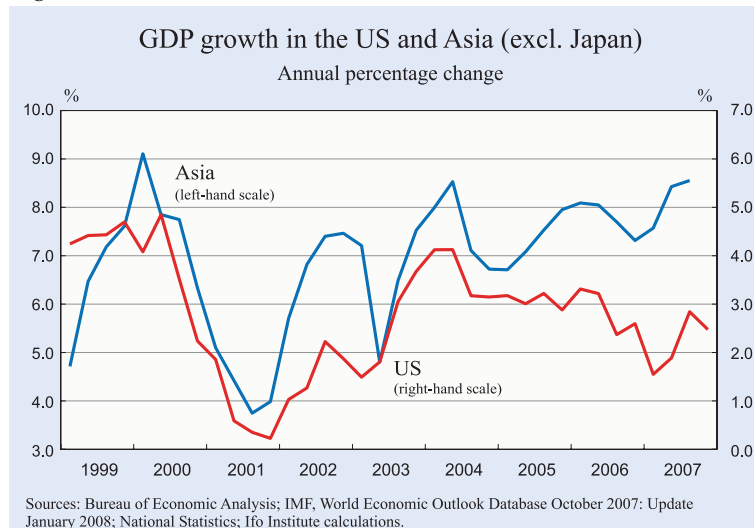Source: Eurostat; European Commission: Statistical Annex of the European Economy, Autumn 2007, Table 76.

US demand. Because of this, actual growth in the recent past has not been affected as much by developments in the US as the years before would have suggested (see Figure 1.24).

Despite the current favourable economic prospects, there are at least two factors suggesting that East Asia is still quite dependent on the US business cycle. First, Asia's export diversification is a consequence of intra-Asian division of labour. Instead of exporting directly to the US (as was the case a decade ago), Asian economies currently to a very large extent supply intermediate inputs and raw materials to China, where they are made into finished products and sold in the global market. However, as China itself has in recent years increased its share of exports to the US from around 21 percent in 2000 to approximately 40 percent now, Asian exports remain linked to the state of the US economy.

Second, increased financial integration also helps transmit worldwide economic cycles. Exchange rates, stock prices and interest movements are much more pronounced and abrupt than changes in trade flows. Within the financial sector, the US – which continues to account for around 40 percent of global stock market capitalisation – still plays a dominant role. To date, however, the tightening of credit markets in Asia brought about by the American mortgage crisis has generally remained moderate – among other things

the coming months have deteriorated. The more restrictive monetary policy stance and the administrative measures taken last year will restrain growth: it will fall to 9.5 percent this year.

A further reduction in growth in *India* is not very probable. Although the central bank is likely to tighten monetary policy further, the domestic economy appears to be very resilient. Given the slowdown in the second half of last year, it is likely that growth this year will fall back to 8 percent.

In the other East Asian countries *(Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan* and *Thailand),* the domestic economy remains strong and will be able to buffer some of the slowdown in the world economy. Does this mean that Asia has detached itself from the US economic cycle? This decoupling thesis is substantiated by the series of economic reforms that were implemented in recent years as a consequence of the lessons drawn from the Asian Crisis of the late 1990s. Since then, most East Asian countries have reduced their budget deficits, have improved their net foreign asset positions and have massively boosted their foreign exchange reserves. Together with more flexible exchange rates, this means that the scope for countercyclical fiscal and monetary policy has become significantly greater. A larger proportion of exports is now sold within Asia, which has reduced the direct dependency on

Figure 1.24

GDP growth in the US and Asia (excl. Japan)
Annual percentage change

Sources: Bureau of Economic Analysis; IMF, World Economic Outlook Database October 2007: Update January 2008; National Statistics; Ifo Institute calculations.

because profits from export activities continue to ensure ample inflows of liquidity.

All in all, our judgement is that East Asian countries will be affected by the slowdown in the US economy, albeit only moderately. In, for instance, South Korea, the biggest economy of this group, the results of the Ifo World Economic Survey have actually brightened up. The assessments of both the current and future situation have been adjusted upwards. Growth in the entire region will be able to remain at a level of 5.5 percent this year.

4.4 The rest of the world

Aggregate growth in Latin America will be 4.5 percent this year. The reasons for these slightly lower growth rates are the more moderate developments in the world economy and capacity limits in those Latin American countries that export raw materials.

A normalisation of food price developments and appreciations of local currencies will give central banks in the region reason to continue their course of reducing interest rates. This will stimulate domestic demand. High raw material prices will allow exports to continue to expand. Although imports will accelerate due to the appreciation of local currencies, increased net exports will contribute positively to economic growth.

The close ties to the US will imply a somewhat stronger slowdown of the *Mexican* economy for the time being. Beside exports, also domestic demand will be held back due to reduced financial transfers from emigrants to the US.

High inflation will reduce private consumption somewhat in *Russia*. Also, business expectations have started to deteriorate slightly. However, given record oil prices and surging energy exports, the overall economy can be expected to continue growing at a rapid pace. We forecast GDP growth of 6.5 percent this year.

4.5 Risk and uncertainties for the world economy

As usual, this outlook is exposed to both up- and downside risks. It is assumed that the oil price will fluctuate around 90 US dollars per barrel over the whole forecasting horizon and that the exchange rate of the euro will move around 1.45 US dollars. If the oil price were to fall substantially, the world economy could develop more strongly.[9]

At present, the main uncertainties are the depth of the current credit crisis and its impact on the real economy, especially on the US economy. Sharp falls in US real estate prices could have strong negative effects on both financial markets and the real economy. They could dampen private consumption severely by aggravating the negative wealth effects and raise interest rate risk premiums. Furthermore, nonresidential investment could also be severely affected as firm profits are endangered and credit constraints exacerbated. This would in turn have negative consequences for the labour market leading to a potentially vicious circle. To the extent that this would induce the Federal Reserve to loosen monetary policy even more, it might cause an even stronger depreciation of the dollar. This would reduce net exports of other countries and could in this way transmit recessionary impulses.

Views differ widely on when financial markets will start to function again normally. The forecast presented here is based on a return to properly functioning markets in roughly half a year's time, but still with higher risk premiums persisting thereafter.

A further risk is associated with the still high US current account deficit of 5.6 percent of GDP last year. It indicates that investment in the US is higher than domestic savings. The difference is financed by the increase in the net foreign debt position. An abrupt increase in the US savings rate to correct this would imply a severe reduction in domestic demand. Furthermore, a more pessimistic risk assessment of foreign investors and an associated reduction in their willingness to invest in the US would lead to an increase in long-term interest rates there. This would affect aggregate demand in the US negatively. Experiences from other countries show that a deficit of more than 5 percent of GDP has not been sustainable in the past. The depreciation of the US dollar has already led to an increase in export dynamics. A further loss in confidence in the US economy could accelerate this development. Such a demand reduction in the US would be transmitted to other countries as well. They could also be severely affected by an associated large depreciation of the dollar, which would reduce net exports from other countries to the US (see Box 1.1 in Chapter 1 of the 2007 EEAG

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[9] According to recent estimates of the Ifo Institute, a 12 percent reduction in the oil price implies an increase in the euro area growth rate by approximately 0.35 percentage points (see Carstensen et al. 2007).

Report and Chapter 2 of this year's and the 2006 EEAG Report).

4.6 The European economy

The cyclical situation

After the outbreak of the credit crisis, producer confidence started to crumble and the euro appreciated even further against the US dollar. These headwinds and the consequent reduction of US imports will continue to dampen growth during the first half of this year, bringing economic growth back to its potential. After 2.9 and 2.6 percent last year, growth is likely to fall to 2.1 percent and 1.8 percent this year in the EU27 and the euro area, respectively (see Figure 1.25). Due to the persistent global unrest in financial markets, the uncertainties surrounding this forecast are large though.

From a demand-side perspective, the main reasons for the slowdown are twofold. First, investment will expand less dynamically as its business cycle peak has already been passed. Second, the high value of the euro and the weakening of global trade will slow down European exports and lead to a small negative growth contribution from net exports.

Employment will continue to increase (see Figure 1.26), but there will be higher inflation and relatively low wage increases. For this reason consump-

Figure 1.26

Employment in the EU27
Seasonally and work-day adjusted data

Sources: Eurostat; Ifo Institute calculations and forecast.

tion increases will be only moderate. Nevertheless, the highest contribution to growth will come from consumption (see Figure 1.27).

Employment and inflation

As growth will not fall below potential and there are likely to be delayed reactions to the strong growth in the past two years, employment will increase further. Unemployment in the EU27 will fall to 6.8 percent this year (see Figure 1.28).

The output gap will remain positive in 2008. The restrictive monetary policy stance will slowly allow the inflation rate to move back to a level close to 2 percent next year. This holds for both the EU27 and the euro area. Moderate nominal wage increases, of the same order of magnitude as last year, that is, approximately 2 3/4 percent for the euro area, also work in favour of this scenario.

The ECB is advised not to react to the presently high inflation rates. First of all, they are largely explained by special effects that will only have a temporary influence on inflation and hence will not affect medium-term inflation expectations. For instance, the increase in the oil price has been fortified by a baseline effect resulting from its distinct decrease during winter last year. Furthermore, the German VAT increase early last year is presently affecting the euro CPI inflation rate by
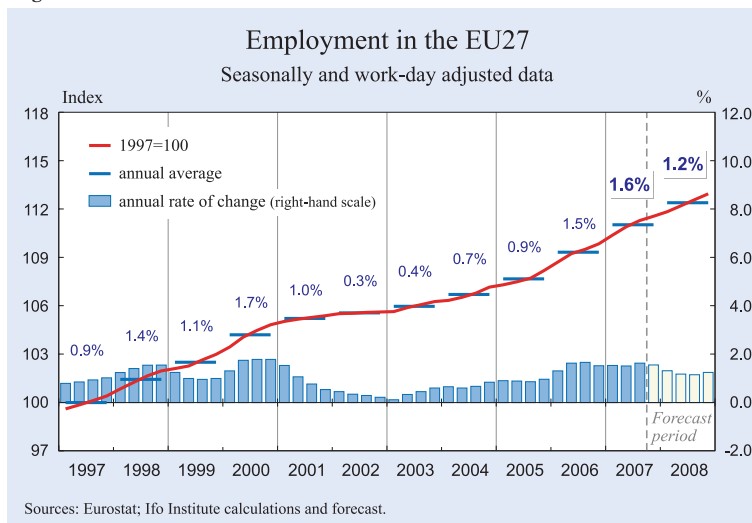
Figure 1.25

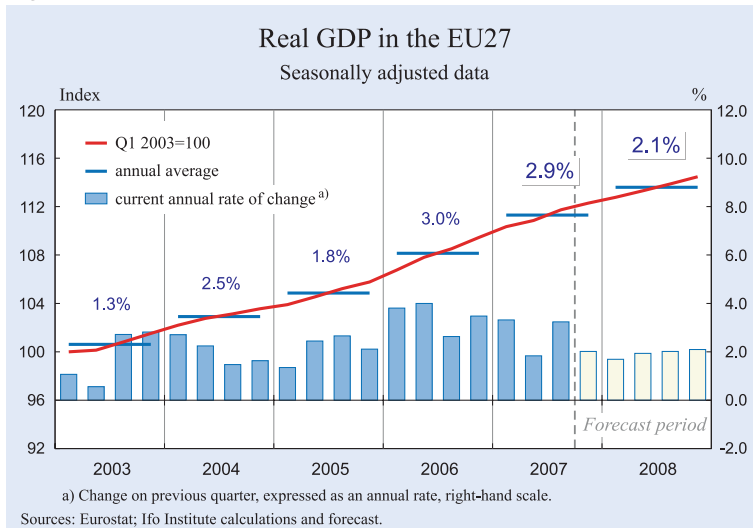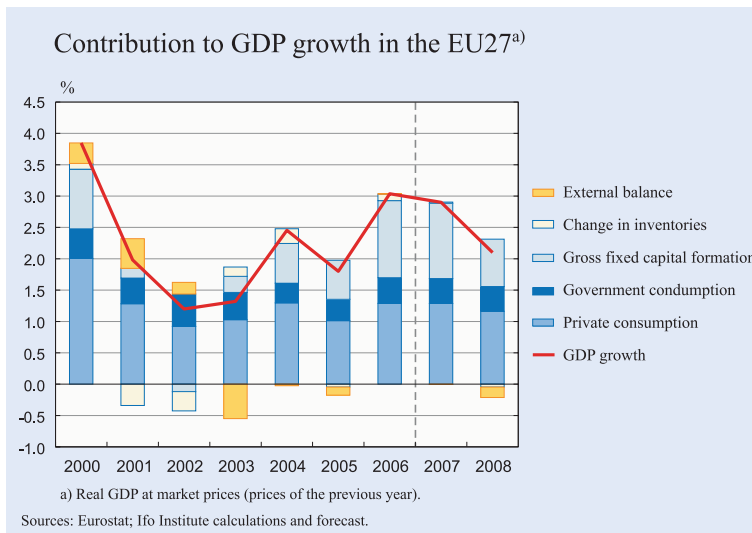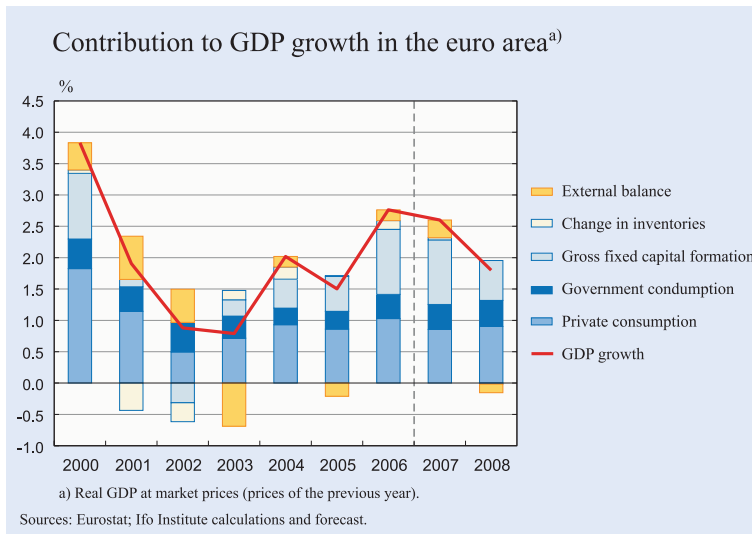Real GDP in the EU27
Seasonally adjusted data

a) Change on previous quarter, expressed as an annual rate, right-hand scale.
Sources: Eurostat; Ifo Institute calculations and forecast.

Figure 1.27

Contribution to GDP growth in the euro area[a)]

a) Real GDP at market prices (prices of the previous year).

Sources: Eurostat; Ifo Institute calculations and forecast.

Contribution to GDP growth in the EU27[a)]

a) Real GDP at market prices (prices of the previous year).

Sources: Eurostat; Ifo Institute calculations and forecast.

Differences in output growth within Europe

The slowdown of the *German* economy will continue at least until the second half of the year. Some investment projects were hastened last year to still benefit from old depreciation allowances.[10] This will reduce this year's equipment investments. An increase in consumption will be decisive in bringing output growth back to potential again. After the inflation hike has been put behind us, improved labour market conditions and wage developments will raise real consumption growth to about 1.3 percent; a growth level not seen since 2001. Overall, this will allow GDP growth to reach 1.6 percent this year. Correcting for the fact that there will be more working days this year than usual, growth will be 1.3 percent. As last year, the inflation rate will on average equal 2.3 percent. However, at the end of the year it will fall below 2 percent again. There is no sign that the competitiveness of the German economy is starting to deteriorate soon. Inflation rates and wage growth will remain below the euro area average.

approximately 0.3 percentage points. Nevertheless, the oil price increases will have an impact on the inflation rate in the months to come. An inflation rate of 2.4 percent in the euro area (and 2.5 percent in the EU27) is clearly beyond the target rate as communicated by the ECB. Assuming that no further oil price hikes occur, the strong euro will dampen inflation and the target rate of 2 percent will be reached again in 2009.

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[10] Since the beginning of this year, it is no longer possible in Germany to depreciate in accordance with the declining-balance method. As a reaction to this, firms pulled relevant investments into the year 2007. For instance, the registration of commercial vehicles turned out to be high last year.
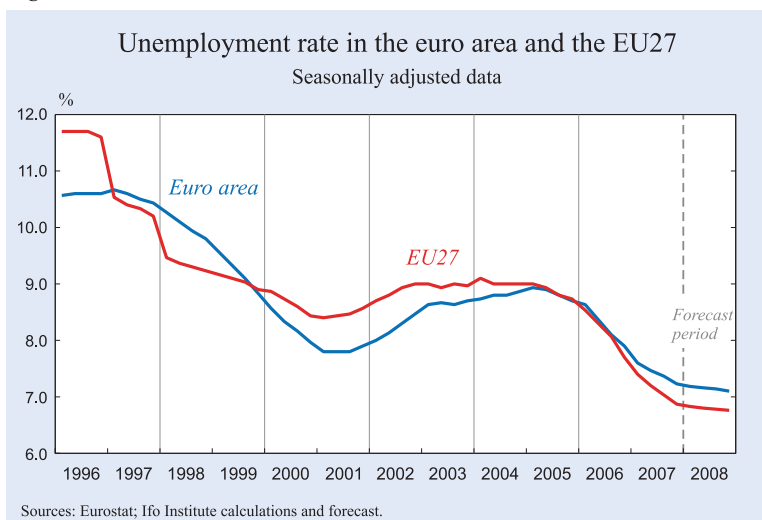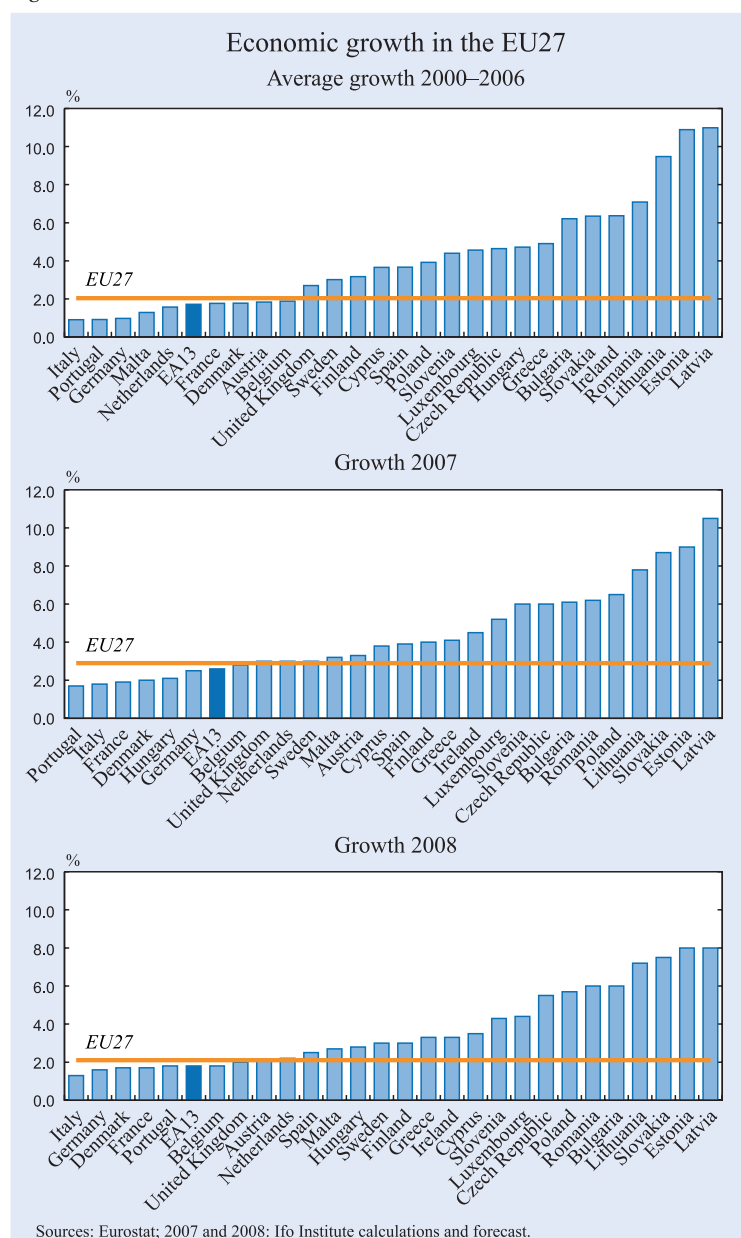
Figure 1.28

Unemployment rate in the euro area and the EU27

Seasonally adjusted data

Euro area

EU27

Forecast period

Sources: Eurostat; Ifo Institute calculations and forecast.

Figure 1.29

Economic growth in the EU27

Average growth 2000–2006

Growth 2007

Growth 2008

Sources: Eurostat; 2007 and 2008: Ifo Institute calculations and forecast.

Furthermore, exports will pick up somewhat. All other spending components are likely to show more moderate developments in the near future. In sum this will allow GDP to grow at rates of 1.7 percent this year. Inflation is forecasted at 2.1 percent; the surge in inflation will not hit France to the same extent as in many other countries.

The macroeconomic prospects for *Italy* remain clouded. First, investment will continue to develop moderately. Especially, residential investment growth will fall after relatively strong increases in the last few years. Second, exports of, in particular, the textile industry, which still make up a relatively large share of the manufacturing sector, will continue to suffer from strong international competition. The international competitiveness of the Italian economy continues to deteriorate. Its export performance will therefore keep on worsening as it has since 1996. GDP will increase by 1.3 percent this year. Although employment will grow by less than 1 percent, an even weaker increase in the labour force will still allow the unemployment rate to continue to fall and reach 5.8 percent this year.

The economic expansion in the *UK* will initially weaken (see Figure 1.29). GDP growth will be only 2 percent this year. Private consumption will expand more slowly than in recent years. One reason is that the savings rate – which has fallen to relatively low levels – will increase again. Real estate prices started to decline in autumn last year. On top of that, relatively high interest rates and increased uncertainty will lower investment growth as well. The development of net exports will contribute negatively to GDP growth. Substantial risks concern the development of the UK real estate market.

Private consumption in *France* will slowly revive and again become the main factor behind demand growth.

Growth in *Spain* will weaken relative to recent years. Housing markets slump, and residential investment will grow only weakly. This will also affect employment in the building sector negatively, which in turn will dampen growth in disposable income. Private consumption will not develop as strongly as it did in the past. In total, GDP will grow by 2.5 percent this year.

At the start of this year, the two Mediterranean islands, *Malta* and *Cyprus*, joined the euro area. With a joint population of 1.5 million and a share of less than 0.2 percent in the euro area's GDP, the importance of these two economies for the economic development of the euro area is very small. These coun-

tries, though, will clearly benefit from entering. Both are open economies that rely heavily on trade with the rest of Europe. Adopting the euro means less currency risk for exporters, more competitive economies for consumers and a stable environment for foreign direct investment. Nevertheless, there are adjustments costs. Both economies are growing faster than the rest of the euro area which might induce rising inflation. Lower interest rates could further raise house and asset prices to dangerous levels. Furthermore, given the upcoming elections in both countries, it is not clear whether the fiscal consolidation path during the run-up to the euro will be maintained.

Although it will level off somewhat, economic growth in the new EU member states will remain strong. GDP of the region will increase by 5.7 percent this year. Domestic demand especially, will continue to expand buoyantly. Inflation will level off somewhat and the labour market – as measured by the unemployment rate – will continue to improve.

The Baltic states, *Estonia, Latvia* and *Lithuania*, will remain the front-runners in this group. However, these are also the countries with the largest current account deficits; in Latvia the current account deficit was 21 percent of GDP in 2006. It raises serious concerns about possible exchange rate overvaluation. As compared to other emerging European economies these deficits are to a large extent financed through bank-to-bank and other borrowing rather than foreign direct investments. The currency board arrangements in Estonia and Lithuania and the pegged exchange rate regime in Latvia explain why a significant portion of these credits are denominated in euros. The high inflation in the Baltic states can to a large extent be explained by the combination of the loss of monetary independence associated with a fixed-exchange rate regime (ruling out a stricter monetary policy than that of the ECB) and the Balassa-Samuelson effect.[11] Although slated to adopt the euro in 2010, the continuing high inflation rates are bound to become a clear obstacle for entering the euro area (see Chapter 3 of the 2007 EEAG Report on this).

After Slovenia in 2007, Cyprus and Malta this year, *Slovakia* is the next in line to join the euro area. It is aiming to adopt the euro on 1 January 2009. Its readiness will be assessed in May this year. With a fiscal

budget deficit estimated to be 2.7 percent of GDP this year and a debt-to-GDP ratio of slightly more than 30 percent, Slovakia complies with the fiscal criteria; only its high inflation rate of 2.6 percent this year might prove to be somewhat problematic. Nevertheless, we expect a positive decision by the EU Finance Ministers in early summer.

5. Macroeconomic policy

5.1 Fiscal policy

The economic upswing continued to reduce fiscal deficit and debt positions throughout Europe. Except for France and Hungary, all countries that still had debt-to-GDP ratios above 60 percent in 2006 improved their debt positions last year. For the euro area as a whole, the total deficit fell by around 0.8 percent of GDP. As the year before, approximately half of this was of a structural nature. According to the latest estimates, the structural deficit for the euro area has now fallen five years in a row. Nevertheless, there are still fiscal deficits in most of the countries in the euro area.

This year, fiscal policy will turn expansionary again in Europe. The consolidation of government expenditures will not really make progress. Consequently, the scheduled tax relief in, for instance, France and Germany will only partly be financed by reduced expenditures. Improved labour market conditions and increased tax receipts will have to cover the remaining parts in order to avoid a substantial increase in the deficit-to-GDP ratio at the European level. Hence, the cyclical improvements of the recent past are likely to be used as an excuse for complacency and we do not expect to see any further improvements of structural deficits this year.

Although the ageing of our societies is steadily progressing and will definitely take its toll on public finances in Europe (see Chapter 1 of the 2007 EEAG Report and Chapter 4 of the 2005 EEAG Report), politicians have not been able to use the past few years of extraordinary growth to cut government spending to prepare for these future budgetary pressures. To the extent that deficits have been reduced, it has mostly been done by increasing revenues. Excellent examples are the VAT increase in Germany and the increase in income tax progressivity in Italy last year. For years, we (and other economists) have been advocating the lowering of in particular government transfers. This would be an important route towards cutting back

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[11] The Balassa-Samuelson effect implies that high productivity growth in the tradables sector causes high wage increases that spill over to the non-tradables sector and thereby result in substantial price rises there.

marginal tax rates on labour, which would in turn promote labour supply. Increasing participation rates is a prerequisite for financing the current welfare-state provisions in Europe. At present, a labour force participation rate of 72 percent in the euro area is still well below those of countries like Australia, Canada, Japan, the UK or the US where this ratio stands well above 75 percent.[12]

This year, government revenues in *Germany* will increase by about 2.5 percent, which is less than in the last two years. In particular, the reform in corporate taxation, which became effective at the beginning of this year, is responsible for this reduction in the growth of tax revenues. Government spending will rise by approximately 2 percent, which is faster than in 2007. The defence budget and the budget for education and research will benefit from this. Although the actual government budget will approximately stay balanced, the structural counterpart will for the first time in years deteriorate somewhat. Hence, fiscal policy in Germany will be slightly expansive.

The deficit ratio in the *UK* is not likely to be reduced in 2008. No efforts worth mentioning are scheduled and a level of 3 percent of GDP will be reached this year.

Despite the high debt-to-GDP ratio of 64 percent, it is not very likely that *France* will opt for fiscal consolidation in the near future. The scheduled public expenditures for this year are close to identical to those of last year, underlining the French position to not move to a medium-term target of close to balance in the near future.

In *Italy*, after clear improvements last year, no further structural changes in government finance are scheduled. Fiscal policy in *Spain* will remain expansionary this year. Beside additional tax reductions, an increase in government spending is scheduled. This, together with a cyclical downturn, is forecasted to reduce the surplus to about 1.2 percent of GDP this year.

The public finance situation in the new EU member states will continue to develop quite heterogeneously. A more restrictive fiscal stance, however, does not appear likely in most of these countries either.

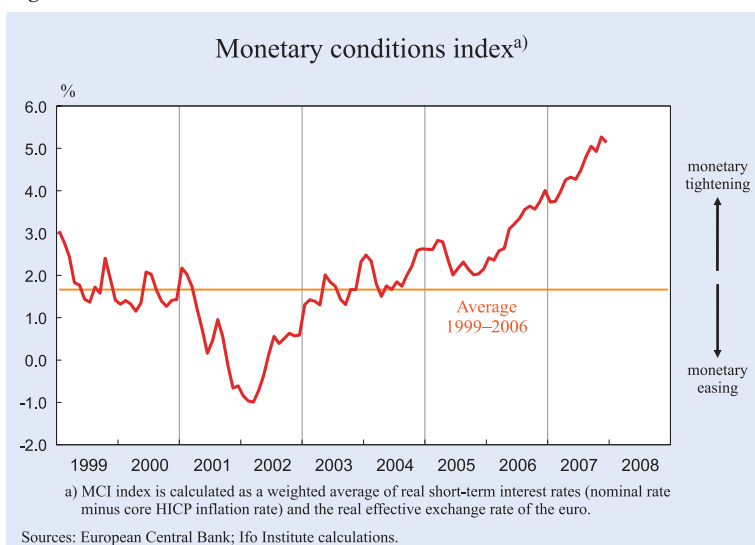### 5.2 Monetary policy

Monetary conditions

Annual money growth rose to unprecedented rates above 12 percent in recent months. Experience teaches that also in other phases of high volatility in financial markets, the demand for short-time time deposits surges. Though these deposits are part of M3, they are not contained in the more narrowly defined monetary aggregate, M1. Although the ECB notes itself that these extremely high growth rates have been influenced by a number of temporary factors, all related to the financial market turmoil, such as the flattening of the yield curve[13] and specific transactions associated with the restructuring of certain banking groups, we already have seen M3 growth rates exceeding the 10 percent level since January last year. At the same time as M3 growth started to increase, M1 growth fell from levels above 10 percent to a level of around 6.5 percent. This mainly shows the tightening of monetary policy in Europe. Nevertheless, the monetary and the accompanying credit aggregates still show a vigorous expansion, which is not quite in line with a credit-crunch scenario. Actually, we have to go back to the early 1980s to find more than two consecutive months with M3 growth rates above 10 percent. To the extent that inflation is ultimately determined by money growth and the ECB is taking its monetary pillar seriously – according to which the ECB reference value for money growth is set to be only 4.5 percent – this upsurge has to be watched closely. So far, the ECB has on several occasions stressed that it will wait before taking action and continue to monitor financial markets to see how and when the turbulence calms down.

In addition to the steady increase of the main refinancing rate in eight steps since December 2005, the appreciation of the euro during the same period has tightened monetary conditions in the euro area considerably (see Figure 1.30). Over the year, the euro appreciated by more than 10 percent against the US dollar. In real effective terms the euro appreciated by more than 5 percent against its 44 most important trading partners during the same period.

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[12] With respect to employment rates, that is, the ratio of total employment to the population of working age, a similar picture emerges.

[13] The yield curve is a graphical representation of the relationship between interest rates or yields on securities of the same credit quality but with different maturities. Usually, the yield curve is positive, that is, upward sloping, because investors demand compensation for the added risk of holding longer-term securities. A flattening of the yield curve implies that this risk compensation is reduced.

Figure 1.30

Monetary conditions index[a)]

a) MCI index is calculated as a weighted average of real short-term interest rates (nominal rate minus core HICP inflation rate) and the real effective exchange rate of the euro.

Sources: European Central Bank; Ifo Institute calculations.

On top of this, interbank money market rates are well above the main refinancing rate, again tightening monetary conditions further. The money market interest rate as measured by the three-month EURIBOR deposit rate was on average 84 basis points above the main refinancing rate in December last year. Between 2006 and the start of the financial turbulence, this spread averaged around 30 basis points. Hence, from a monetary policy point of view, it was as if the central bank had already made one additional interest rate hike of 50 basis points. However, a rise in interbank rates today does not and cannot provide information regarding the future path of interest rates. Hence, this spread does not affect market expectations as an actual interest rate increase would. Only the central bank can meaningfully affect those expectations, which is what matters for future inflation.

Despite this tight monetary policy stance, inflation did surge in recent months. During the last two months of last year, the annual inflation rate as measured by the Harmonized Index of Consumer Prices (HICP) increased to 3.1 percent. Also during the first months of this year, inflation will be well above the ECB target of 2 percent. In the own forecast presented by the ECB early December, the inflation rates lies between 2 and 3 percent, that is, well above its target. This forecast is conditional on the interest rate path that the markets foresee as most likely. Nevertheless, it is also recognised that this inflation surge is temporary and at least partly driven by the drop in oil prices one year ago and the subsequent increase at the end of last year. Furthermore, any further interest rate increases would display

their peak effect on inflation after approximately six quarters. However, there is a risk that the present inflation surge is translated into higher wage demands, which would threaten still moderate medium-term inflation expectations. That would force the ECB to increase interest rates and thereby reduce aggregate demand.

A Taylor Rule for the euro area

What monetary policy decisions can we expect from the ECB this year? Following up on last year's report, we have estimated a monetary policy rule, the Taylor rule, for the euro area. The general idea behind estimating a Taylor rule is to identify to what extent a central bank, in our case the ECB, has changed its main policy rate as a reaction to deviations of inflation and output from their respective targets. The Taylor rule interest rate is generally seen as a benchmark interest rate for actual monetary policy. Furthermore, by extrapolating its past behaviour into the future, we are able to gain an idea of the direction future interest rate changes tend to go.

When using so-called Taylor rules to analyse the appropriate stance of monetary policy, it is important to take a forward-looking perspective. It is generally recognised that it will take several quarters for a policy change today to have its full effect on the real economy and actual inflation rates. Hence, instead of focusing too much on today's inflation rate, the central bank is likely to put substantial weight on expected future developments in their decision-making process. Indeed, when exploring different ECB Taylor rules for the euro area, Sauer and Sturm (2003, 2007) conclude that only forward-looking specifications (by either taking expectations derived from surveys or assuming rational expectations) give estimated Taylor rules in line with both theoretical models and communicated behaviour of the ECB itself. Similar conclusions are drawn by Castelnuovo (2007).

Hence, we explore forward-looking Taylor rules based on the idea that in order to ensure medium-term price stability, the central bank interest rate seeks to keep expected output growth and inflation at their target

Box 1.4

The KOF Monetary Policy Communicator for the euro area (KOF MPC)[1]

The KOF MPC is based on a coding of each introductory statement provided by Media Tenor, a media research institute, which has a long track record in handling press releases and guarantees a high degree of objectivity and reproducibility. Media analysts read the text of the introductory statement of the monthly press conference sentence by sentence. Each sentence contains one or more statements, which are then coded. The coding does not only capture different topics but also various other dimensions such as the tense of a statement, ambiguity and the like. The data that underlies the indicator are obtained from all sections of the introductory statement. However, only statements that refer to risks for future price stability are selected for construction of the KOF MPC. The coding is aggregated into the index by taking balances of the statements that reveal that the ECB sees upside risks to price stability and statements that reveal that the ECB sees downside risks to price stability, relative to all statements about price stability (including neutral). By design, the values of the KOF MPC are restricted to be in the range of minus one to plus one. The larger a positive (negative) value of the KOF MPC, the stronger the ECB communicated that there are upside (downside) risks for price stability. Since price stability is the ECB's primary objective, movements in the KOF MPC should indicate the path of future interest rates.

As the KOF MPC indicates changes in the main refinancing rate, summing up these changes over time gives a better picture of how the KOF MPC correlates with the level of the interest rate. The cumulative indicator is the sum of all previous values of the KOF MPC and the current value. Figure 1.32 plots the development of both the actual KOF MPC and its cumulative version. Comparing Figures 1.32 and 1.31 highlights that the time course of the cumulative indicator closely matches that of the main refinancing rate. This visual impression is confirmed by a contemporaneous correlation coefficient between the two series of about 90 percent. This development shows that the connection between the ECB's deeds and its communication is rather close.

[1] More information on the KOF MPC can be found on http://www.kof.ethz.ch/communicator.

rates. In our formulation, real economic developments are proxied by growth rates.[14]

We use consensus forecasts for both expected GDP growth and expected inflation as published monthly by Consensus Economics Inc. and estimate a Taylor rule specification for the euro area. The implied target Taylor rate – a benchmark to which we can compare the actual main refinancing rate – is depicted in Figure 1.31. In general, the implied target rate appears to have a lead over the actual interest rate development. At the end of the sample, the target Taylor rate suggests future cuts in the main refinancing rate. This result is easily explained. Actual inflation expectations have not moved much over the past few months. Growth expectations on the other hand have clearly deteriorated. This latter

effect outweighs the former and – given past behaviour of the ECB – suggests a decline in future interest rates. Taking the rhetoric of the ECB into account, this result might come as a surprise. Since the summer of 2007 the ECB appears to stress increased risk for price stability.

Central bank communication has become more and more important over the years. For instance, the introductory statements of the ECB president at the monthly press conference receive high media coverage. Basically every word Mr. Trichet says is analysed by journalists, financial analysts and economists around the world. Among others, it is supposed to contain information about future interest rate moves. The KOF Swiss Economic Institute has recently released a new indicator intended to quantify the risks

[14] Under the assumption of constant potential output growth, this implies that instead of the level of the output gap, we include the expected change in the output gap. For instance, Walsh (2003) and Geberding et al. (2004) have argued that such a "speed limit policy", or "difference rule", performs quite well in the presence of imperfect information about the output gap. Given that output gaps are notoriously difficult to measure and tend to be revised substantially over time, this appears quite plausible. Growth rates, on the other hand, are much less prone to data revisions. Secondly, the use of growth cycles has the advantage that they in general have a clear lead over classical cycles. Furthermore, most theoretical models abstract from long-run growth. When allowing for trend growth, it is possible to specify Taylor rules in terms of output growth rates. Finally, expectations and forecasts are normally formulated in terms of growth rates and are therefore readily available. Any deviations of the expected inflation and growth rates from their targets will induce the central bank to adjust the interest rate.
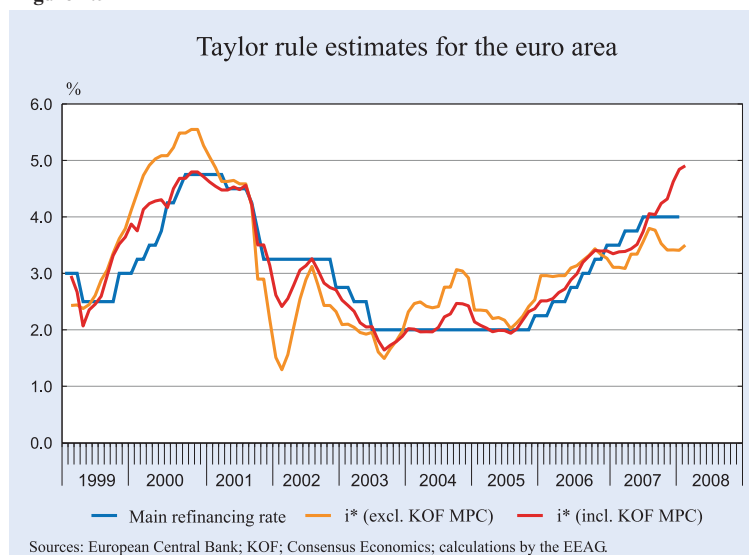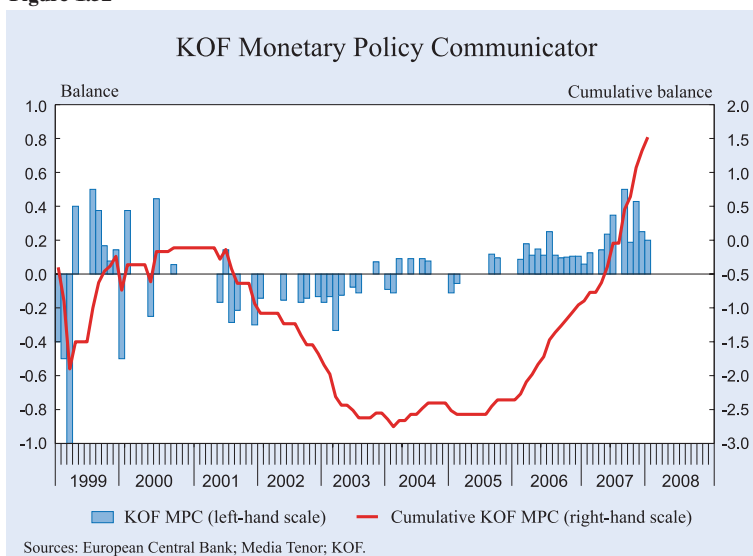
Figure 1.31

Taylor rule estimates for the euro area

Sources: European Central Bank; KOF; Consensus Economics; calculations by the EEAG.

Figure 1.32

KOF Monetary Policy Communicator

Sources: European Central Bank; Media Tenor; KOF.

the ECB Governing Council ascribes to future price stability. Hence, this new KOF Monetary Policy Communicator for the euro area (KOF MPC) translates the ECB president's statements concerning risks to price stability as made during the monthly press conference into an index. By aggregating forward-looking statements concerning price stability, the KOF MPC contains information about the future path of ECB monetary policy. In general, it anticipates changes in the main refinancing rate by two to three months.

To capture the communication of the ECB, we integrate the cumulative version of the KOF MPC into our Taylor rule. As indicated by Figure 1.31, the cumulative KOF MPC clearly improves the fit. The target Taylor rate implied by a specification including the KOF MPC follows actual interest rate developments far closer without losing its lead. Our previous conclusion that an interest rate cut is becoming more likely, is, however, completely reversed. As of late, the ECB is so strongly stressing risks with respect to price stability, that the implied target Taylor rate that takes this into account points toward future hikes.

The most plausible reason why, despite the clear risk to price stability as communicated by the ECB, we have so far not seen interest rate increases is the turbulence on financial markets triggered by the sub-prime crisis in the United States. Stock markets have been very negatively affected by this and, probably more important, interbank trust plummeted leading to liquidity problems within the banking sector. This initiated fears of a so-called credit crunch, that is, a situation in which banks are less willing to supply

credit. More restrictive credit allocation would imply a worsening of the monetary conditions without a change in the main policy rates of the ECB. Although this has hardly materialised, we do see a larger spread between the main refinancing rate and the three-month interbank rate in recent times as compared to the situation before the start of the crisis. This in itself means a tightening of monetary conditions in the euro area.

Another potential reason for holding off policy rate increases might be the exchange rate development vis-à-vis the US dollar. This argument is less convincing though, as the channels by which the strong appreciation of the euro is affecting monetary policy decisions are already captured by the expected growth and inflation rates.

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Appendix 1:
Forecasting tables

Table A.1

GDP growth, inflation and unemployment in various regions

	Share of total GDP in %	GDP growth in %		CPI inflation in %		Unemployment rate[d] in %	
		2007	2008	2007	2008	2007	2008
EU27	33.4	2.9	2.1	2.3	2.5	7.1	6.8
Euro area	24.4	2.6	1.8	2.1	2.4	7.4	7.2
Switzerland	0.9	2.9	2.0	0.7	1.6	2.8	2.3
Norway	0.8	2.9	2.7	2.3	2.4	2.6	2.6
Western and Central Europe	35.1	2.9	2.1	2.3	2.5	7.0	6.7
US	30.2	2.2	1.7	2.8	2.8	4.6	4.9
Japan	10.0	1.9	1.7	0.0	0.5	3.9	4.0
Canada	2.9	2.6	2.3	2.3	2.3	6.0	6.0
Industrialised countries total	78.2	2.5	1.9	2.2	2.3	5.7	5.7
Newly industrialised countries							
Russia	2.3	7.5	6.5	.	.	.	.
China and Hong Kong	6.5	11.0	9.5	.	.	.	.
India	2.0	9.0	8.0				
East Asia[a]	5.1	5.5	5.5	.	.	.	.
Latin America[b]	5.9	5.0	4.5	.	.	.	.
Newly industrilaised countries total	21.8	7.5	6.7	.	.	.	.
Total[c]	100.0	3.6	3.0	.	.	.	.
World trade. volume		5.4	6.0	.	.	.	.

[a] Weighted average of Indonesia. Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand. Weighted with the 2006 GDP levels in US dollars. – [b] Weighted average of Argentina, Brasil, Chile, Columbia, Mexico, Peru, Venezuela. Weighted with the 2006 GDP levels in US dollars. – [c] Sum of the listed groups of countries. Weighted with the 2006 GDP levels in US dollars.. – [d] Standardised unemployment rate.

Sources: EU; OECD; IMF; National Statistical Offices; 2007 and 2008: forecasts by the EEAG.

Table A.2

GDP growth, inflation and unemployment in European countries

	Share of total GDP in %	GDP growth in %		Inflation[a] in %		Unemployment rate[b] in %	
		2007	2008	2007	2008	2007	2008
Germany	20.0	2.5	1.6	2.3	2.3	8.4	7.8
France	15.4	1.9	1.7	1.6	2.1	8.3	8.3
Italy	12.7	1.8	1.3	2.0	2.3	6.0	5.8
Spain	8.4	3.9	2.5	2.8	3.2	8.3	8.6
Netherlands	4.6	3.0	2.2	1.6	2.3	3.2	2.9
Belgium	2.7	2.8	1.8	1.8	2.2	7.5	7.3
Austria	2.2	3.3	2.1	2.2	2.2	4.4	4.3
Greece	2.1	4.1	3.3	3.0	3.3	8.4	8.0
Finland	1.5	4.0	3.0	1.6	2.4	6.9	6.3
Ireland	1.4	4.5	3.3	2.9	2.4	4.5	4.5
Portugal	1.3	1.7	1.8	2.4	2.4	8.2	8.0
Slovenia	0.3	6.0	4.3	3.8	3.8	4.7	4.6
Luxembourg	0.3	5.2	4.4	2.7	2.9	4.9	4.6
Cyprus	0.1	3.8	3.5	2.2	2.3	3.9	3.6
Malta	0.0	3.2	2.7	0.7	2.5	6.3	6.2
Euro area[c]	73.1	**2.6**	**1.8**	**2.1**	**2.4**	**7.4**	**7.2**
United Kingdom	16.4	3.0	2.0	2.4	2.4	5.4	5.4
Sweden	2.6	3.0	3.0	1.7	2.5	6.1	5.8
Denmark	1.9	2.0	1.7	1.7	2.3	3.7	3.3
EU18[c]	94.1	**2.7**	**1.9**	**2.1**	**2.4**	**7.0**	**6.8**
Poland	2.3	6.5	5.7	2.6	2.8	9.6	8.8
Czech Republic	1.0	6.0	5.5	3.0	3.5	5.3	5.0
Hungary	0.8	2.1	2.8	7.9	5.0	7.2	7.0
Romania	0.8	6.2	6.0	4.9	5.6	6.7	6.5
Slovakia	0.4	8.7	7.5	1.9	2.6	11.3	9.7
Lithuania	0.2	7.8	7.2	5.8	6.4	4.3	4.0
Bulgaria	0.2	6.1	6.0	7.6	6.8	6.9	6.3
Latvia	0.1	10.5	8.0	10.1	9.2	5.9	5.4
Estonia	0.1	9.0	8.0	6.7	6.1	4.9	4.7
EU9	5.9	**6.2**	**5.7**	**4.2**	**4.1**	**7.8**	**7.2**
EU27[c]	100.0	**2.9**	**2.1**	**2.3**	**2.5**	**7.1**	**6.8**

[a] Harmonised consumer price index (HCPI). – [b]Standardised unemployment rate. – [c] Sum of the listed countries.

Sources: EUROSTAT; OECD; IMF; 2007 and 2008: forecasts by the EEAG.

Table A.3

Key forecast figures for the euro area

	2006	2007	2008
	Percentage change over previous year		
Real gross domestic product	2.8	2.6	1.8
Private consumption	1.8	1.5	1.6
Government consumption	1.9	2.0	2.1
Gross fixed capital formation	4.9	4.8	2.9
Net exports[a]	0.2	0.3	-0.1
Consumer prices[b]	2.2	2.1	2.4
	Percentage of nominal gross domestic product		
Government fiscal balance[c]	-1.5	-0.8	-0.9
	Percentage of labour force		
Unemployment rate[d]	8.2	7.4	7.2

[a] Contribution to change in real GDP (percentage of real GDP in previous year). – [b] Harmonised consumer price index (HCPI). – [c] 2007 and 2008: forecasts of the European Commission. – [d] Standardised unemployment rate.

Source: Eurostat; 2007 and 2008: forecasts by the EEAG.

Appendix 2:
Ifo World Economic Survey (WES)

The World Economic Survey (WES) assesses worldwide economic trends by polling transnational as well as national organisations worldwide on current economic developments in their respective countries. This allows for a rapid, up-to-date assessment of the economic situation prevailing around the world. In October 2007, 1 020 economic experts in 90 countries were polled. WES is conducted in cooperation with the International Chamber of Commerce (ICC) in Paris. The survey questionnaire focuses on qualitative information: assessments of a country's general economic situation and expectations regarding important economic indicators. It has proved to be a useful tool, since it reveals economic changes earlier than conventional business statistics.

The individual replies are combined for each country without weighting. The grading procedure consists in giving a grade of 9 to positive replies (+), a grade of 5 to indifferent replies (=) and a grade of 1 to negative (−) replies. Overall grades within the range of 5 to 9 indicate that positive answers prevail or that a majority expects trends to increase, whereas grades within the range of 1 to 5 reveal predominantly negative replies or expectations of decreasing trends. The survey results are published as aggregated data. The aggregation procedure is based on country classifications. Within each country group or region, the country results are weighted according to the share of the specific country's exports and imports in total world trade.

1. World: Economic climate deteriorates

In October 2007, the World Economic Climate deteriorated after a period of economic expansion in 2006 and 2007. The climate indicator still stands at 99.3 (after 113.6 in July 2007: 1995=100), above its long-term average (1991–2006: 95.3). This indicates that the global economic expansion is softening. The index of the present economic situation slipped somewhat, after having reached a six-year high in the third quarter 2007. The economic outlook for the coming six months deteriorated, as experts have become more cautious. The economic climate index fell in all three main economic regions: North America, Western Europe and Asia. The largest decline, as expected, was in the United States. In Western Europe, particularly the near-term forecasts have been revised downward.

The smallest decline has been recorded for Asia as a whole. The Asian decline has been somewhat more pronounced in Japan and Hong Kong than in other Asian countries.

The effect of the on-going US mortgage crisis spilled over to Europe and Asia. Already by the end of 2006, the economic climate index had approached a cooling-down phase. In the first half of 2007, however, business sentiments picked up again. But, in the summer of 2007, the US mortgage crisis caused a sharp decline in global business sentiments, aggravated by the increased oil price, which was heading towards the shock value of $100 per barrel. In autumn 2007, the economic climate index started to cool down. However, an increasing number of economists have argued that there is an economic "decoupling" of European and Asian economies from the US. The United States is still the world's biggest importer, but in 2006 Japan, China, India and Russia together imported the same volume of goods. Although the economic expectations for the next six months have visibly slipped all over the world, assessments of the current economic situation have been only slightly downgraded, raising hope for a moderate cooling in 2008. A recession in the US, however, remains a sizeable downside risk for the world economy.

2. Western Europe: Economic cooling

The overall economic climate indicator for Western Europe deteriorated strongly in October. Both components of the economic climate index – assessments of the present economic situation and economic expectations for the next six months – were downgraded. According to the panel's forecast, the economic expansion will slow in the first half of 2008.

The economic climate index declined in all euro area countries. Assessments of both the present economic situation and economic expectations have been revised downward. The present economic situation has been assessed as less favourable, particularly in France, where it is judged below the satisfactory level. Economists surveyed trimmed their economic expectations, which, however, still point to a stable economy in the next six months. The surveyed economists also assess as less favourable the present economic performance in Germany, the Netherlands and Belgium, but still considerably above the satisfactory level. Here, the forecasts for the next six months have also been downgraded and point to an economic

slowing in 2008. The fall in the US dollar has had a negative impact on European exports, but, on the other hand, it alleviated the negative effect of rising oil prices for the euro area, as oil, and many other commodities, are priced in US dollars. This, in combination with strong demand from emerging markets raises hopes that economic expansion, particularly in Germany, will continue in 2008, although with lower growth rates.

Outside the euro area the economic climate cooled somewhat. In Denmark and Sweden, the economic climate deteriorated but is still described as very favourable. WES experts gave the present economic performance very high marks on the WES scale. But the economic expectations for the next six months have been downgraded; particularly with capital expenditures expected to weaken. Norway was one of the few European countries where the economic climate index has remained stable at a very favourable level over the last quarter. This situation is expected to continue, although private consumption is foreseen to weaken strongly. In Switzerland a very favourable economic climate prevails. In the current quarter the surveyed economists gave the present economic situation the highest marks on the WES scale. However, the forecasts for the first half of 2008 have been revised downward here as well. In the United Kingdom, the present economic performance is now assessed as good. But the economic prospects for the next six months have been strongly downgraded, indicating that the UK economy may follow the US into a slowdown. Capital expenditures and private consumption are expected to weaken strongly in the course of the next six months.

3. North America: Economic climate index strongly deteriorates

The economic climate indicator in North America strongly deteriorated in October. The economic expectations for the next six months weakened in particular. The assessments of the present economic situation were also revised downward. This pattern applies to both the United States and Canada.

In the United States, the economic climate has clearly deteriorated since the previous survey, although the present economic situation is still assessed as favourable by the majority of surveyed economists. But the economic expectations have been strongly downgraded and point to a further slowdown in the

next six months. An increasing number of WES experts see a sizeable risk of recession in the US. They forecast capital expenditures and private consumption to weaken in the coming months, triggered by weakness in the US housing market and lack of confidence in the US financial sector. They expect further depreciation of the US dollar, with the Fed determined to avoid a recession. However, given the weak US dollar, the WES experts in the United States foresee a very significant strengthening of the export sector in the US.

In Canada the present economic state continues to be good, according to the survey responses, but the economic outlook for the coming six months has been very strongly downgraded. Capital investment, private consumption and exports are expected to weaken strongly in the next six months.

4. Central and Eastern Europe: Economic climate remains favourable

The economic climate cooled slightly in Central and Eastern Europe. The present economic situation and economic expectations have been somewhat downgraded, on average. However, both indicators remain at a very favourable level, pointing to a stable economic development over the next six months.

Lithuania is the only country within the European Union where both components of the economic climate index have been upgraded. In Central and Eastern Europe, only Poland and Slovakia have been given higher marks for the present economic performance, although the economic forecasts for the next six months have been strongly downgraded. In Poland, economic experts forecast an economic slowing in the beginning of 2008. Capital expenditures in particular are expected to weaken. An economic cooling is also expected by the surveyed economists in the Baltic countries of Estonia and Latvia, where the present economic situation is, however, still assessed at a very favourable level. But in the next six months capital expenditures and private consumption are expected to deteriorate. The same applies to Slovenia, where the economic climate index has deteriorated relative to the previous quarter's survey. In Hungary, the majority of surveyed economists have described the present economic situation as "bad". However, they remain optimistic regarding an economic turnaround in the near-term future. Capital expenditures and the export sector are particularly foreseen to strengthen

very strongly in the next six months. Optimism prevails also among the surveyed economists in the Czech Republic, where the present economic performance was assessed as very good in October. Further strengthening of capital expenditures and the export sector is foreseen for the next six months.

Outside the European Union, the economic climate remains favourable in Bulgaria and Croatia. It is expected to remain so in the coming six months in both countries, with a further revival in capital expenditures, private consumption and exports. In Romania the economic climate is described as favourable by the majority of surveyed economists. Although assessments of the present economic situation and economic expectations have been downgraded somewhat, the surveyed economists expect a stable economic development in the next six months. In Serbia the present economic performance has strongly deteriorated, according to WES experts and is now assessed as poor. However, the economic prospects for the next six months have been strongly upgraded and have become optimistic. In contrast, the Albanian outlook remains clouded and current conditions are still regarded as weak.

5. CIS: Economic climate cools

The overall economic climate index for the CIS countries covered by WES (Russia, Ukraine, Kazakhstan, Kyrgyzstan and Uzbekistan) cooled somewhat in October compared to the July survey.

The assessments of the present economic situation and economic expectations have been downgraded somewhat in Russia. However, the record oil prices and surging energy exports are fuelling economic growth. Thus the overall economy is still described as very good. The economic forecasts for the next six months point to a stable economic environment in the next six months. The experts named a lack of international competitiveness as the main challenge facing the Russian economy at present. In Kazakhstan the economic climate index has deteriorated somewhat since the previous quarter's survey. While the present economic performance is assessed as satisfactory, the economic prospects for the next six months have been downgraded. The economic climate index in Ukraine has remained stable. The majority of surveyed economists sees the present economic situation as satisfactory. The expectations relating to the economic development in the next six months are generally positive.

In contrast, the surveyed economists regard the economic climate in Kyrgyzstan as below the satisfactory level. The economic outlook points to a rather sluggish economy for the coming six months.

6. Asia: Mild cooling of business sentiments

The economic climate in Asia, the second largest region after Western Europe, deteriorated only slightly in the fourth quarter of 2007, following global business sentiments. Assessments of both the present economic performance and economic expectations for the next six months have been downgraded somewhat, on average, for the region. However, several "old" and emerging markets in the region remain generally buoyant, offsetting the US demand drop for products and services in the global economy. According to the surveyed economists the outlook for Asia remains positive.

The deterioration of the economic climate index for Asia resulted mainly from the cooling of business sentiments in the three main economies, Japan, China and India, where both assessments of the present economic situation and economic expectations for the next six months have been downgraded. The surveyed economists expect a slowing of economic activity particularly in Japan. However, in all three economies the capital expenditures are expected to stabilise at the current level and for Japan and India the surveyed economists foresee that exports will strengthen further in the next six months. The economic outlook became clouded also in Sri Lanka and Pakistan, where political turmoil dampens economic recovery. In Thailand the surveyed economists assessed the present economic situation as critical. However, they remain optimistic regarding an economic turnaround in the first half of 2008. The same applies to Bangladesh, where the experts regard the present economic state as somewhat below the satisfactory level.

In the other countries of the region, economic performance did not deteriorate as a result of the financial market crisis. Singapore and Vietnam are ranked with the highest marks on the WES scale and the WES is very positive in the Philippines, South Korea and Malaysia. The surveyed economists forecast further strengthening in all these countries. Particularly in Vietnam, South Korea and the Philippines, exports, private consumption and capital expenditures are foreseen to pick up by the beginning of 2008. In Hong Kong, Indonesia and Taiwan the surveyed experts

judged the present economic situation as satisfactory. Economic outlook for the next six months is pointing to an economic stabilisation. In Hong Kong and Indonesia the capital expenditures are expected to strengthen somewhat. According to the WES panel, the export sector remains upbeat.

7. Oceania: Economy remains buoyant

According to the fourth quarter survey results, the economic climate improved somewhat in Australia and New Zealand. The Australian present economic situation is assessed with the highest marks on the WES scale. The economic outlook for the coming six months has also been upgraded and is pointing to further strengthening of the economy in the beginning of 2008. In New Zealand, the present economic performance has deteriorated, according to the WES experts, but is still assessed as satisfactory. The economic prospects for the next six months have been strongly upgraded and are now pointing to a period of economic stabilisation. Capital expenditures and the export sector in New Zealand are forecasted to strengthen in the next six months by the surveyed economists.

8. Latin America: Stable economic climate

The economic climate index for Latin America remained stable in October. The present economic situation is again assessed above the satisfactory level, on average, for all countries surveyed in the region. The outlook for the coming six months point to continued economic stabilisation.

A highly favourable economic climate prevails in Brazil, Chile and Peru. The economic outlook for the coming months has been revised slightly downward by the majority of surveyed experts but is still pointing to an upbeat economy in the rest of 2007 and the beginning of 2008. Particularly in Peru and Chile, the surveyed economists foresee a strong pick-up of exports in the next six months. In Peru, a strengthening of capital expenditures and consumption, is expected. In Brazil, WES experts have reported strong consumer demand and capital investment. In Mexico the present economic performance continues to be assessed as satisfactory. However, considering the strong economic relationships to the US markets, the surveyed economists expect rather sluggish economic activity in the next months, particularly in the export

sector. In Argentina the economic climate index has deteriorated somewhat over the previous quarter's survey, although the present economic performance is still assessed as favourable. The Argentinean economy has grown by more than 8 percent each year over the last five years. However, the economic prospects for the next six months have become clearly pessimistic. WES experts forecast inflation to be nearly 16 percent for this year. Energy shortages are also damping business sentiments. Capital expenditures are expected to weaken strongly and private consumption to fall, according to WES experts. In Venezuela, Paraguay, Ecuador and Colombia, the present economic state has been described as good in the present survey round. However, the economic forecasts for the next six months have been downgraded and are cautious in all of these four countries. Particularly pessimistic are the panel's forecasts for Ecuador and Venezuela, where lack of confidence in the government's economic policy appears to be growing. Also in Bolivia, lack of confidence in the government's economic policy is ranked as the economic problem number one by the surveyed economists. In Costa Rica, Uruguay and Guatemala a favourable economic climate prevails, according to the WES experts. In Costa Rica the present economic situation has been assigned the highest marks on the WES scale. The economic forecasts in all three countries point to stable economic growth in the near-term future.
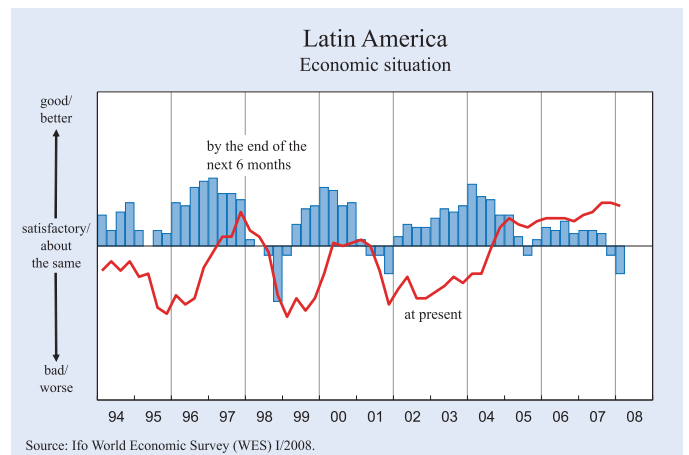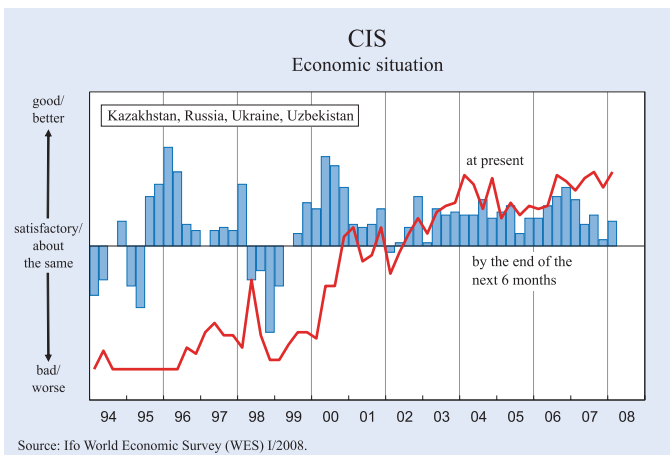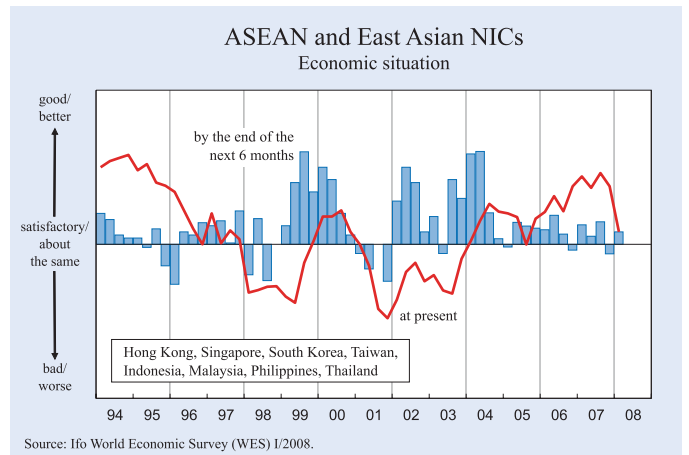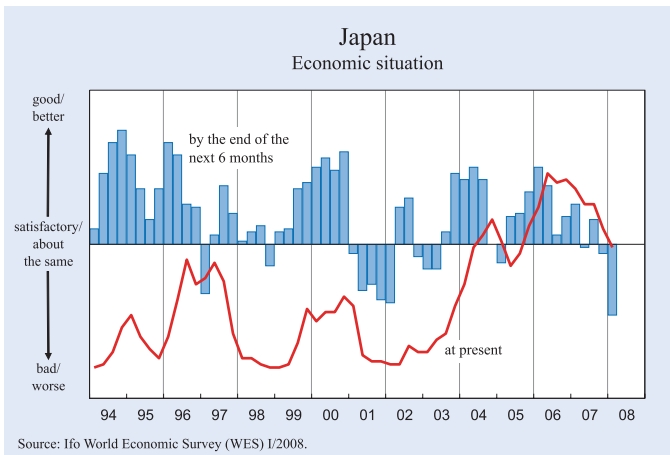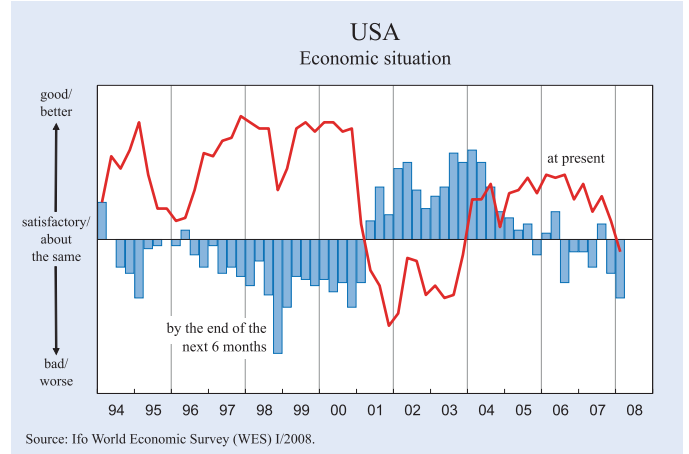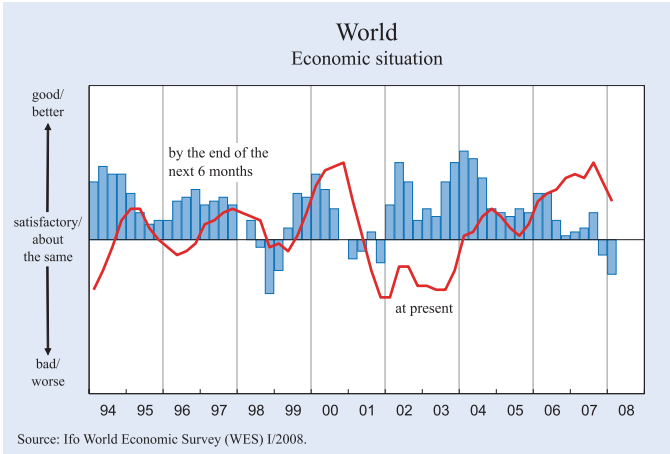
9. Near East: Diverging economic trends

The economic trends in the countries surveyed in the Near East region diverge. While the present economic situation remains highly favourable in Bahrain, Jordan, Kuwait, Saudi Arabia and the United Arab Emirates, the economic climate strongly deteriorated in Iran and Turkey, where an armed conflict is threatening economic activity. Also in Israel, the economic prospects for the next six months have been strongly downgraded. In particular capital expenditure and private consumption are expected to weaken. The country's present economic situation, however, has been assessed as very good.

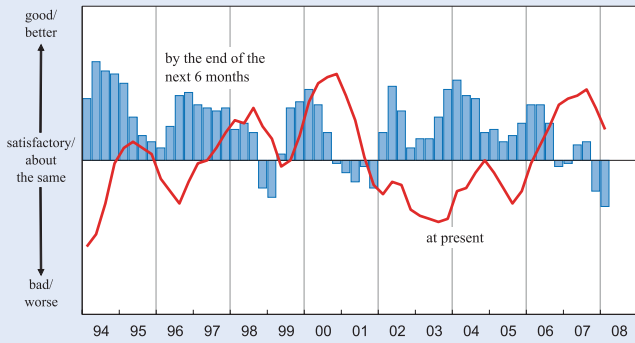### 10. Africa: Business confidence damped in South Africa

In South Africa, the economic climate deteriorated again somewhat compared to the previous quarter. The assessments of the current economic situation

have been revised downward. South Africa's economy is showing signs of a slowdown due to labour strikes, global financial turmoil and a worsening inflation outlook, followed by rate hikes, according to the Bureau for Economic Research (BER). However, the country's economic performance is still seen as good by the majority of surveyed economists. But the economic outlook for the next six months is cautious. Capital expenditures and exports are expected to strengthen somewhat, but private consumption is foreseen to weaken markedly. In Algeria, Kenya, Morocco and Tunisia, the present economy is performing at a satisfactory level, according to economists surveyed in these countries. The outlook for the next six months points to stable economic development. In contrast in Mauritius and Nigeria, the economy has been described as weak. In Zimbabwe, disastrous circumstances have prevailed for more than a decade now. The bleak economic outlook aggravates the overall situation for the country's plagued population.
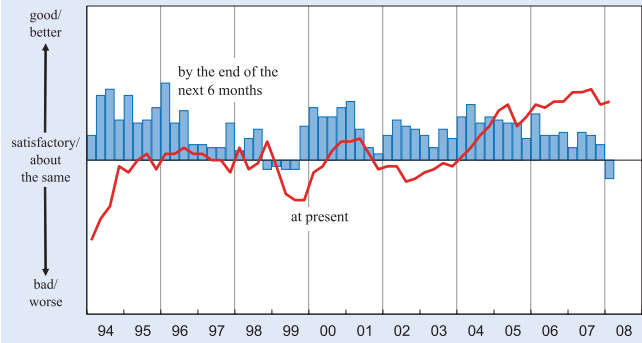
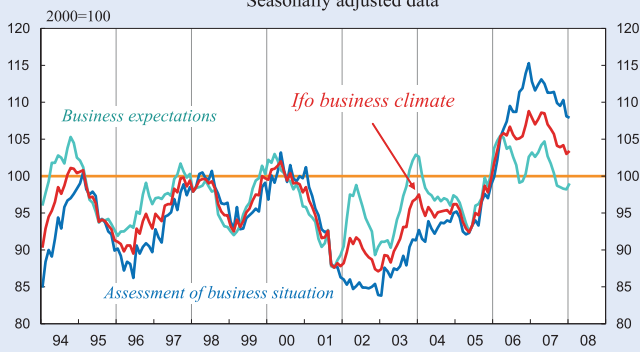# IFO WORLD ECONOMIC SURVEY (WES)

World
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

USA
Economic situation

good/better

satisfactory/about the same

bad/worse

at present

by the end of the next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Japan
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

ASEAN and East Asian NICs
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

Hong Kong, Singapore, South Korea, Taiwan, Indonesia, Malaysia, Philippines, Thailand

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

CIS
Economic situation

good/better

satisfactory/about the same

bad/worse

Kazakhstan, Russia, Ukraine, Uzbekistan

at present

by the end of the next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Latin America
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

European Union (15)
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

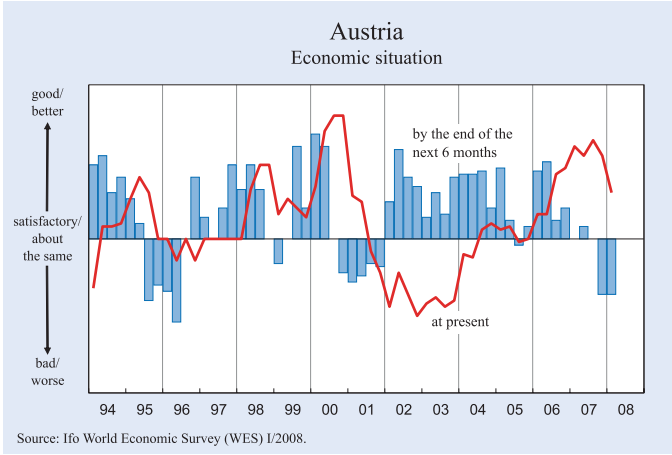by the end of the
next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Eastern Europe
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

by the end of the
next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Germany: Ifo business climate[1]
Seasonally adjusted data

2000=100

120
115
110
105
100
95
90
85
80

120
115
110
105
100
95
90
85
80

Business expectations

Ifo business climate

Assessment of business situation

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

1) Manufacturing industry, construction, wholesale and retail trade.

Source: Ifo Business Survey, January 2008.

France
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

by the end of the
next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Italy
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

by the end of the
next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08
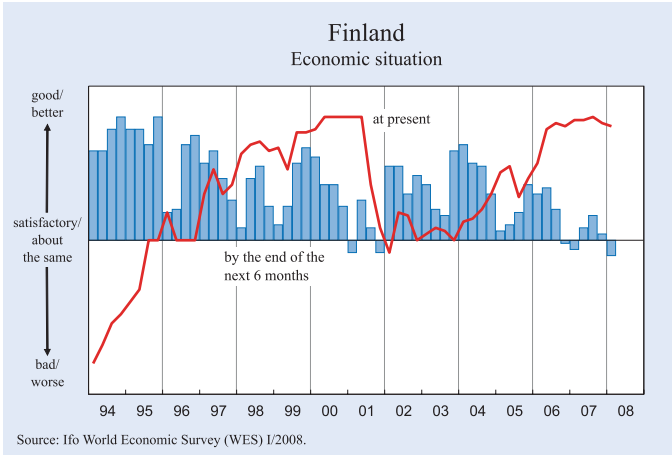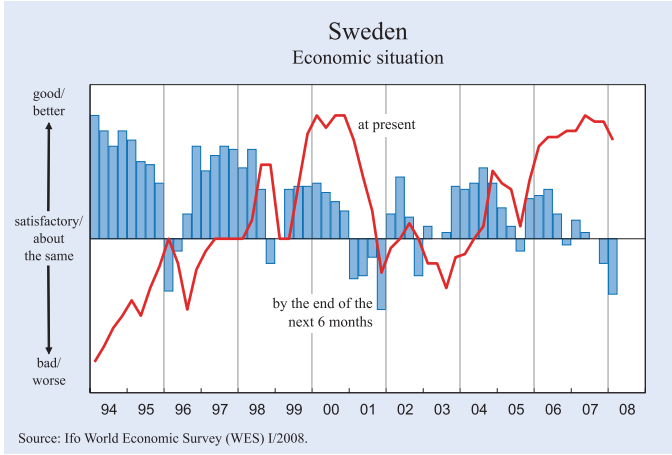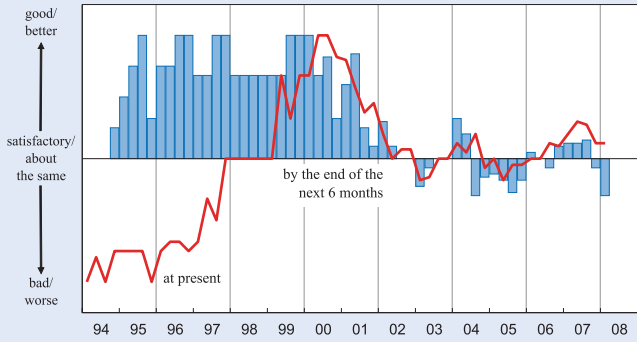
Source: Ifo World Economic Survey (WES) I/2008.

United Kingdom
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

at present

by the end of the
next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Spain
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

at present

by the end of the
next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Sweden
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

at present

by the end of the
next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Finland
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

at present

by the end of the
next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Austria
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

by the end of the
next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Belgium
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

by the end of the
next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Denmark
Economic situation

good/
better

satisfactory/
about
the same

bad/
worse

at present

by the end of the
next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Greece
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Ireland
Economic situation

good/better

satisfactory/about the same

bad/worse

at present

by the end of the next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Netherlands
Economic situation

good/better

satisfactory/about the same

bad/worse

at present

by the end of the next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Portugal
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Slovenia
Economic situation

good/better

satisfactory/about the same

bad/worse

at present

by the end of the next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Hungary
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Poland
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Czech Republic
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Slovak Republic
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Estonia
Economic situation

good/better

satisfactory/about the same

bad/worse

at present

by the end of the next 6 months

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Latvia
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Lithuania
Economic situation

good/better

satisfactory/about the same

bad/worse

by the end of the next 6 months

at present

94 95 96 97 98 99 00 01 02 03 04 05 06 07 08

Source: Ifo World Economic Survey (WES) I/2008.

Bulgaria
Economic situation

Source: Ifo World Economic Survey (WES) I/2008.

Romania
Economic situation

Source: Ifo World Economic Survey (WES) I/2008.

HOW MUCH REAL DOLLAR DEPRECIATION IS NEEDED TO CORRECT GLOBAL IMBALANCES?

1. Introduction

In the mainstream view, a weak dollar is the natural consequence of the long string of large and increasing current account deficits run by the US in the past decade. In ten years, from 1997 to 2007, the current account deficit of the US increased from 1.7 percent of US GDP to 1.7 percent of world output.

Already in 2000, leading economists such as Maurice Obstfeld and Kenneth Rogoff warned that adjustment would require substantial depreciation of the dollar in real terms and on a multilateral basis. Specifically, based on a stylised model, Obstfeld and Rogoff (2005) showed that eliminating a current account deficit of 5 percent of GDP in an economy like the US would require that economy's real exchange rate to depreciate between 35 and 50 percent.[1] Meanwhile, from its peak in 2002 to the beginning of 2008, the dollar lost almost one third of its value in real terms (CPI based). Against the major currencies the fall was much more pronounced: about 40 percent in real terms – mirroring the strong appreciation of the euro (up to 50 percent!).

Questions such as "How much dollar depreciation should Europe and the world expect in the future as a consequence of the US imbalance?" or "To what extent will the dollar fall be accompanied by a global realignment of Asian currencies, supposedly reducing the pressure on the euro?" are in everybody's mind, and rightly so. Yet, to a large extent the answer to these questions builds on some understanding of the specific mechanisms by which real dollar depreciation is an essential step towards global adjustment. After all, it is these mechanisms that

will shape the macroeconomic outlook in the next few years.

In what follows, we reconsider the argument that the US currency must weaken substantially in real terms to correct the US current external imbalance. The emphasis here is on "real terms", because what counts in the adjustment process is the movement of the price of US goods relative to goods produced in the rest of the world.

Addressing this issue is important because estimates of the real dollar depreciation required for a correction of global imbalances provide a natural anchor for trends in the currency market. The world has already experienced ample swings in the dollar-euro exchange rate. Early on in the decade this rate almost reached 80 dollar cents per euro; it may well be possible that the parity will fall as low as 1.60 dollars per euro. But would the exchange rate then remain persistently at these extreme levels?

The text below will emphasise that the largest estimates of real dollar depreciation (such as the ones by Obstfeld and Rogoff 2005 mentioned above) are based on models which typically assume a strong adjustment in the *domestic* relative prices of non-tradable goods (say, services) within the US and abroad. Strong movements in these prices relative to international prices are clearly possible, but they would be unprecedented by historical standards, and are not supported by econometric evidence. In addition, it is hard to think that large movements in domestic prices would fail to create strong incentives to reallocate production across sectors (away from the non-tradables sector), which would in turn reduce the need for price movements.

The chapter concludes by discussing two recent contributions that reconsider the mechanisms underlying current account adjustment, pointing to much milder scenarios of real dollar depreciation (Dekle et al. 2007 and Corsetti et al. 2008). Carrying out exercises similar in spirit to those of Obstfeld and Rogoff (2005 and 2007), these new contributions confirm the presumption that closing the US current account imbal-

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[1] The assessment of the real dollar depreciation required to correct global imbalances carried out by international organisations was often less extreme. As of 2006, the IMF had constructed scenarios with real effective dollar depreciation in the range of 15 percent, under the so-called soft-landing scenario. See, for example, IMF (2006), Box 1.3. Similar estimates are discussed in Faruqee et al. (2007)

ance will require the dollar to weaken persistently in real terms. But the depreciation required for a sustainable current account adjustment would be much lower. The results suggest that a real dollar depreciation of between 10 and 20 percent may well be enough (see also Corsetti 2007).

What does this mean for Europe? Early assessments of the equilibrium exchange rate between the euro and the dollar, especially the ones based on purchasing power parity, by and large pointed to values between 0.90 and 1.30 dollars per euro,[2] an interval also suggested by Figure 1.5 in Chapter 1. Our conclusion is that at the beginning of 2008 the real exchange rate between the euro and the dollar has already reached, and probably overshot, the value needed for global rebalancing – especially if Asian countries end their (explicit or implicit) peg to the dollar.

2. The ABC of dollar depreciation: terms of trade versus internal price adjustment

The 2005 EEAG Report already discussed in great detail different views on what lies at the heart of the emergence of global imbalances in the 1990s, and the implications of such imbalances for Europe. That report also included a synthetic introduction to the ABC of dollar depreciation and external adjustment according to leading models. To introduce our new argument, it is worth reconsidering once again the role of relative price movements in rebalancing the external account. The starting point consists of a definition and simple national accounting.[3]

To begin with, recall that the real exchange rate is the price of US consumption relative to consumption abroad. It is customarily measured by multiplying the nominal exchange rate by the ratio of domestic to foreign CPI. The CPI, of course, includes both goods that are traded across the border and goods that are not traded because their value is too small relative to (international) trade costs. Hence, real exchange rate movements can be roughly decomposed into changes in the relative price of traded goods produced at home and abroad, that is, the *terms of trade,* and changes in

the price of non-traded goods in terms of traded goods.

As regards national accounting, the simplest identity states that the value of a country's total domestic demand plus net exports must be equal to the value of its output:

Value of Domestic Demand + Value of Net Exports = Value of GDP

For our purposes, it is useful to rewrite this identity as follows. First, net exports are replaced with some *target* level of current account adjustment, that is, of an assessment by how much adjustment would be required to correct the external imbalances. As a reference estimate, consider an adjustment up to 5 percentage points of GDP, which would correspond to a de facto elimination of the US external imbalance. Second, in order to highlight the role of relative price adjustment, demand and GDP are broken down into two components, distinguishing between traded and non-traded goods. We obtain:

$$P_N D_N + P_T D_T + D_F + \text{Current Account Adjustment} = P_T Y_T + P_N Y_N$$

In this identity, P_N and P_T denote the prices of US non-tradables and US tradables, respectively, both expressed in terms of US imports (which consist of foreign tradables); D_N, D_T and D_F denote the US demand for domestic non-tradables, domestic tradables and foreign tradables (imports); Y_N and Y_T denote US output of non-tradables and tradables.

With the different components of output and demand spelled out explicitly, the above identity is useful to capture the essence of the adjustment mechanism. The logic of this mechanism is straightforward. Reducing the US deficit is equivalent to a transfer of resources from the US to the rest of the world. Adjustment thus requires a decrease in US demand relative to production, matched by an increase in demand relative to output in the rest of the world. Such global reallocation of demand in turn requires a change in relative prices as well as a change in relative income and wealth.

To see the role of relative price adjustment most clearly, assume that all quantities produced in the world (the Y's in the above identity) remain constant before and after the adjustment. This means that the whole adjustment mechanism works through prices and

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[2] See Chinn and Alquist (2000), Alberola et al. (2002), Maeso-Fernandez et. al (2002), and Rosenberg (2003) among others.
[3] The model below draws on the economics of "transfer", referring to the classic controversy between Keynes (1919, 1929a,b,c) and Ohlin (1929a,b).

demand movements (the *P*'s and the *D*'s in the identity). This is essentially the exercise proposed by Obstfeld and Rogoff (2005).

For a given output, current account adjustment requires all prices to move in equilibrium. The relative price of US tradable goods *(PT)* must fall to raise foreign demand for US exports, and discourage US demand for imports (causing a fall in *DF*). But, other things equal, cheaper US tradables would mean that US households and firms will demand more of them, at the expense of their demand for US non-tradables. As the supply of these goods is given by assumption, the relative price of US non-tradables *(PN)* must also fall, to ensure that domestic demand for US non-tradables will be high enough to meet their supply.

A striking result in the Obstfeld and Rogoff (2005) calculations concerns the relative magnitude of the price changes for tradables and non-tradables, once reasonable demand elasticities for different types of goods are used to calibrate the model. These authors propose the following scenario. Holding output quantities fixed, the fall in the international price of US tradables (that is the adjustment in the terms of trade) accounts for a real dollar depreciation of between 5 and 15 percent; the change in the relative price of non-tradables accounts for a real dollar depreciation of between *20 and 30 percent.* In this scenario, it is the change in the latter relative price which clearly makes up the lion's share. The movement in non-tradables prices could be several times larger than changes in the terms of trade.

services should fall by up to one third *relative to trend,* in terms of the (mostly traded) US manufacturing goods.
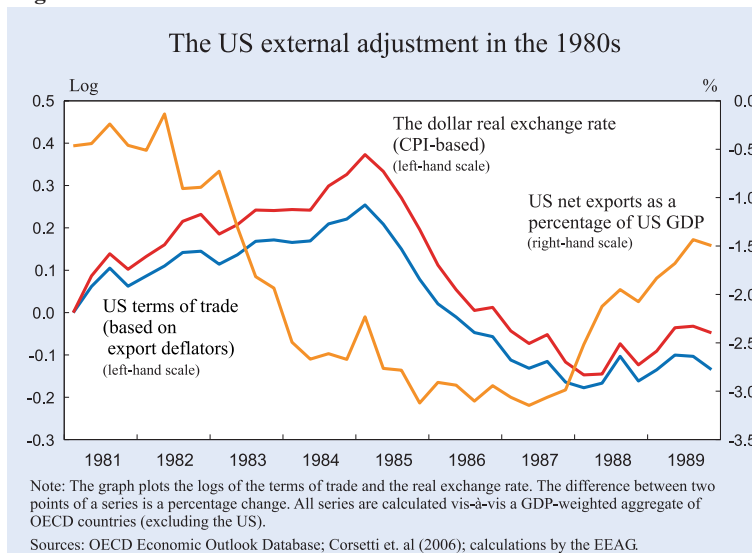
To be accurate, it should also be stressed that the above scenario is not the only possible outcome of adjustment. According to the model used in the above calculation, there are different ways in which a given real dollar depreciation can occur: real depreciation can result from, say, a sharp increase in the price of non-tradables in the rest of the world, as opposed to a fall in the US. The calculations in the example by Obstfeld and Rogoff nonetheless raise an important issue: how much *internal* relative price adjustment in the US can be anticipated in a process of external adjustment?

3. Is a sizeable change in internal prices likely to happen in the US?

Some insight on the different dynamics of relative price movements at the domestic and international level can be gained by reconsidering previous episodes of real depreciation and current account adjustment. We first review a case study, then some econometric evidence.

The most relevant episode for our purpose is clearly the one experienced by the US in the mid-1980s. After a period of substantial appreciation associated with current account imbalances, the dollar started to depreciate in 1985, and fell throughout 1989, after which it roughly stabilised. The current account initially deteriorated somewhat, then stabilised in 1986–87, and

To understand the concrete meaning of these estimates, it is important to keep in mind that services are mostly non-tradables, while manufactured goods are mostly tradables; over time, productivity differentials across sectors cause the price of services to fall steadily in terms of the price of manufactured goods, as predicted by the Harrod-Balassa-Samuelson hypothesis, amply discussed in the 2002 EEAG Report. The reasoning above suggests that for the US to eliminate its current account deficit, the price of US

Figure 2.1

The US external adjustment in the 1980s

Note: The graph plots the logs of the terms of trade and the real exchange rate. The difference between two points of a series is a percentage change. All series are calculated vis-à-vis a GDP-weighted aggregate of OECD countries (excluding the US).

Sources: OECD Economic Outlook Database; Corsetti et. al (2006); calculations by the EEAG.

eventually started to improve from 1988, with a three-year delay from the beginning of the dollar depreciation phase. These patterns are illustrated by Figure 2.1, which plots US net exports (whose behaviour are very similar to the current account) together with the US terms of trade and the real exchange rate of the dollar (both CPI and PPI-based), measured against an aggregate of other OECD countries. The episode of the US current account adjustment in the 1980s, and the debate around it, is discussed in great detail by Krugman (1991) among others.

In the three-year period going from the beginning of 1985 to the beginning of 1988, the dollar depreciated in real terms by about 50 percent against the rest of the OECD countries, as opposed to a cumulative appreciation as high as 15 percent in the preceding three years. On a multilateral basis (considering all trade partners of the US), the corresponding figures are 35 percent and 20 percent, respectively. From 1988 on, in real terms the dollar fluctuated around the new, weaker level for a long time, well into the 1990s.

Further insight into the role of prices can be gained by looking at Figure 2.2, which plots the US terms of trade together with the relative price of non-tradables. The latter is proxied by the ratio of the US Consumer Price Index for Services and the US Producer Price Index (PPI). The figure also includes a linear trend through (our proxy for) the relative price of non-tradables.

Over the whole period displayed in Figure 2.2, the CPI for services kept increasing steadily in terms of the PPI. The trend line captures the secular relative price increase of non-tradables. Compared to this trend, however, the figure unveils interesting patterns.

First, remarkably, the rate of increase in the relative price of non-tradables actually became faster in a two-year window after 1985, when the dollar was depreciating sharply, relative to the period before 1985, when the dollar was still appreciating.[4] This (admittedly temporary) acceleration seems at odds with the model discussed above, as this predicts that the price of non-tradables would actually weaken together with the real exchange rate during phases of external adjustment.

Nonetheless, one should observe that in the three-year period after 1985, the US external deficit did stabilise but did not narrow. A significant change in both internal prices and external deficit, consistent with the argument illustrated by Obstfeld and Rogoff, eventually occurred, but only over the last two years of the decade. It was only then that the price of non-tradables rose at a much lower rate relative to trend, and the current account started to show significant improvement.

The lesson to draw from these considerations is not straightforward. On the one hand, consistent with the leading model of current account adjustment, there was a notable correction of the non-tradables prices around the time when the current account stabilised and started to improve, that is, between 1987 and 2000.

One the other hand, Figure 2.2 also highlights a marked movement of the price of non-tradables in the opposite direction immediately after the beginning of dollar depreciation, especially between 1986 and 1987. In light of the strong relative-price increase for non-tradables in those two years, the reversal in the following years appears less striking, as it may correspond, at least in part, to an offsetting movement. Obviously, cyclical considerations heavily influence these numbers.

Figure 2.2

US relative price of non-tradables and terms of trade in the 1980s

Note: The graph plots the logs of the terms of trade and the relative price of non-tradable goods. See also Figure 2.1.

Sources: OECD Economic Outlook Database; Corsetti et. al (2006); calculations by the EEAG.
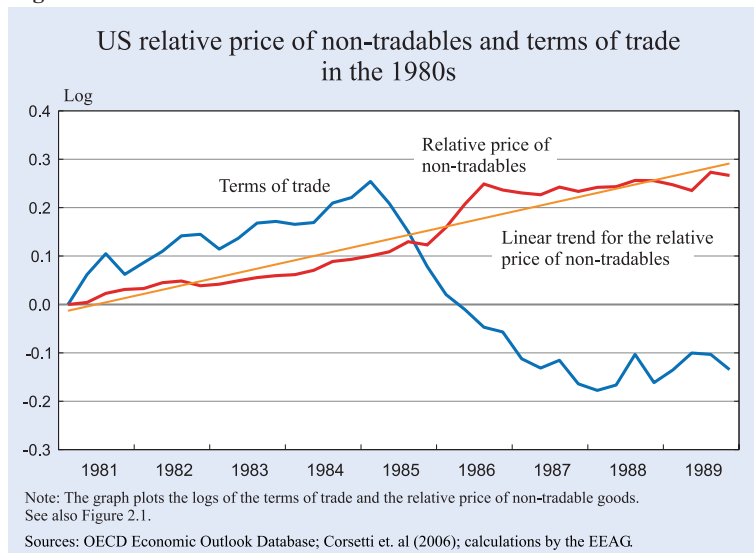
[4] A similar picture emerges if one looks at different proxies for non-tradable prices, such as the ratio of the CPI to the price of capital equipment. For this indicator, there is no change in dynamics in the three-year window before and after 1985.

Most strikingly, Figure 2.1 shows that the real exchange rate remained strongly correlated with the US terms of trade before and over the entire adjustment period. In Figure 2.1, the two international prices closely track each other. In the period 1985–1987, for instance, the US terms of trade (based on export deflators) deteriorated by about 40 percent against OECD trade partners, against a 50 percent decline in the real exchange rate. As shown by Figure 2.2, over this period of dollar and US current account adjustment in the 1980s, the terms of trade varied substantially more than internal relative prices.

So, while the experiences from the 1980s suggest that movements in domestic relative prices of non-tradable in the US were eventually consistent with the model, the size of these movements were quite contained, and in any case significantly smaller than the corresponding movements in the terms of trade.

These conclusions are backed by empirical estimates of the effects of deficits on the terms of trade and the relative price of non-tradables. According to the baseline econometric results for the G3 countries by Galstyan (2007), for instance, the percentage deterioration in the terms of trade in response to a reduction in the external deficit is three times larger than the percentage fall in the price of non-tradables (4.7 versus 1.6). Remarkably, this ratio is similar for other countries.

In light of this evidence, it is not surprising to find that also now there is little or no evidence of strong internal relative price adjustment in the US, despite the large slide in the external value of the dollar since 2002. The rate of price increase for services has constantly outpaced the rates of price increase for other broad categories of goods in the US: between the end of 2002 and the end of 2006, the CPI for services has increased by 12.8 percent, more than 2 percentage points faster than the overall CPI (10.6 percent), and twice as fast as the CPI excluding food and energy (6.3 percent). The PPI (excluding food and energy) rose by even less, by about 5.6 percent. Over the same period, the dollar depreciated by about 15 percent in real effective terms, although (admittedly) there was hardly any sign of current account adjustment.

In the next few years, it is plausible to expect some effects of dollar depreciation on the relative rate of price increase by sectors in the US, with the rates of price increase for non-tradables falling somewhat relative to the rates of price increase for tradables (always relative to trends). According to the model, this should be required for the US external position to improve in a substantial and sustainable way. Correspondingly, Europe should expect internal relative price movements in the opposite direction. It would be highly unlikely, however, that these differentials in the rates of price increase lead to internal realignments of dramatic magnitudes.

4. Prices and valuation effects in the global rebalancing

Real dollar depreciation also causes "valuation effects", that is movements in the value of US incomes relative to the rest of the world. To see the "income side" of the adjustment mechanism discussed so far, focus on the right-hand side of the national accounting identity in Section 2 above. For given output quantities, the fall in the price of both the US traded *and* the US non-traded goods relative to foreign tradable prices lowers the value of US GDP relative to the value of foreign GDP. Inherent in the logic of the exercise proposed in the first part of this text, US residents are relatively poorer because of price adjustment, even if they produce exactly the same amount of goods.

In this respect, real dollar depreciation is akin to a persistent slowdown of US output growth relative to the rest of the world: in either case the relative *value* of US output would fall, reducing US domestic demand relative to foreign demand, hence making room for current account adjustment. Those who believe that the only way to reduce the US external deficit is a pronounced and persistent US recession essentially emphasise the role of quantities over prices in driving down US relative income.

Now, we have argued above that while the leading model of current account adjustment attributes relative wealth and demand effects to strong movements in the average price of non-tradable goods, a large correction in this relative price is not very likely in practice. Yet, one could argue that the leading model is actually right on target, once the emphasis is placed on the price of housing (after all houses are non-tradables) rather than on the price of non-tradable goods and services entering the Consumer Price Index.

Indeed, a large correction in the housing prices in the US per se can generate substantial wealth and demand

effects consistent with external rebalancing – as long as the fall in these prices hits this country more than the rest of the world. Not only housing has a large weight in national wealth. Most importantly, housing wealth accounts for a very large share of the portfolio owned by low- and middle-income households, who arguably have a relatively higher propensity to spend than richer households. Hence, a fall in housing wealth can be expected to have a comparatively stronger impact on final demand than other components of national wealth.

One may observe that, starting in 2006, the fall in the price of housing indeed coincided with an acceleration in the rate of dollar depreciation and a pick-up in the pace of US net export growth. Assessing the specific role of housing in the global rebalancing is, however, quite complex. First, global portfolio diversification implies that the losses from a fall in asset prices in one country are partly borne abroad. At the time of writing, the amount and distribution across countries of the direct and indirect losses from the subprime mortgage crisis in the US is still unclear. Moreover, the financial turmoil created by this crisis may have global wealth and output implications well beyond the direct losses in the mortgage markets. Second, developments in the housing sector obviously have important cyclical consequences for the country as a whole, driving the current account.

Some of the external effects of a substantial contraction in real estate markets are direct, via import demand from the sector. Evidence on this transmission channel is provided by researchers at the New York Fed, who examined the year-to-year growth rate

of all non-petroleum imports by the US, and compared this to the growth rate of imports commonly used as inputs by the residential construction sector (see Hellerstein 2008). The main findings are summed up in Figure 2.3 below. The graph shows that the year-to-year growth rate of housing-related imports was very dynamic during the years of the housing "bubble": it is at least as high, often higher, than total imports (excluding oil) through late 2006. From the end of 2006 on, the growth of housing-related imports slowed down considerably, once again moving closely together with total imports.

In addition to the direct implications for import demand, a real estate crisis drives the external account to the extent that it creates a recessionary impulse (which per se reduces US import demand), and motivates a reaction by the Federal Reserve, in the form of interest rate cuts (which creates external demand via dollar depreciation). An analysis of this scenario is proposed by Krugman (2007).

These cyclical considerations, including the possibility of a severe global slowdown induced by a credit crunch, obviously weigh on the currency market. Arguably, already in 2007 investors took into account possible differences in the response of the European Central Banks relative to the Federal Reserve Bank. A US slowdown and a large fall in the dollar would clearly contribute to accelerating the correction of the US external imbalance.

Yet it is important to stress that sustained adjustment of the external imbalance can only occur through a shift in relative wealth and demand over the medium and long run, that is well beyond the time frame of a business cycle downturn.

Figure 2.3

Housing-related and non-petroleum US imports

Annual % change

Note: Housing-related imports are calculated using input-output tables from the Bureau of Economic Analysis, reporting the average value of other industries' output used by the residential construction industry each year.

Source: Hellerstein (2008).
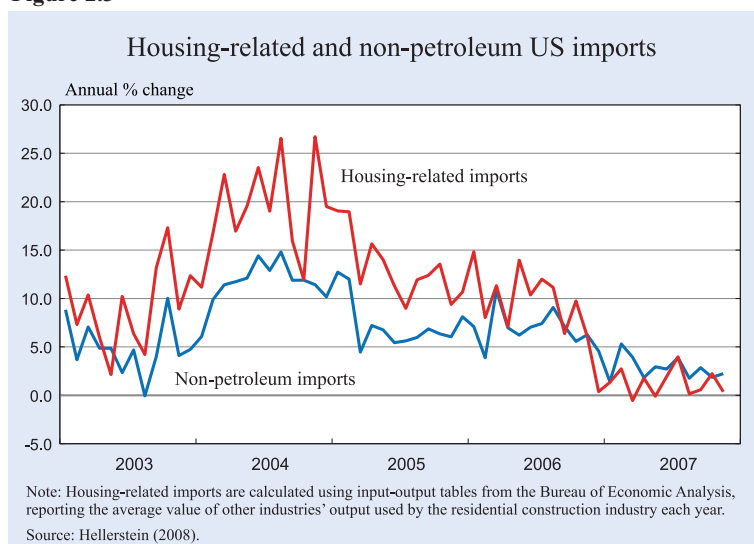
5. Scenarios for the medium run

If the internal relative prices of goods and services in the US and abroad cannot be expected to move substantially during the process of external adjustment, how far can the dollar be expected to fall in real terms? Once again, the focus here is not on short-run developments but over a longer horizon.

There are reasons to expect a long period of dollar weakness, but the fall in the US currency required to foster current account adjustment is likely to be smaller than suggested by estimates that place a large weight on the adjustment in non-tradable prices.

First, changes in wealth and international prices are bound to have an impact on the level and composition of output in the US and abroad. Indeed, it is hard to believe that internal relative price can move by almost $1/3$ without causing significant sectoral shifts in production, a possibility ruled out by construction in the example proposed by Obstfeld and Rogoff that we discussed in Section 2 above. In some other examples by the same authors, it is indeed shown that, for given demand elasticities, the need for internal price adjustment and therefore real dollar depreciation can decrease considerably if the composition of US output by sector changes in favour of tradables as a response to relative-price movements (see Obstfeld and Rogoff 2007).

5.1 Rebalancing and market dynamics

A relatively small dollar depreciation is predicted in several recent contributions that develop a variety of models, allowing for some adjustment in the level and composition of output. The numerical exercises proposed by Corsetti, Martin and Pesenti (2008), for instance, suggest that closing the US current account deficit (from 5 percent of GDP to zero) could lead to a combination of lower US consumption (– 6 percent), and higher US employment (+ 3 percent), relative to trend. This would then correspond to a rate of real dollar depreciation of the order of 20 percent.

Because of entry and exit of new firms and product varieties in the export market over time, the "required" dollar depreciation could actually become smaller than 20 percent (even substantially smaller; see Corsetti Martin and Pesenti 2007), without necessarily changing the adjustment in consumption and employment (which could still be – 6 percent and + 3 percent, respectively). These results are particularly noteworthy, because they suggest that the macroeconomic costs of current account adjustment (in terms of consumption and employment) are not necessarily increasing in the extent of real dollar depreciation.

Key to these scenarios is the degree of economic flexibility and adaptability of both the US economy and the economies in the rest of the world. In the baseline

exercise, adjustment would coincide with some contraction in the US non-tradables good sector (– 2 percent), coupled by a substantial expansion in tradables, both for the domestic market (+ 11 percent) and for the foreign markets (+ 24 percent). The idea is that product innovation and differentiation could reduce the need for a large weakening of the international prices of US products. Observe that in light of this consideration, in the next few years European firms can be expected to face much stronger competition by firms overseas, even if the adjustment in the exchange rate turns out to be modest.

5.2 A multi-country model

A similar assessment is presented by Dekle, Eaton and Kortum (2007), based on a quite different model. These authors build a multilateral model calibrated to 40 countries using 2004 data on GDP and bilateral trade flows in manufacturing goods.

Table 2.1 reports gross and net trade in manufactures for a subset of countries considered in this study. The table includes 14 European countries, Japan, China, India, and the US. Observe that ten of the 14 European countries included in the table run a deficit, the other four a surplus. The largest deficits are run by the UK, Spain and the area comprising Belgium, the Netherlands and Luxemburg, i.e. the Benelux countries. The largest surpluses are run by Germany, Ireland, Sweden and Finland.

These authors ask what would happen, in general equilibrium, if manufacturing trade deficits around the world had to be adjusted to set *all* current account balances equal to zero. The target adjustment is reported in the fourth column in the table, under the heading "Counterfactual balance". For the US, the counterfactual balance is of course staggering: it requires a shift from a deficit of almost 500 billion US dollars to a surplus of 180 billion US dollars. Similarly large is the required adjustments with the opposite sign, for China and Japan.

Observe that depending on the overall current account in 2004, the "Counterfactual balance" requires significant adjustment also in Europe. Notably, the surplus in Germany is cut by one half; the surplus should turn into a deficit in Sweden; the external deficit run by Benelux countries substantially widens. On the other hand, Italy is required to increase its manufacturing surplus. Ireland's external position is unaffected.

Table 2.1
Trade in manufactured goods: values in 2004 and counterfactual adjustment.

	Gross trade (a)		Trade balance (a)	Counterfactual balance (a)	Relative wage adjustment (b)
	Exports	Imports			
Austria	82.4	83.5	− 1.1	− 3.1	1.2
Belgium, the Netherlands and Luxemburg	307.8	371.6	− 63.7	− 136.8	1.5
Denmark	42.6	52.2	− 9.5	− 16.7	4.6
Finland	50.5	36.2	14.4	3.4	5.2
France	333.0	338.2	− 5.3	− 0.3	0.4
Germany	750.9	541.4	209.5	106.5	3.1
Greece	9.3	38.9	− 29.5	− 17.3	− 11.2
Ireland	115.2	49.1	66.2	66.0	0
Italy	278.3	257.1	21.2	35.6	0
Norway	22.8	39.2	− 16.4	− 52.4	34.5
Portugal	29.9	40.6	− 10.7	− 1.0	− 6.1
Spain	132.0	194.7	− 62.8	− 9.1	− 4.8
Sweden	100.3	77.1	23.2	− 5.5	7.3
United Kingdom	254.5	363.7	− 109.2	− 75.3	− 1.4
China and Hong Kong	816.8	695.0	121.8	36.2	2.5
India	58.5	53.1	5.4	− 2.7	1.7
Japan	545.2	268.2	277.0	103.7	3.7
United States	673.7	1159.3	− 484.6	179.4	− 6.8

(a) Data are for 2004 in billions of US$. – (b) Percentage change.

Source: Deckle et al., (2007), Table 2.

What is the magnitude of the macroeconomic adjustment required to engineer such a fix of external imbalances? The surprising answer is that according to the trade model adopted in the exercise, the magnitude of adjustment is, on average, small.

Strikingly limited is the implied adjustment of relative wages (labour costs). For example, wages in the country with the largest deficit (US) fall only by 10 percent relative to wages in the country with the largest surplus, which is Japan. Overall, the relative wage of the US must adjust by about 7 percent. Among the European countries in the table, relative wage appreciation is quite contained everywhere except for Norway. Relative wage depreciation is expected for Greece, Portugal, Spain and the UK.

In all these countries, however, wages hardly change in real terms, mostly because of the large component of non-tradables in total consumption but also because of a home bias in domestic spending on manufacturing goods. Overall, wages move by approximately 1 percent in real terms, with the exception of Norway where they increase by 4.2 percent (see Deckle et al. 2007 for details).

Changing trade elasticities clearly affects the numerical estimates from the exercise. In some robustness checks using a lower elasticity, the size of relative wage adjustment in the US rises but only up to 18 percent relative to China and 20 percent relative to Japan. The adjustment in US real wages is barely affected.

5.3 Beyond trade-related considerations

The two exercises reviewed above are similar in spirit to the ones proposed by Obstfeld and Rogoff (2005 and 2007): they are static in nature and largely focus on the equilibrium relative price adjustment required to correct "global imbalances". For this very reason, however, they prove that general-equilibrium trade models do not necessarily support the view that substantial correction is possible only with a very large real dollar adjustment.

It should be stressed that these calculations are not forecasts. They point to plausible outcomes in a world where a large debtor (the US) starts to service its debt, therefore compressing domestic demand relative to foreign demand. But the exchange rate is driven by many different factors. For instance, an especially important one, which we have not treated explicitly, is relative productivity growth (and market expectations about it). Many observers believe that the differential

in favour of the US, which seems to have driven much of the current account deficits from the mid-1990s on, has now substantially fallen.

Nonetheless, an additional reason why the dollar fall need not be dramatic has to do with the currency and asset class composition of the US external portfolio (including both gross assets and gross liabilities). As is well known, most of the US debt is denominated in dollars, whereas a large fraction of this country's external assets are denominated in foreign currency. In the short run, these differences may provide opportunities for the US to alleviate the burden of its foreign debt through exchange rate depreciation: other things equal, dollar depreciation raises the value in dollars of foreign-currency denominated assets owned by the US, without affecting the value of the dollar-denominated liabilities of this country. As the current account is the difference in the value of net foreign assets between the beginning and the end of a year:

Current Account = Change in Net Financial Assets,

any revaluation of foreign assets held by US residents would clearly reduce the external deficit for a given value of net exports. This mechanism creates a potentially important channel through which international price movements cause valuation effects which feed back into the overall external position of a country, much discussed in recent research work (see Chapter 2 of EEAG 2005 for a discussion).

While dollar depreciation can generate short-run gains, the abuse of the opportunity to manipulate values through the exchange rate would create dynamic risks. The main risk is that excessive and/or systematic recourse to depreciation would convince international investors to redirect their portfolios away from dollar-denominated assets, ultimately raising issues about how to finance the US external deficit. But the US monetary authorities are well aware of the need to maintain confidence in the dollar.

6. Conclusions

Closing the US current account deficit does require a weak dollar, but current assessments of global rebalancing differ regarding the required real dollar depreciation. In this chapter we have argued that, in the leading model of current account adjustment, estimates of large real depreciation presuppose a strong

fall in the relative price of domestic non-tradables within the US economy. In light of the evidence from the 1980s as well as of the results from econometric studies, such sizeable corrections in internal relative prices, larger than changes in the US terms of trade, are quite unlikely.

According to recent studies, the magnitude of a real depreciation that would insure a sustainable correction of the US external imbalance may well be in the range of 10–20 percent, perhaps even less, in real effective terms. By these standards, the real depreciation of the dollar, especially vis-à-vis the euro, is more likely to have reached, and probably overshot, the parity that is consistent with a global correction of imbalances.

This consideration does not exclude much sharper movements over the next few quarters or even in the next few years, in the early phases of the correction (see Krugman 2007 for a particularly sharp analysis of this point). But the economic forces at play do not necessarily support scenarios of sustained extreme dollar depreciation.

We should also stress that possible substantial movements in the dollar, especially taking into account the possibility of overshooting, do not necessarily coincide with a dollar crisis. A dollar crisis could occur if there were to be an abrupt decline of the dollar as the main international reserve and vehicle currency. For instance, a premise for such a crisis could be a sudden sell-off of dollar reserves by monetary authorities around the world. While we do not attach any significant probability to such an event, we find it important to stress that a dollar crisis would be quite harmful to the process of global rebalancing. Financial turmoil would seriously undermine the foundations of world asset market integration. Even more damaging is the possibility that an abrupt depreciation of the dollar could trigger strong protectionist pressures especially in Europe.

Even without an extreme dollar depreciation, however, the correction of global imbalances can be expected to entail significant macroeconomic adjustment both in the US and in Europe. European firms are already facing much stronger and increasing competition from US firms. As there will be some reallocation of resources from the non-tradable to the tradable sector in the US, the opposite can be expected to happen in Europe.

The intensity of these effects is likely to differ across countries. While the current account for the euro

area as a whole is roughly balanced, there are substantial differences among countries. This also applies to the degree of openness and to competitiveness. One of the exercises reviewed in this chapter assumes an even distribution of adjustment across all countries. In this exercise, Germany would reduce its surplus by one half, while Italy is expected to gain competitiveness. Unfortunately, there is no guarantee that adjustment in Europe will be even. With different degrees of flexibility in economic structures, Europe runs the risk of facing a period of strong divergence in growth rates and external adjustments. Dealing with this risk is well beyond the reach of the European Central Bank, and is definitely not a reason for increasing deficit spending, which can at best provide some short-run relief. The need for correcting the global imbalances instead raises the social value of investment in reforming the goods and the labour markets at the national level, along the lines amply discussed in several earlier EEAG reports.

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The effects of globalisation on Western European jobs: curse or blessing?

1. Introduction*

Much of the Western European debate on globalisation has focused on the risk that increased competition from foreign workers with low wages will cause job losses. This could occur because of import competition, offshoring of production or labour immigration. The fears in the public debate stand in stark contrast to the attitudes of most economists, who tend instead to stress the long-run welfare gains from increased international integration. These accrue because trade allows specialisation in production. According to "old" trade theory, the basis is comparative advantages based on differences in endowments of production factors or in technology. According to "new" trade theory, specialisation is instead based on economies of scale. Alternatively, mobility of production factors allows them to be used more efficiently.

Traditional theory more or less defined away the risk that the opening up of trade could lead to unemployment. The standard assumption has been that flexible prices and wages guarantee full employment in the long run. This can be seen as a shortcut to capture the notion that equilibrium unemployment, that is the average unemployment over the business cycle, is mainly determined by labour market institutions and is not to any large extent affected by the volume of trade.

However, the sanguine attitude of traditional theory towards the employment effects of increased trade with low-wage economies has also been challenged. It has become a standard argument that unemployment will arise to the extent that wage rigidities prevent wages and prices from adjusting to changed trade pat-

terns. This has been claimed to be a contributing factor to the high unemployment, especially among low-skilled workers, in many European countries. According to this argument, the fall in demand for low-skilled labour associated with competition from low-wage economies has caused the relative wage of this group to fall in the US and other Anglo-Saxon countries, whereas the effect on the relative wage has in contrast been marginal in most of Western Europe with the consequence that employment has instead fallen.

It is true, of course, that if globalisation leads to a fall in demand for labour as a whole or for certain types of labour in advanced economies, employment will suffer in the presence of rigidities that prevent downward wage adjustments. But to gauge the long-run effects, it is crucial to analyse how the wage rigidities themselves may change in response to globalisation. This chapter argues that globalisation in itself tends to weaken these rigidities. It is possible that globalisation could promote labour market flexibility to such an extent that employment rises in the long run. If so, globalisation will not be a curse for employment in Western Europe; it could instead turn out to be a blessing.

Possible positive employment effects do not imply that economic policy-makers should not respond to globalisation pressures. To the extent that positive employment effects come about, it may be because globalisation raises wage inequality and shifts the functional income distribution in favour of capital. So, an important task of economic policy is to try to allocate the gains from globalisation in a "fair way" and ensure that groups that might otherwise lose out (or receive only small gains) also share the benefits. It may be this, rather than preventing employment losses, that is the main challenge to economic policy from globalisation. But if so, redistribution policies must be pursued in such a way that they support – and do not counteract – the general objective of raising employment. This speaks strongly against policies such as rises in unemployment benefits and the imposition of minimum wages. Measures such as retraining schemes, government support to displaced workers

through severance pay, wage insurance and employment tax credits are more promising but should be pursued with caution.

The chapter is structured as follows. Section 2 gives a brief overview of globalisation trends. Section 3 summarises the theoretical arguments for why globalisation may cause unemployment in the presence of wage rigidities. Section 4 identifies possible mechanisms through which globalisation might loosen these wage rigidities and instead be beneficial for employment. Section 5 surveys existing research on the effects of globalisation on the relative demand for low-skilled versus high-skilled labour in advanced economies. Section 6 focuses instead on the effects of globalisation on overall labour demand and employment: the section both reviews existing research and adds new empirical evidence. Finally, Section 7 discusses appropriate policies to deal with the labour market effects of globalisation.

2. Globalisation trends – an empirical overview

Global market integration takes place via three channels: (1) trade in goods and services, (2) capital mobility and (3) labour mobility.

2.1 Trade integration

Figure 3.1 displays trade-to-GDP ratios (exports + imports as percentages of GDP) for OECD and EU15 countries since 1960.[1] These numbers are averages of trade ratios at the individual country level and therefore reflect trade flows within the EU15 and the OECD as well as between these areas and the rest of the world. There have been strong upward trends for both areas. The main explanation of the lower figure for the OECD is the large influence of the US, which as a large country is naturally characterised by a low trade-to-GDP ratio. While for the EU15 as a whole total trade

as a percentage of GDP increased from 39 to 74 percent between 1960 and 2005, the ratio for the OECD increased from 20 to 48 percent. The trade expansion over the last fifteen years has been much faster than over the preceding fifteen years.

Table 3.1 gives an overview of trade developments country by country. As can be seen, the trade expansion has been a universal phenomenon, encompassing all the countries shown.

The globalisation debate in advanced economies has focused on the increased trade with low-wage countries in particular. To illustrate this, we show trade with non-OECD countries excluding OPEC members in Figure 3.2. As can be seen, the trade with low-wage economies as a percentage of GDP is still small, 8–9 percent for both EU15 and the whole OECD area. But the trade ratios have been increasing at a rapid pace since the late 1980s.

Table 3.2 shows imports from low-wage countries as a percentage of GDP for individual OECD countries. The dependence on low-wage imports has increased for all countries except Norway. In Europe, the increases in imports were particularly large in the Netherlands, Belgium, Ireland and Finland.

Although trade with low-wage economies only makes up a small fraction of the total trade of advanced economies, these trade flows have grown much faster than overall trade. Figure 3.3 shows that the share of imports from low-wage economies in total imports increased from 13 to 19 percent for the EU15 between 1988 and 2004. For the OECD as a whole this ratio
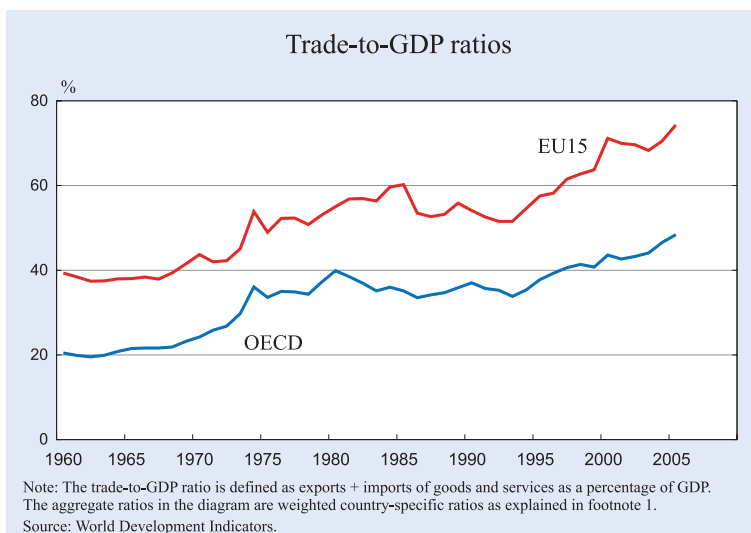
Figure 3.1

Trade-to-GDP ratios

Note: The trade-to-GDP ratio is defined as exports + imports of goods and services as a percentage of GDP. The aggregate ratios in the diagram are weighted country-specific ratios as explained in footnote 1.
Source: World Development Indicators.

[1] The calculations have been done by weighting country-specific trade-to-GDP ratios by the countries' shares in aggregate GDP for the whole area. The OECD aggregate does not include the Czech Republic, Hungary, Iceland, Mexico, Poland, Slovakia and Turkey, as we want to focus on high-income countries.

Table 3.1

Trade-to-GDP ratios[a]

	1960	1980	2000	2005
Austria	48	74	92	101
Belgium	78	119	169	172
Denmark	63	66	82	93
Finland	44	66	76	74
France	26	43	56	53
Germany		52	67	75
Greece	24	51	58	49
Ireland	65	106	176	151[b]
Italy	26	46	56	52
Luxembourg	177	196	291	294
Netherlands	92	104	130	134
Portugal	36	60	75	66
Spain	15	32	62	56
Sweden	45	60	89	90
UK	42	52	58	56
EU15	**39**	**55**	**71**	**74**
Australia	29	33	46	40[b]
Canada		55	87	73[b]
Japan	21	28	20	24
Korea	16	73	87	83
New Zealand		60	72	59
Norway	73	80	77	73
Switzerland	53	73	88	85[b]
US	10	21	26	25[b]
OECD	**20**	**40**	**44**	**48**

Note: [a] See Figure 3.1. – [b] The figure refers to 2004.

Source: World Development Indicators.

approached 29 percent in 2004, reflecting mainly the larger share of imports from non-OECD countries in total imports in Japan and the US than in Western European countries. This can be seen in Table 3.3.

Among the low-wage countries, China stands out as it has integrated into the world economy at a particularly high pace. According to the United Nations' COMTRADE data, the share of OECD imports from China in total imports from outside the OECD jumped from 0.7 percent in 1980 to nearly 10 percent in 2005.[2]

Through improvements in communication and transport technology, firms are now better able than before to manage complex production processes around the globe such that parts of the value added chain can be moved abroad. This phenomenon has attracted a lot of attention in the trade literature as well as in the public debate since the 1990s. The concept of *international outsourcing* and *offshoring* are widely used to characterise this process. The terminology varies, however. International outsourcing is sometimes defined as a firm's imports of intermediary inputs from foreign non-affiliated production locations and *offshoring* as a firm's imports of intermediary inputs from foreign in-house production locations. Unless stated otherwise, we shall here let international outsourcing denote the imports of intermediary inputs from abroad in general independently of whether the source is an affiliated or a non-affiliated production location. Offshoring will denote imports from an affiliated production location only. Figures 3.4a and 3.4b show that the share of intermediate imports in total output increased for most countries between 1995 and 2000. This is true for both materials and services.

2.2 Capital mobility

Capital mobility is another important channel for international market integration. We focus first on foreign direct investment (FDI), which can be divided into horizontal and vertical FDI. While the former takes place mainly between countries at similar levels of development

Figure 3.2

Trade-to-GDP ratios vis-à-vis low-wage economies

Note: Low-wage economies are defined as non-OECD, non-OPEC countries. See also Figure 3.1.
Source: OECD STAN Bilateral Trade Database; calculations by the EEAG.

[2] See Figure 3.2 in OECD (2007).

Table 3.2
**Imports from low-wage countries as a
percentage of GDP**

	1990	2000	2004
Austria		3.4	4.2
Belgium	5.7	10.6	10.5
Denmark	2.4	3.4	4.0
Finland	3.3	6.3	7.9
France	2.4	3.6	3.7
Germany	2.9	4.4	4.7
Greece	2.8	4.6	4.9
Ireland	2.0	7.1	5.2
Italy	2.5	3.9	4.1
Netherlands	5.6	8.7	11.1
Portugal	3.4	3.2	3.3
Spain	2.0	4.1	4.3
Sweden	1.9	3.3	3.4
UK	2.6	4.3	4.4
EU15	**2.7**	**4.5**	**4.9**
Australia	2.3	5.4	6.2
Canada	1.5	3.4	4.1
Japan	2.4	3.4	4.6
Korea	0.0	10.9	12.1
New Zealand	2.8	5.7	6.2
Norway	3.6	3.1	3.2
Switzerland	2.4	3.6	2.5
US	2.2	3.8	4.4
OECD	**2.4**	**4.1**	**4.8**

Note: See Figure 3.2.

Source: OECD STAN Bilateral Trade Database.

Table 3.3
**Imports from low-wage countries as a
percentage of total imports**

	1990	2000	2004
Austria		9.4	11.0
Belgium	9.4	14.1	13.1
Denmark	9.7	12.3	14.6
Finland	16.4	22.4	29.2
France	12.4	15.5	17.7
Germany	13.8	16.6	18.2
Greece	11.8	17.1	19.5
Ireland	4.5	13.4	15.3
Italy	15.4	17.5	20.0
Netherlands	12.2	18.3	26.1
Portugal	9.5	8.6	10.6
Spain	11.5	14.9	17.2
Sweden	8.3	10.2	11.9
UK	11.6	18.1	20.6
EU15	**12.4**	**16.2**	**18.7**
Australia	18.4	31.0	37.6
Canada	7.4	10.0	14.6
Japan	31.8	42.2	46.6
Korea	0.0	31.3	36.7
New Zealand	13.0	21.0	26.8
Norway	15.3	14.7	16.9
Switzerland	7.9	10.3	8.3
US	24.4	29.8	33.7
OECD	**19.6**	**27.0**	**28.8**

Note: See Figure 3.2.

Source: OECD STAN Bilateral Trade Database.

and serves to access foreign markets by moving production closer to consumers, firms to a large extent engage in vertical foreign direct investments to exploit the advantage of low wages in emerging economies in the production of labour-intensive intermediate goods. Figure 3.5 and Table 3.4 show a dramatic increase in FDI from advanced countries.

For the EU15 the ratio of total outward FDI stock to domestic GDP jumped from 6 to 40 percent between 1980 and 2005.[3] The OECD figure reached 27 percent in 2005. Among individual countries, the Netherlands stand out as their ratio more than quadrupled from 24 percent to more than 100 percent between 1980 and 2005; larger countries like the US or Japan show much smaller increases.

Distinguishing again between advanced and low-wage countries, one finds a similar pattern as with international trade. Low-wage economies only play a minor role as recipients of

Figure 3.3

Imports from low-wage economies as a percentage of total imports

Note: Low-wage economies are defined as non-OECD, non-OPEC countries. See also Figure 3.1.
Source: OECD STAN Bilateral Trade Database; calculations by the EEAG.

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[3] The percentages in Figure 3.5 have been calculated in a similar way as in Figure 3.1. See footnote 1.
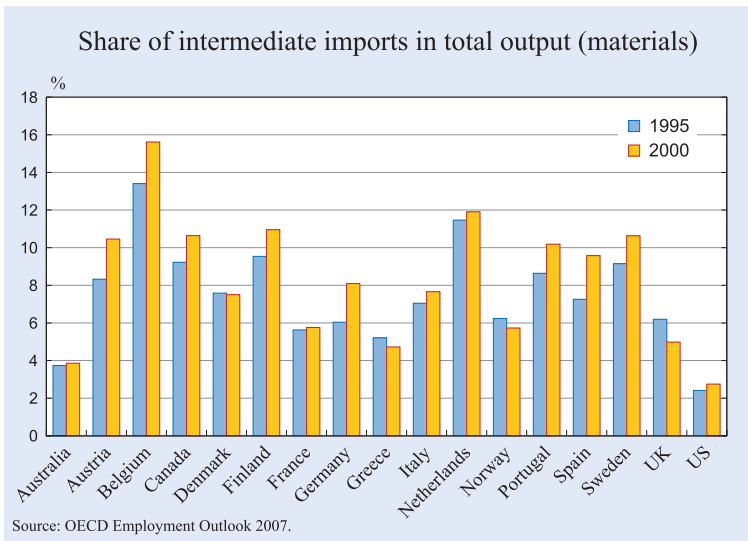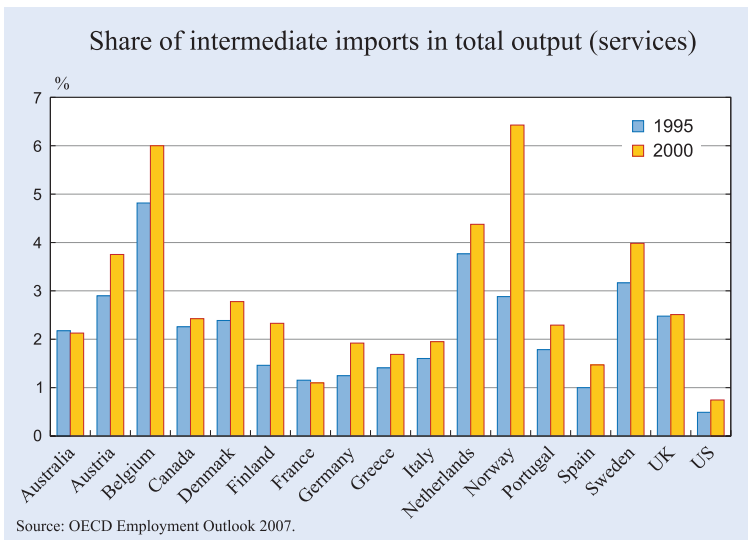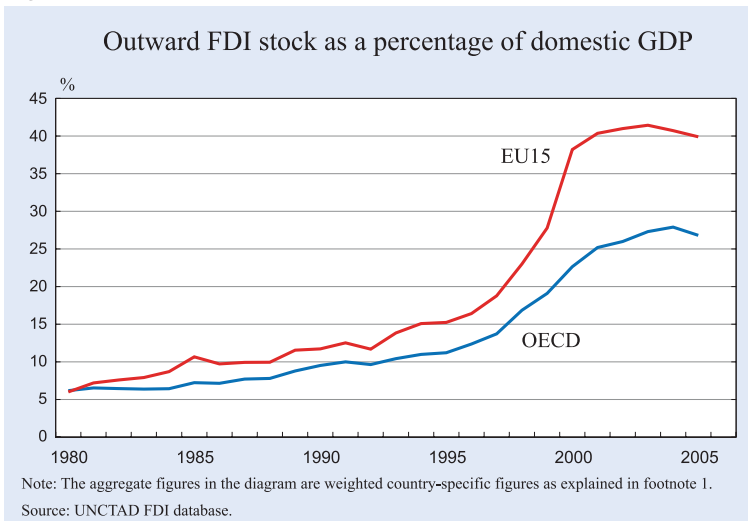
Figure 3.4a

Share of intermediate imports in total output (materials)

Source: OECD Employment Outlook 2007.

Figure 3.4b

Share of intermediate imports in total output (services)

Source: OECD Employment Outlook 2007.

Figure 3.5

Outward FDI stock as a percentage of domestic GDP

Note: The aggregate figures in the diagram are weighted country-specific figures as explained in footnote 1.
Source: UNCTAD FDI database.

FDI from advanced economies (see Table 3.5). Relative to the GDP of advanced countries, outward FDI stock in low-wage economies made up no more than a small percentage in 2000 if one excludes outliers such as Switzerland and the Netherlands. For most advanced countries, the share of low-wage economies in total outward FDI stock is below 15 percent (the exceptions are Austria with 38.9 percent, the US with 31.1 percent, Canada with 25.2 percent and Switzerland with 22.3 percent). It is noteworthy, however, that the share of the outward FDI stock in low-wage economies rose for most advanced economies between 1995 and 2000.

Although the amount of FDI can be used as an indicator of capital market integration, the measure says nothing about the extent to which the world capital stock has been reallocated from advanced to low-wage economies. Ideally, one would like to see how the distribution of the world capital stock has changed over recent decades. Capital stock data, especially in low-wage economies, are, however, notoriously unreliable.

It is clear though that the allocation of investment has changed substantially over time. Figure 3.6a shows that low-wage economies still account for less than 30 percent of total global capital formation, but this fraction increased by more than 10 percentage points between 1970 and 2005. As can be seen in Figure 3.6b, the rising share of low-wage economies in world investment can to a large extent be attributed to increasing investment in China.

Table 3.4

Outward FDI stock as a percentage of domestic GDP

	1980	1990	2000	2005
Austria	0.7	2.9	12.8	21.9
Belgium and Luxembourg	4.8	19.4	72.5	
Denmark	3.0	5.5	46.2	45.5
Finland	1.4	8.2	43.5	38.5
France	3.5	9.0	33.5	40.5
Germany	4.8	9.1	29.0	34.6
Greece		3.4	5.4	6.0
Ireland		36.4	29.4	59.0
Italy	1.6	5.5	16.8	16.6
Netherlands	23.6	36.3	82.4	102.6
Portugal	1.7	1.3	18.4	24.2
Spain	0.8	3.0	28.9	33.8
Sweden	2.8	21.1	51.4	56.5
UK	15.0	23.2	62.4	56.2
EU15	**6.0**	**11.7**	**38.2**	**39.9**
Australia	3.0	9.8	22.0	22.5
Canada	8.9	14.8	33.3	35.3
Japan	1.8	6.6	5.9	8.5
Korea	0.2	0.9	5.2	4.6
New Zealand	2.3	14.7	16.3	10.2
Norway	0.9	9.4	217.2	123.3
Switzerland	19.4	28.0	93.4	107.4
United States	7.8	7.5	13.5	16.4
OECD	**6.2**	**9.5**	**22.6**	**26.8**

Note: The aggregate figures are weighted country-specific figures as explained in footnote 1.

Source: UNCTAD FDI Database.

2.3 Labour mobility

Migration of labour represents a third channel of globalisation. Table 3.6 shows the stocks of foreign-born population as a percentage of total population in various countries. The table gives a picture of

Table 3.5

Outward FDI stock in low-wage countries

	Percentage of GDP		Percentage of total stock	
	1995	2000	1995	2000
Austria	1.7	4.9	34.1	38.9
Finland	0.8	2.6	7.3	6.1
France	0.5	1.9	4.3	5.6
Germany	1.4	4.0	13.3	14.3
Italy	0.3	0.6	4.0	4.2
Netherlands	6.6	11.5	16.5	14.7
Sweden	0.5	4.9	1.9	9.5
UK	4.9	5.3	17.8	8.3
Australia	2.1	2.4	14.9	10.5
Canada	4.0	8.4	20.0	25.2
Norway	1.7	3.9	10.9	15.3
Switzerland	9.0	20.5	20.4	22.3
US	2.7	4.2	29.1	31.1

Note: See Figure 3.2.

Source: UNCTAD FDI Database.

increases everywhere. The largest shares of foreign-born population in Europe are in Switzerland (23.8 percent) and Austria (13.5 percent), which are countries that have always relied on large inflows of foreign labour. But it is also to be noted that the percentages of foreign-born population in Germany (12.9), Sweden (12.4) and Belgium (12.1) more or less match that of the US (12.9), a traditional immigration country.

Table 3.7 shows instead gross yearly inflows of foreign citizens as a percentage of total population. The EU15 average in 2005 was 0.7 percent. The European countries that stand out with the largest inflows are Spain (1.6 percent), Switzerland (1.3 percent), Austria (1.2 percent) and Ireland (1.2 percent). Here, too, there is an increasing trend for most countries.

3. Globalisation and unemployment

The standard framework of economists to analyse the effects of trade integration with low-wage economies is the so-called *Heckscher-Ohlin model* of trade. In the simplest versions of the model, the basic assumptions are that there are two production factors, two goods with different relative factor requirements in production and two regions with different relative factor endowments. Sometimes capital and labour are seen as the two production factors, with advanced countries having a larger stock of capital relative to labour than low-wage economies. Sometimes the focus is instead on high-skilled and low-skilled labour as the two factors of production, with a larger relative supply of high-skilled labour (human capital) in advanced than in low-

Figure 3.6a

Share of low-wage economies in global gross fixed capital formation

Note: Low-wage economies are defined as non-OECD, non-OPEC countries.

Source: UNCTAD FDI database; calculations by the EEAG.

Figure 3.6b

Shares of global gross fixed capital formation

Note: "Other Asia" includes all South, East and South-East Asian countries according to the UNCTAD definition except China and Korea.

Source: UNCTAD FDI database; calculations by the EEAG.

wage economies. Below we will denote the sector using capital/skilled labour more intensively the *capital-intensive* sector and the other sector the *labour-intensive* one.

In the absence of trade, relative goods prices differ between advanced economies (the North) and low-wage economies (the South): the relative price of the capital-intensive good is lower in the North than in the South. The opening up of trade between the two regions equalises goods prices: the relative price of the capital-intensive good increases in the North, whereas the reverse development occurs in the South. In the North, there is an incentive to move production factors to the capital-intensive sector. Hence, output in this section expands, whereas output in the labour-intensive sector contracts. In the South, the

reverse development takes place. As a result, the North will export the capital-intensive good and import the labour-intensive good. In the North, there is an increase in the relative demand for the production factor used intensively in the expanding sector: capital or skilled labour. The explanation is that more additional capital (or skilled labour) is demanded from the expanding capital-intensive sector than is released from the contracting labour-intensive sector, at the same time as the increase in demand for the other production factor from the expanding sector is smaller than the fall in demand in the contracting sector. If factor supplies are given and markets clear – as is assumed in traditional trade models – the relative reward of the factor used intensively in the expanding sector must rise: the return to capital rises relative to the wage or the relative wage of skilled labour rises. Reverse developments occur in the South. The changes in the relative factor price are larger than the changes in the relative price. The association between an increase (decrease) in the relative price of a good and the increase (decrease) in the relative reward for the factor used intensively in the production of that good is usually labelled the *Stolper-Samuelson effect.*

Overall, the expansion of trade results in welfare gains for both regions because production factors can be used more efficiently when each region can expand the production in which it has a comparative advantage due to the differences in factor endowments. But the convergence of factor prices between the North and the South also implies changes in the income distribution. Although the opening up of trade creates aggregate gains in both regions, there are, according to the Heckscher-Ohlin model, both winners and losers. The existence of aggregate gains means, however, that in principle the winners can compensate the losers by means of monetary transfers, so that all

Table 3.6
Stock of foreign-born population as a
percentage of total population

	1996	2000	2005
Austria		10.5	13.5
Belgium	9.8	10.3	12.1
Denmark	5.1	5.8	6.5
Finland	2.1	2.6	3.4
France		7.3[a)]	
Germany	11.9	12.5	12.9[a)]
Greece		10.3[b)]	
Ireland	6.9	8.7	11.0
Italy		2.5[b)]	
Netherlands	9.2	10.1	10.6
Norway	5.6	6.8	8.2
Portugal	5.4	5.1	6.3
Spain		5.3[b)]	
Sweden	10.7	11.3	12.4
Switzerland	21.3	21.9	23.8
UK	7.1	7.9	9.7
Australia	23.3	23.0	23.8
Canada	17.4	18.1	19.1
New Zealand	16.2	17.2	19.4
US	10.3	11.0	12.9

Notes: [a)] 2003. – [b)] 2001.

Source: OECD International Migration Outlook 2007.

agents in a region can be made better off than if it had remained in autarky.

While the Heckscher-Ohlin framework focuses on trade as the explanation of factor price convergence, capital and labour movements have similar effects. When it can, capital moves from high-wage to low-wage countries, decreasing labour demand in the former and increasing it in the latter. Labour, in turn, migrates from low-wage to high-wage countries, increasing labour supply there and reducing it in the low-wage countries.

The Heckscher-Ohlin story has been invoked as an explanation of both rising wage inequality and a falling labour share in advanced economies. Figure 3.7 shows how the relative earnings of high-skilled versus low-skilled labour – measured as the ratio between the earnings of the 90th and the 10th percentile of the

earnings distribution – have increased strongly in the US and the UK over the last decades. There have also been increases – although smaller – in Germany, the Netherlands and Sweden. The two exceptions to this pattern in the diagram are Finland and France: in Finland the wage gap has remained more or less unchanged, whereas it has narrowed somewhat in France. Figure 3.8 shows how the aggregate income shares of labour and of employees in advanced economies have declined since 1980.

3.1 Trade and rigid wages

It has become a standard reasoning that globalisation causes unemployment in Western Europe because rigidities prevent wages from adjusting. The argument was first developed by Krugman (1995) on the basis of earlier work by Brecher (1974). More recent examples include, for example, Davis (1998), Landmann and Pflüger (1998), Sinn (2003, 2005a, 2006), EEAG (2005), Calmfors (2006) and Seidel (2007).

Krugman's argument was developed within the Heckscher-Ohlin framework described above. He focused on low-skilled versus high-skilled labour. The argument is simply that if the fall in relative demand for unskilled labour in the North is not allowed to reduce the relative wage of this group, then unem-

Table 3.7
Gross inflow of foreign citizens as a percentage
of total population

	1992	1996	2000	2005
Austria			0.8	1.2
Belgium	0.5	0.5	0.6	0.7
Denmark	0.3	0.5	0.4	0.3
Finland	0.2	0.1	0.2	0.2
France		0.1	0.2	0.2
Germany	1.5	0.9	0.8	0.7
Ireland		0.6	0.7	1.2
Italy			0.5	0.5
Netherlands	0.1	0.1	0.1	0.0
Portugal		0.0	0.2	0.3
Spain			0.8	1.6
Sweden	0.5	0.3	0.5	0.6
UK	0.3	0.4	0.6	0.8
EU15			0.5	0.7
Australia	0.6	1.3	1.8	2.2
Canada	1.1	1.4	1.6	1.6
Japan	0.2	0.2	0.3	0.3
New Zealand	0.7	1.1	1.0	1.3
Norway	0.4	0.4	0.6	0.7
Switzerland	1.6	1.1	1.2	1.3
US	0.4	0.3	0.7	0.8
OECD			0.6	0.7

Source: OECD International Migration Outlook 2007.

Figure 3.7

Earnings inequality

Note: Earnings inequality is measured as the earnings ratio between the 90th and the 10th percentile of the earnings distribution.
Source: OECD.
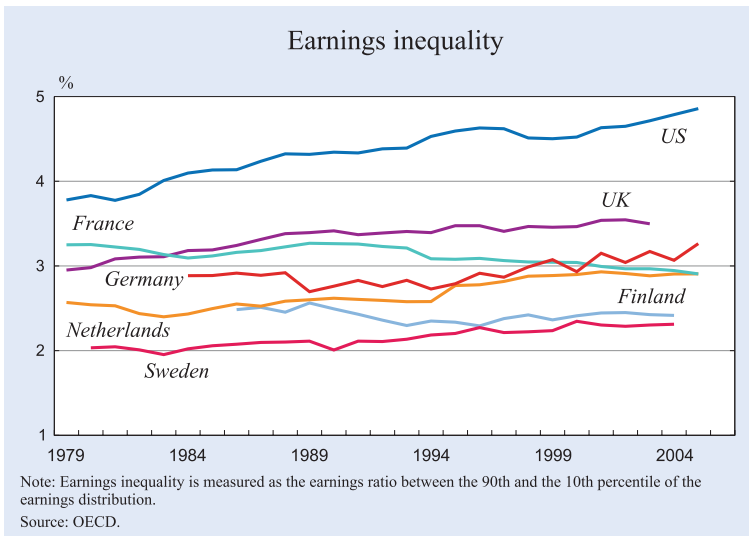
ployment of unskilled workers must emerge. Because of this, the opening up of trade does not result in overall welfare gains for the North; instead welfare falls as compared to the pre-trade situation.

The lack of downward relative wage adjustment for unskilled workers could be the consequence of several types of rigidities. It could be the *relative wage* itself that is rigid. It could be the *real wage* in terms of the CPI (or any other combination of the prices of the two goods in the model) that is rigid. Or it could be the *money wage* that is rigid downwards (provided there is no or only very low inflation).

If the North is large enough, the rigid relative wage there locks the world relative price after trade has

Figure 3.8

Income shares of employees and labour for advanced economies

Note: a) The income share of employees is the ratio of employees' labour compensation to value added. b) The income share of labour is the ratio of labour compensation of employees and "non-employee" workers to value added. c) Advanced economies include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, the UK, and the US, weighted using series on GDP in US dollars from the World Economic Outlook database.
Source: IMF, World Economic Outlook, October 2007.

opened at the pre-trade level in the North. This means a larger expansion of the output of the labour-intensive good in the South than if wages were flexible. The North cuts down more on the production of labour-intensive goods than in the flexible-wage case, at the same time as it expands the production of the skill-intensive good more.[4] Both the North's exports of the skill-intensive good and its imports of the labour-intensive good will be larger than if wages were flexible. The wage rigidity thus causes both *overspecialisation* and *overexpansion* of trade.

With flexible wages, the North also specialises in the skill-intensive good, but less so because declining wages for the unskilled keep a larger fraction of the labour-intensive sector alive. With a rigid relative wage, too large a part of the labour-intensive sector is lost, and too much skilled labour is driven into the skill-intensive sector, where, however, the unskilled set free cannot be fully reemployed. The upshot is that exports from a skill-abundant country with rigid wages need not be a sign of high competitiveness. Instead, it might just reflect a "pathological export boom" enabled by an overly large shrinkage of the labour-intensive sector.[5]

According to the Krugman argument, globalisation may have caused more wage inequality in the US and other Anglo-Saxon countries, where wages are flexible, but unemployment in European economies, where wages are rigid. A similar argument can be made for labour in general if one thinks instead in terms of the North and the South having different relative endowments of capital and

[4] This is an application of the so-called *Rybczinsky theorem*. According to that, a fall in the employment of a production factor causes a reduction in the output of the good that is intensive in the use of this factor and an increase in the output of the other good.
[5] For an extensive analysis see Sinn (2005a, 2006). The overexpansion of trade was first mentioned by Srinivasan (1995) in a comment to Krugman (1995).

labour. With an abundance of capital relative to labour in the North, trade then implies specialisation there in capital-intensive goods and a fall in the overall demand for labour. With downward real wage rigidity or money wage rigidity (in the case of very low inflation), an analogous reasoning to that above implies an increase in unemployment of all categories of workers.[6]

The risk that globalisation would cause unemployment because of wage rigidities obviously depends on the specific form of wage rigidity and on the speed with which trade integration occurs. If it is the real wage that is rigid downwards, risks are reduced to the extent that there is ongoing productivity growth that tends to raise the demand for labour: a relative shift in factor demand from labour to capital does not then have to involve any cut in real wages, to which there may be strong resistance.[7] If the downward rigidity refers to nominal wages, the risk that this rigidity will bite is smaller not only to the extent that productivity growth is higher but also the higher is inflation, since both higher productivity growth and higher inflation imply higher nominal wage growth. Conversely, a slowing of productivity growth, as has occurred in many European countries in recent years (see Chapter 3 in EEAG 2006), might exacerbate the problems. In general, the risks that either real or nominal wage rigidity will bite are smaller, the slower the pace of trade integration. Relative wage rigidity is a much larger problem than real wage rigidity: if labour demand shifts from low-skilled to high-skilled labour because of trade integration at the same time as there is general (factor-neutral) productivity growth, the latter cannot prevent unemployment from arising among the low-skilled if their wages increase to the same extent as the wages of the high-skilled.

3.2 Capital movements and unemployment

As discussed above, trade and factor mobility can be substitutes for each other. So, it is not surprising that the argument of globalisation causing unemployment under wage rigidities could just as well be phrased in terms of capital movements (see EEAG 2005; Seidel 2005, 2007; or Calmfors 2006).

Think about two economies (again the North and the South) with different capital-labour ratios. The two regions produce the same internationally traded good. The return to capital is lower in the capital-abundant North than in the labour-abundant South, whereas the reverse applies to the real wage. Opening up for free capital movements leads to a reallocation of the world capital stock in the long run, so that the returns to capital are equalised between the two regions by capital flows from the North to the South. In the process, labour demand falls in the North. With flexible wages, the result of capital reallocation and the fall in labour demand in the North is a reduction in the real wage there. There is, however, an overall income gain for the region because the gain to capital owners of higher returns outweighs the wage losses for labour.[8]

But if there is instead downward wage rigidity, unemployment emerges in the North. This prevents an increase in the return to capital there. If the North is large enough, its fixed real wage locks the factor returns in the world economy to the pre-capital-mobility levels in the North. This can only happen with a larger outflow of capital to the South than with wage flexibility, raising the marginal product of labour, and thus the real wage, more in that region than in the flexible-wage case. So, in this model framework, wage rigidity in the North again causes larger structural changes than would otherwise be the case. And again the wage rigidity implies that the potential aggregate income gains in the North never materialise. Instead, globalisation reduces aggregate income in this region: the income of capital owners remains unchanged, whereas total labour income falls when employment falls.

The above reasoning is, of course, too simplistic because it assumes that the wage does not respond to the unemployment emerging during the globalisation process. This is at odds with received wage-setting theory, which usually posits a wage-setting relationship according to which the wage is sensitive to the level of unemployment (see, for example, EEAG 2004, 2005). Taking this into account, one should expect the unemployment emerging in the process to gradually exert some moderating influence on wages. This will in turn reduce the rise in unemployment, but the main conclusion remains that with imperfectly flexible wages the shifts in labour demand associated with globalisation raise equilibrium unemployment under the assumptions made above.

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[6] It is more far-fetched to think of a rigid relative wage in terms of the return to capital
[7] Such downward real wage rigidity has been documented by, for example, Dickens (2005) and Holden and Wulfsberg (2007).

[8] The implication is thus that, relative to a counterfactual where capital cannot move and everything else is held equal, the region's Gross National Income (GNI) rises, while its Gross National Product falls as capital is being relocated elsewhere.

3.3 Unemployment and labour migration

Immigration has similar implications for factor price convergence as trade specialisation and capital movements, because people migrate from low-wage to high-wage countries, increasing the scarcity price of labour in the former and reducing it in the latter. Ideally, also such factor movements create aggregate welfare gains for all nations involved. The nation from where labour emigrates gains because its workers obtain higher wages in the host country than what they were able to contribute to GDP at home. The nation to where the workers immigrate gains, because the immigrants typically make a contribution to GDP that is higher than the wage they receive, since part of that contribution accrues to complementary factors such as capital.

Also immigration can significantly change the income distribution. Those who offer labour services that are complements to what the immigrants offer gain, but those who offer substitute services lose. However, the losses are not aggregate losses, as they are counterbalanced by gains elsewhere in the economy. The lower the wages of domestic substitute workers fall, the larger are the gains for those who buy their services.

Again wage rigidities and unemployment in the host country modify the analysis substantially. If wages do not fall despite immigration, employers have no incentive to create additional jobs, and the immigration hence causes unemployment. If wage rigidities and unemployment stem from high union wages or legally imposed minimum wages, the immigrants may be able to get some of the jobs, crowding out nationals to the extent they succeed. However, as their chances of taking over the jobs of nationals are limited, migration itself will be limited.

If wage rigidities and unemployment instead stem from high welfare replacement payments that are not dependent on wages, the wage replacement payments act as minimum wages for domestic residents, but not for the immigrants, as the latter typically are not eligible to these benefits before they have worked. Then, as shown in Sinn (2005b), immigrants are likely to underbid domestic residents in the labour market and crowd out domestic residents from jobs to a very large extent. As domestic residents – whose reservation wages are higher because of the possibility of receiving welfare – remain the marginal suppliers in the labour market, they continue to determine the market-clearing wage and prevent the creation of additional jobs. Immigration will then cause unemployment among domestic residents, but this unemployment will not discourage immigration.

3.4 Unemployment and increased "turbulence"

Another important channel through which globalisation could increase unemployment is through faster structural change ("increased turbulence"). It is a common view that the pace of structural transformation has increased over time and that globalisation in all its forms is an important explanation, even if there is no consensus on this.[9] Ljungqvist and Sargent (2006) have emphasised how such increased turbulence could result in higher unemployment. They associate faster structural change with a more rapid loss of human capital (skills needed in new jobs) among the unemployed. This reduces the wage they could get on a new job and hence raises the *effective* replacement rate of unemployment insurance (the ratio of unemployment benefits to the wage on a new job) if unemployment benefits are tied to earlier wages, as is the case in most countries. The consequence is that unemployed workers' reservation wages become very high, which reduces job creation and hence raises unemployment. This may in particular be the case with stringent employment protection regulation, the costs of which will not be shifted back on to employees if effective replacement rates are high.

4. Six arguments why globalisation could be good for Western European employment

The preceding section has set out the arguments for why globalisation in conjunction with labour market rigidities may cause unemployment in Western Europe. This will certainly be the case to the extent that an unchanged employment level requires wage adjustments that are not allowed to take place. Unemployment then substitutes for wage reductions as an adjustment mechanism. However, one should not take the amount of wage rigidity as given. Instead, the extent of trade integration and international factor mobility may be important determinants of the degree of labour market rigidity, particularly in the long run. So, a crucial question is to what degree globalisation could help relax labour

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[9] See the short summary of empirical evidence in Ljungqvist and Sargent (2006). See also Blanchard (2006), OECD (2007) and WTO-ILO (2007).

market rigidities and in this way mitigate adverse employment effects or possibly even contribute to higher employment.

This section analyses several mechanisms through which globalisation might in fact promote high employment by reducing market imperfections. These mechanisms include:

1. Scale effects due to the cost savings associated with international outsourcing
2. Lower price mark-ups because of stronger international competition
3. Increased sensitivity of labour demand to wages
4. A stronger bargaining position of employers vis-à-vis unions
5. Institutional changes in the labour market
6. Terms-of-trade gains for advanced economies

4.1 Cost-saving effects of international outsourcing

As discussed in Section 2.1, a prominent feature of globalisation is the strong trend towards outsourcing production to low-wage economies. Initially, the debate on international outsourcing mainly emphasised the potential threat to employment in advanced economies from the substitution of imports of intermediary products for domestic labour. But recently, the discussion has come to focus more on the cost-saving and productivity-increasing effects of outsourcing.

Work by Grossman and Rossi-Hansberg (2006a,b) has emphasised how the production process can be seen as a set of *tasks* performed by workers. International outsourcing represents trade in such tasks, of which some are more easily tradable than others.[10] Improvements in both physical transportation and electronic communication have reduced the costs of outsourcing tasks. When more tasks are outsourced abroad, foreign labour is substituted for domestic labour. This effect tends to reduce domestic labour demand. But at the same time, the possibility to outsource tasks allows firms to deepen the division of labour; the associated cost savings imply a positive *scale* effect raising the demand for local labour to perform the tasks that are less suitable to outsource abroad. The outsourcing of tasks therefore affects labour demand in a similar way as labour-augmenting technological progress.

If one embeds this analysis in a standard Hechscher-Ohlin trade framework, it is no longer clear that outsourcing of tasks must reduce domestic labour demand.[11] On the one hand, the efficiency gain from outsourcing labour services causes an increase in the relative supply of the labour-intensive good, which depresses its relative price. This tends to reduce labour demand in the domestic economy in the way discussed above. But on the other hand, the net "productivity" effect of outsourcing tends to raise labour demand.[12]

If one takes the Grossman and Rossi-Hansberg analysis at face value, it leads to the important policy conclusion that it is counter productive for a single country – like Belgium or even France or Germany – to try to protect employment through national measures to restrict international outsourcing of tasks. If this is done by a country in isolation, it has only a marginal effect on the prices of goods traded in the world market as long as other advanced countries continue to outsource. The main effect is instead to eliminate the cost-savings effect which exerts a positive influence on domestic employment.[13]

Empirical knowledge on the cost-saving effects of both international outsourcing and outsourcing in general is still scant. Görzig and Stephan (2002) found that outsourcing of materials is positively correlated with profits for German manufacturing firms, whereas the relationship appears to be negative for services. Kimura (2002) did not find any evidence of positive profit effects of outsourcing in Japanese manufacturing firms. A study of outsourcing in electronics subsectors in Ireland by Görg and Hanley (2004) found that large firms benefit from the outsourcing of both material and service inputs, while this is not the case for small plants. A likely explanation of these differences is that transactions costs are smaller for large than for small plants. Amiti and Wei (2005b) studied international outsourcing in US manufacturing firms

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[10] See also Feenstra and Hanson (1996a,b), Levy and Murnane (2004) or Feenstra (2007).

[11] See the introduction to Section 3 and Section 3.1. Grossman and Rossi-Hansberg focus their analysis on high-skilled and low-skilled labour, but the analysis can just as well be recast in terms of capital and labour.

[12] A similar cost-saving effect, tending to raise employment, has been analysed by Mitra and Ranjan (2007) in a model where unemployment arises because of search frictions.

[13] The sharp conclusions from the Heckscher-Ohlin trade model derive from the equality of the number of production factors and the number of goods. With more production factors than goods, there would also be an additional "labour supply effect" from outsourcing, reducing the wage that would equate labour demand and supply in the same way as if there had been an increase in domestic labour supply. In general, one could not tell whether or not this labour supply effect outweighs the productivity effect for a single economy. However, Grossman and Rossi-Hansberg (2006a,b) argue that this has been the case for the US.

and concluded that more than ten percent of productivity growth over the 1995–2001 period could be attributed to such outsourcing of services and another five percent to the outsourcing of material inputs. On the basis of a back-of-the-envelope calculation, Grossman and Rossi-Hansberg (2006a) argued that the cost-savings effect they emphasise in their theoretical analysis was an important factor behind the increase in US wages between 1998 and 2004.

Although it is still an open question to what extent international outsourcing results in cost savings, the basic hypothesis must be that rational firms engage in it because it is profitable.

A wider question is whether international trade in general, including final goods, raises productivity growth. One would expect this to be the case, as more competition is likely to raise the incentives for efficiency improvements. A common result in empirical growth studies is also that larger trade openness is associated with higher growth.[14] Recent theoretical research has emphasised that falling trade costs are likely to raise within-sector productivity growth because larger export opportunities stimulate the entry of new firms and in this way "drive down the *ex post* profitability of producers, and therefore push up the minimum level of productivity firms need in order to survive".[15] This leads to relative growth of high-productivity firms within industries.[16] It is theoretically possible that these productivity gains are large enough to ensure that real wage gains are consistent with full employment also for production factors that are used intensively in comparative-disadvantage sectors (such as unskilled labour).[17]

The conclusion is that the cost-saving effects of international outsourcing and trade might reduce significantly the risk that trade with low-wage economies in combination with wage rigidities will cause unemployment. The evaluation depends to a large extent on the type of wage rigidity. If downward rigidity of the real or the nominal wage is the problem, the probability that such rigidities bite is lowered.[18] It may very well be that productivity growth is high enough that

all *real* (and nominal) wages can increase without causing unemployment, even though the *relative* wage of low-skilled may have to fall.[19] But to the extent that relative wage rigidity is a binding constraint and that international outsourcing contributes to general cost savings for all types of labour, rather than primarily for unskilled labour, the unemployment risks associated with globalisation are larger.

4.2 Lower price mark-ups because of increased competitive pressures

Another positive employment effect of globalisation could arise because increased trade in general, including trade with low-wage economies, implies stronger competitive pressures in the markets for products and services. More exactly, stronger competition raises product demand elasticities, that is the sensitivity of product demand to price changes. Basic price theory teaches that firms with market power restrict output and employment by raising prices above marginal costs. Price mark-ups are higher the lower are product demand elasticities. Hence, to the extent that stronger international competition raises product demand elasticities, firms are forced to reduce their price mark-ups. This tends to increase the demand for output and thus also the labour demanded by producers. One can think of the effect as an outward shift of the labour demand schedule, which tends to raise both employment and the real wage: an increase in nominal wages relative to prices, that is an increase in the real wage, is the flip side of a reduction in prices relative to nominal wages.[20]

There exists a large empirical literature trying to explain differences in unemployment in panel data for OECD countries (that is to explain variation both across countries and within countries over time) by differences in labour market institutions in a wide sense: generosity of unemployment benefits, union density, coverage of collective agreements, the degree of coordination of wage bargaining and tax wedges.[21] It has become increasingly common to add variables capturing the extent of product market regulation to such regressions including labour market

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[14] A frequently quoted study is Frankel and Rose (2000). See also Frankel and Romer (1996) and OECD (2005).
[15] Bernard et al. (2007).
[16] Bernard and Jensen (2004) found that a very substantial part of productivity growth in US manufacturing is explained by higher growth for high-productivity exporters than for lower-productivity firms producing only for the domestic market.
[17] Bernard et al. (2007). See also Mélitz (2003).
[18] The wage regressions in Box 1.2 of Chapter 1 provide some support for this hypothesis, as they indicate that a rise in productivity growth is only partially reflected in higher wage growth.

[19] See Feenstra (2007) for similar conclusions regarding real wage growth and relative wage developments in the US.
[20] See, for example, Layard et al. (1991) or Nickell (1999). The "labour demand schedule" showing the relationship between employment and the real wage under monopolistic competition is usually denoted the "price-setting schedule". A seminal theoretical contribution, showing that equilibrium unemployment is decreasing in the degree of product market competition in a model with bargaining about both the wage and employment, is Blanchard and Giavazzi (2003).
[21] The standard procedure is to control for the cyclical situation. See also Section 6.2 below.

institutions. A number of studies have found product market deregulations to exert a significant unemployment-decreasing effect. The studies include, for example, Bertola et al. (2001), Nicoletti and Scarpetta (2005), Griffith et al. (2006) and Bassanini and Duval (2006).[22] This research has found that reductions in product market regulations have contributed to lower unemployment in Western Europe over the last 10–15 years. Reductions in both tariff rates and regulatory barriers to trade have constituted an important part of these deregulations. A number of studies have also provided support for the hypothesis that increased foreign competition has been an important factor behind lower price-cost make-ups (see, for example, Kee and Hoekman 2003 or Boulhol et al. 2006).

4.3 Increased sensitivity of employment to wages

A mechanism that partly overlaps with the effect of increased competition in product markets is that globalisation likely increases the sensitivity of employment to wage changes, that is the elasticity of labour demand.

First, an increase in the elasticity of product demand, following from increased competition in product markets, also increases the derived elasticity of labour demand. The explanation is that a wage increase is partly passed on to prices and therefore leads to a larger reduction in product demand, and hence output, the higher is the product demand elasticity. This is translated into a larger fall in labour demand.

Second, the establishment of international production networks associated with globalisation offers firms larger possibilities of substituting intermediary inputs produced by foreign labour for domestic labour through international outsourcing. This also raises the elasticity of labour demand. Third, increased possibilities of moving final goods production abroad work in the same direction.

According to the theory of trade unions and collective bargaining, an increased labour demand elasticity promotes real wage restraint and in this way also higher employment. The explanation is that a higher sensitivity of employment to wages increases the costs to unions of raising wages in the form of larger employment losses.[23] Under some commonly used assumptions, collective bargaining results in the real wage being set as a mark-up over the unemployment benefit: with a higher labour demand elasticity this mark-up is reduced.

A recent theoretical analysis stressing the links between outsourcing and the elasticity of labour demand is Koskela and Stenbacka (2007). They model international outsourcing as a substitute to domestic low-skilled labour and show how it raises the elasticity of labour demand for this category of workers. In contrast, international outsourcing works as a complement to high-skilled labour. According to their analysis, international outsourcing leads to lower wages for low-skilled labour and higher wages for high-skilled labour. As a consequence, employment *increases* for the low-skilled but falls for the high-skilled. If the proportion of low-skilled in the labour force is high enough, aggregate equilibrium unemployment in the economy falls.

Empirical research on the link between various aspects of international integration and labour demand elasticities is summarised in OECD (2007). Several studies, but not all, have found that globalisation tends to raise labour demand elasticities. The support is stronger for manufacturing than for services. On the basis of data from eleven OECD countries and 20 industries, the OECD study reports new evidence for a substantial increase in sectoral labour demand elasticities over the last twenty years (of the order of magnitude from 0.2 to 0.5).[24] The study also finds a positive relationship between the size of the labour demand elasticity in different industries and the intensity of outsourcing.

It follows from our analysis that increased product market competition not only decreases firms' price mark-ups (as discussed in Section 4.2) but also increases labour demand elasticities (as discussed in this section). Both effects tend to raise employment: the first effect because it shifts the employment-real wage relationship outwards, the second because it lowers the real wage along a given employment-real wage relationship. For this reason, one should expect a stronger positive employment effect from increased competition in product markets the larger is the bargaining power of unions. The explanation is that increased product market competition then serves to a larger extent to reduce monopoly

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[22] See also Schiantarelli (2005) for a survey of the empirical literature on product market regulations and labour markets.
[23] See, for example, Layard et al. (1991), Nickell and Layard (1999) or Calmfors and Holmlund (2000).

[24] The estimated elasticities are constant-output ones.

power in the labour market as well (in addition to reducing monopoly power in product markets). A similar conclusion is drawn by Ebell and Haefke (2006), who argue that employment effects of product market deregulations are almost non-existent if employees bargain individually with their employer, whereas the employment effects may be substantial under collective bargaining.[25] The hypothesis that product market deregulation produces larger employment gains the larger the bargaining power of unions has received empirical support in, for example, Nicoletti and Scarpetta (2005) and Griffith et al. (2006).[26]

4.4 An improved bargaining position of employers vis-à-vis unions

A higher labour demand elasticity gives unions incentives to demand lower wages. Yet another effect of globalisation is that it may improve the relative bargaining strength of employers vis-à-vis unions. Then, the outcome of wage negotiations is closer to the bargaining goals of employers and they will be able to appropriate a larger share of the rents from production.

It is a commonplace to assume that the outcome of bargaining depends on the fall-back positions, that is the alternative outcomes in case there is no agreement, of the parties. The stronger is the fall-back position of a party, the more favourable will be the outcome for the party. In the case of wage bargaining, there are two possible interpretations of the fall-back positions of unions and employers. One is in terms of a *permanent* closing down of production, that is a permanent break-up of the relationship between the employer and the employees. The other interpretation is in terms of the pay-offs during a *temporary* labour market conflict – a strike or a lock-out – until agreement is reached.

Globalisation clearly improves the relative bargaining position of the employer if disagreement leads to a permanent closing down of activities, as this will hurt the employer less in terms of lost profits the larger are the possibilities of moving production abroad. The outcome is theoretically less clear with the temporary-conflict interpretation. On the one hand, larger access to own units abroad producing final goods or the possibility to substitute more of intermediary inputs from abroad for domestic labour implies a smaller profit loss during a temporary labour market conflict. On the other hand, the vertical breaking-up of production into different complementary stages, some of which are performed abroad, could mean that the costs for domestic labour relative to the profit loss for firms of production disruptions become smaller (fewer workers on strike might prevent any final output from being produced). Also, to the extent that globalisation is associated with increased competition, it might become easier for customers to switch to other suppliers during a labour market conflict, making it more costly to the employer.[27]

An improved bargaining position of employers tends to reduce wages. This should have a positive impact on employment.[28] So far, research on how the bargaining power of unions is affected by globalisation is very limited. But the available evidence does suggest that greater exposure to foreign competition reduces the share of the surplus from production obtained by employees. In a study of five EU countries (Belgium, France, Germany, Italy and the UK), Dumont et al. (2006) found that both stronger import competition and more production facilities abroad reduce the bargaining power of labour. Similarly, stronger import competition (from other advanced economies though not from low-wage economies!) has been a major cause of the reduction in bargaining strength of employees in the UK from the mid–1990s, according to a study by Boulhol et al. (2006). Earlier, Kramarz (2003) found that stronger

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[25] The absence of substantial employment effects of product market deregulation under individual bargaining is explained by an incentive of firms to *overhire* in this case. When employees bargain individually, their bargaining strength depends on the profit loss they can inflict on the employer if bargaining breaks down. This loss is larger, the higher is the marginal revenue product of the employee. Hence, since the marginal revenue product is decreasing in employment, the firm has an incentive to hire employees beyond the point at which the marginal revenue product equals the wage: doing this, the bargained wage of *all* employees falls. Because the marginal revenue product is more steeply decreasing the higher is the monopoly power of the firm, increased product market competition reduces overhiring at the same time as it weakens the incentive to restrict output and employment to prop up prices. In their model, Ebell and Haefke find these two effects to more or less cancel out.

[26] Note that the two effects of increased product market competition discussed above tend to offset each other for real wages. This is a possible explanation of why we found no direct effects of product market regulation or globalisation variables on wage growth in the regressions in Box 1.2 of Chapter 1. Griffith et al. (2006) find, however, that increased competition produces real wage gains.

[27] But costs to employees could also increase to the extent that there is a long-run loss of market shares resulting in employment reductions.
[28] The conclusion presupposes that the employer has "the right to manage", that is to determine employment unilaterally in a profit-maximising way after the wage has been bargained with the trade union. Rodrik (1997) has instead analysed an increase in the fall-back level of profits in a so-called efficient bargaining model, which assumes that firms and unions bargain over both the wage and employment. In that setting, the union and the employer will agree on such a high level of employment that the marginal product of labour falls short of the wage rate. Employees share the rents from production with the employer through both a higher wage than in alternative employment and "overemployment". Under these conditions, an increase in the fall-back level of profits causes a reduction in both wages and employment. However, the right-to-manage assumption is a more realistic characterisation of how collective bargaining actually occurs than the efficient-bargaining assumption, since bargaining over employment is unusual.

import competition had reduced the bargaining power of labour in French firms.

4.5 Changes in labour market institutions

Yet another effect of globalisation may be to trigger changes in fundamental labour market institutions. This could come about either as endogenous responses in the labour market or as a result of changes in government regulation.

Ebell and Haefke (2006) have analysed how an increase in competitive pressures could lead to de-unionisation.[29] The key effect driving their results is that under collective bargaining, the rents accruing to the unions depend on the firms' profits, whereas under individual bargaining the rents that can be extracted by the individual only depend on the cost to the firm of replacing her/him.

Employees in a firm face a choice whether to bargain for wages collectively or individually. Under collective bargaining, they are able to appropriate a given share of the surplus from production. The lower the degree of competition, the larger is the surplus from production in a monopolistically competitive firm and hence the higher is the wage that is negotiated under collective bargaining. Under individual bargaining, the wage depends positively on the marginal value of a worker, as this determines the output loss to the firm of not being able to reach an agreement with an individual worker (and thus the bargaining power of the worker). In equilibrium, the marginal value of a worker must equal the cost of hiring the worker. The higher the degree of competition, the more vacancies are opened by firms. This implies higher hiring costs and thus also a higher marginal value of a worker. Hence, the wage under individual bargaining is higher, the higher is the degree of competition. It follows that workers may prefer collective bargaining when competition is low and individual bargaining when competition is high. An increase in import competition could therefore induce deunionisation, that is move an economy from collective to individual bargaining.[30]

Alternatively, globalisation pressures could lead to changes in government regulation. A set of legislated rules (including generous unemployment benefits, rules allowing unions wide scope for strike action, favourable conditions for union membership and high tax wedges) all contribute to pushing up wages and reducing the return to capital. But if employers to a larger extent can move production abroad to low-cost locations, then such "regulation" becomes much less effective in securing high wages, as the domestic rents to be shared by employees are reduced and the employment costs are increased. Boulhol (2007) has analysed how such an increase in capital mobility creates political incentives to reduce regulation. These incentives are particularly strong if costs of international trade fall at the same time, because this makes it more profitable for firms to relocate abroad and supply also the domestic market from that location.

4.6 Terms-of-trade effects

A final aspect on the employment effects of globalisation follows from the substantial improvement for advanced economies over the last ten years in the non-oil terms of trade, that is the price of exports relative to the price of non-oil imports. This development is shown in Figure 3.9. Terms-of-trade changes can influence wages and employment because they drive a wedge between the real product wage (the nominal wage deflated by the producer price index) and the real consumption wage (the nominal wage deflated by the CPI).

An improvement in the terms of trade raises the producer price index relative to the CPI. Hence, the real consumption wage can rise at the same time as the real product wage falls. Because it is the real product wage that determines employment, such an improvement in the terms of trade makes it possible to increase both employment and consumption possibilities of employed workers at the same time. This effect has been demonstrated to be empirically important for employment determination in Sweden by Lindblad and Sellin (2007). Also, in the wage regressions in Box 1.2 of Chapter 1, we found no significant impact of a terms-of-trade change on nominal wage growth (holding the rate of CPI inflation constant): the implication is that an improvement in the terms of trade is fully translated into a reduction in the real product wage.

A related argument focuses on how *ongoing changes* in the terms of trade affect the interaction between inflation and nominal wage rigidity. The reasoning is based on the analysis by Akerlof et al. (1996) of

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[29] See also footnote 25 in Section 4.3.
[30] The reason why employment becomes higher under individual than under collective bargaining in the Ebell-Haefke analysis despite higher wages is the tendency to overhiring in the former case, as discussed in footnote 35.

Box 3.1
Political repercussions from labour market integration: the case of Germany

Germany provides an interesting case study of the political forces that can be set to work by increased integration between regions. Burda (2000) argued that the globalisation shock may help the countries of Western Europe to overcome their rigidities, leading to a wave of reforms that will eventually make gains from trade possible. He saw EU eastern enlargement as a "Trojan horse", through which the vested interests of unions and firms can be weakened. Examining German unification, Burda found evidence for the interrelation between unemployment and the rigidity of labour market institutions. In eastern Germany, the adoption of western German wage agreements led to a collapse of employment. However, the high rates of unemployment in turn triggered a landslide decline in union membership, nearly eliminating union power in the eastern part of the country. Similarly, Schöb and Wildasin (2007) presume that migration is a fundamental determinant of labour market institutions. In their model, wage rigidities are endogenously determined by the degree of labour market integration among regions. Their analysis shows that the east-west integration of labour markets can be conducive to the development of more flexible labour markets.

However, the German experiences also show that employment-promoting labour-market reforms are not the only possible outcome of increased international integration. The downward pressure on wages resulting from globalisation and the forces of factor price equalisation could also cause demands on the government to provide more protection. This seems currently to be the case in Germany where the vast majority of the population now appears to be in favour of a rollback of Chancellor Schröder's Agenda 2010, a reform that made the German labour market more flexible. The Agenda 2010 reforms abolished Germany's second-tier unemployment assistance scheme (*Arbeitslosenhilfe*), which guaranteed unlimited unemployment benefits at about 55 percent of the previous wage, if necessary until retirement. One million people in the west and one million people in the east lost this support. Long-term unemployed now only receive the so-called *Arbeitslosengeld II*. This is basically the same as Germany's pre-existing Social Aid, a benefit available to any needy person with a level unrelated to the previous wage and employment history, with the exception that by reducing the transfer withdrawal rate from 100 to 80 percent, the government now effectively subsidises about 1.1 million full-time jobs in the low-wage segment. The Schröder government moreover cut the period during which ordinary unemployment benefits can be received for persons under 55 years of age from up to 32 to 12 months, in the case of older people above 57 years of age from 32 to 18 months.

The reforms of the Schröder government appear to have been very successful in terms of creating more employment. While job growth was on average 1.6 percent in 2006, the employment of older workers (above 50 years of age) increased by 4.9 percent. Moreover, for the first time since 1970 German unemployment fell below its rising trend. There has been a number of booms and stagnation periods since 1970, but the current boom is the first where unemployment did not rise relative to the previous boom. In the winter 2007/2008, German employment in full-time equivalents was about as high as it was towards the end of the last boom in the winter 2001/2002, and the forecasts predict that it will even increase beyond that level in 2008.

Despite this success, Germany's labour market reforms have caused substantial opposition. The reforms nearly split the Social Democratic Party (SPD) and were the main factor behind the electoral success of the new left-wing party "Die Linke", led by Oskar Lafontaine.

In view of the increasing opposition, the coalition government of CDU/CSU and SPD waived substantial elements of the Agenda 2010 reforms. The first move was to prolong the eligibility period for elderly unemployed from 18 to 24 months. Then, in December 2007, the government imposed high minimum wages – ranging from about eight to ten euros per hour – in the postal sector through the extension by law (*Allgemeinverbindlichkeitserklärung*) of the collective agreement encompassing the earlier state monopoly *Deutsche Post* to all firms in the sector. The coalition government moreover decided to apply the minimum wage procedure used in the postal sector to a number of other sectors that will yet have to be specified. The SPD has even announced that it wants to legislate a national minimum wage of 7.50 euros.
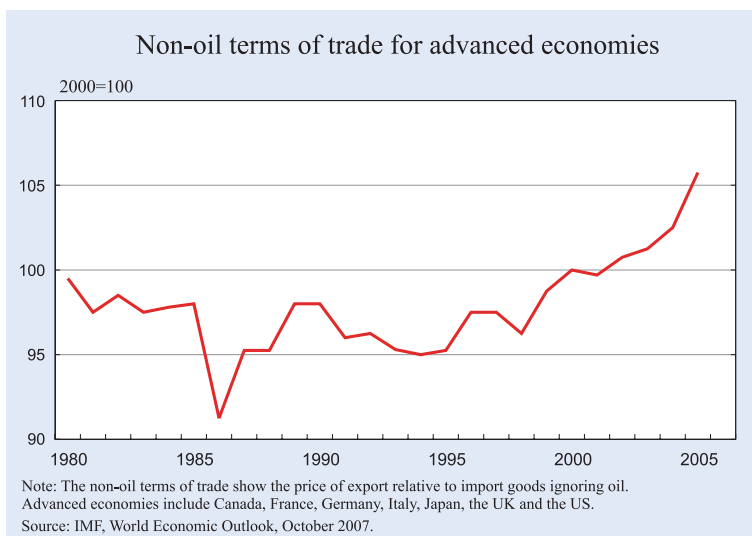
The German minimum wage discussion was originally motivated by the desire to protect Deutsche Post, which would lose the last parts of its monopoly position by 1 January 2008, from foreign and domestic low-wage competitors. However, this discussion has triggered a new national debate about inequality and globalisation. Surveys show that currently more than two thirds of the German population are in favour of legal minimum wages.

Both the extension of the unemployment benefit period for elderly workers and the imposition of minimum wages will make the labour market more rigid, not more flexible. This reduces the hope that Germany could successfully cope with the forces of globalisation in the foreseeable future.

how low inflation together with downward nominal wage rigidity may cause unemployment. The mechanism is that there are always some firms in the economy that are exposed to adverse shocks and would need to reduce their real product wages to defend employment. If there is a binding restriction that nominal wages cannot be cut, more of such real wage adjustments are prevented the lower is inflation (as this decreases the possibilities of reducing real wages through price increases instead). Hence,

Non-oil terms of trade for advanced economies

2000=100

Note: The non-oil terms of trade show the price of export relative to import goods ignoring oil.
Advanced economies include Canada, France, Germany, Italy, Japan, the UK and the US.
Source: IMF, World Economic Outlook, October 2007.

demand effects, whereas Section 6 instead looks at effects on total employment.

There is little doubt that relative demand for low-skilled labour has declined in most OECD countries. But there is an ongoing debate on the extent to which this depends on increased trade integration with low-wage economies. Another possible explanation – in fact the one favoured by most economists – is that the relative-demand shift is mainly due to skill-biased technological change. The argument is that technological advances embodied in new capital (robots, computers, telecom equipment etc.) substitute for low-skilled workers, as simple tasks can be replaced this way. In contrast, these advances serve as complements to high-skilled workers, thereby enhancing their productivity. It is easy to understand the reason for the competing explanations as the reduction in demand for low-skilled labour coincided both with rising low-wage imports and with rapid computerisation of workplaces.

at very low inflation, a further fall in inflation may be associated with higher unemployment (a negatively sloped Phillips curve). Now, if central banks are successful at achieving their inflation targets – as they have been over the last decade – ongoing terms-of-trade improvements relax the Akerlof et al. constraint on the adjustment of real product wages. This follows because a given rate of CPI inflation is associated with higher price increases for domestic output, the larger the rate of improvement in the terms of trade.[31]

The improvements in the non-oil terms of trade for advanced economies over the last decade have been a natural consequence of the gradual increase in the relative supply of labour-intensive goods associated with the integration of low-wage economies into the world trading system. But one should not expect this trend to continue indefinitely and it might very well be reversed as the emerging economies upgrade the capital and skill intensity of their output.

5. Relative labour demand and globalisation

Section 3 gave the theoretical arguments for why globalisation could cause unemployment in advanced economies with rigid labour markets. Section 4 analysed instead how globalisation could help relax these rigidities, which would instead promote employment. So, ultimately the employment effects of globalisation are an empirical issue. This section surveys the empirical research on relative labour

5.1 Trade and relative wages

Most of the research on the trade effects on the relative demand for unskilled versus skilled labour has concerned the US. The focus has been to explain the increased skill wage premium in this country (see Figure 3.7 in Section 3). The literature has produced (at least) three major approaches: factor content analysis, price equations and studies of within-industry versus between-industry factor proportions.[32]

Factor content analysis

The idea here is that trade in goods is disguised trade in production factors. A country that exports skill-intensive goods in exchange for low-skill-intensive imports in fact exports skilled labour in exchange for low-skilled labour. Thereby, international goods transactions change the relative demand for labour. The methodology is to multiply input coefficients for different skill types with export and import volumes. Comparing the demands for various types of labour calculated in this way with the amount of labour that

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[31] This argument is due to Rogoff (2007).

[32] For reviews, see, for instance, Richardson (1995), Freeman (1995) or Wood (1998).

would be necessary to produce the imports domestically provides measures of the changes in factor demands. Using estimates of the elasticity of substitution between high-skilled and low-skilled labour, one can compute the change in the relative wage necessary to accommodate the change in relative demand. Finally, one can divide this value by the total change in relative wages to get the percentage of relative wage change that can be explained by international trade.

There are quite a few empirical studies following this approach – the vast majority using US data for the 1970s and 1980s. Generally, the evidence speaks against a prominent role for international trade in explaining rising wage inequality. In a widely cited paper, Katz and Murphy (1992) find that international trade affected female high-school dropouts the most. However, relative demand did not fall by more than four percent for this group in 1979-85. For earlier periods and other groups, the authors calculate much lower figures. Borjas et al. (1997) claim that trade with less developed countries could only explain up to ten percent of the declining relative wage of high-school dropouts between 1980 and 1995.

Wood (1994, 1995, 1998) strongly opposes this view by arguing that factor content studies are downwardly biased for three reasons. *First,* the assumption that imports would be produced with the skill intensity used by domestic producers is implausible because developed countries have outsourced the most labour-intensive parts of the value chain. As a consequence, the reduction in demand for low-skilled labour due to international trade is underestimated. *Second,* technological change is interrelated with international trade. One reason is that the mere threat of low-wage competition creates incentives for firms to invest in new technology to reduce costs.[33] Another reason is that trade also functions as a transmission channel for technological progress.[34] Moreover, technological improvements in information and communication technologies are major factors behind the reductions in trade costs that are important explanations of the increases in the volume of trade. Hence, it is very difficult to disentangle the influence of skill-biased technological change from the influence of international trade. *Third,* standard factor content analysis might understate the impact of trade because it usually does not take trade in services into account.

In addition, Davis and Weinstein (2001) have argued that factor content analysis might be misleading as differences in technology between trade partners are not taken into account. The authors extend the standard Heckscher-Ohlin model in this regard and argue that the data then support the model predictions.

Stolper-Samuelson effects

A second approach uses the Stolper-Samuelson theorem suggesting a direct link between goods and factor prices (see the introduction to Section 3). In particular, the relative wage of low-skilled workers should decline if the prices of goods using low-skilled labour intensively fall relative to goods using high-skilled labour intensively. So, if relative price changes originating from trade with low-wage economies explained relative wage declines of unskilled labour in advanced economies, one should find that goods prices in import industries have declined relative to goods prices in export industries. Lawrence and Slaughter (1993) found for the US that the relative price of goods that use production labour (a proxy for unskilled labour) intensively *rose* slightly in the 1980s. Hence, the Stolper-Samuelson effect worked towards more, rather than less, wage equality during this period. Several other studies have also failed to find a relative price trend in the US consistent with a Stolper-Samuelson explanation of rising wage inequality.[35] Studies for Europe have come up with similar results.[36]

There are, however, several problems with price studies. Apart from the poor data quality, a common argument has been that changes in goods prices likely translate into relative wage effects only after a substantial time lag (Slaughter 1998). Wood (1998) also points out that even four-digit industry level data may still be too aggregated to detect the relevant price changes since international outsourcing of the most labour-intensive tasks is likely to occur also within industries defined at this level.

Changes in within-industry and between-industry factor proportions

A third approach uses another insight from standard trade theory. As low-wage competition should reduce relative wages of low-skilled labour, it should induce

[33] See also Borjas et al. (1997) and Rodrik (1997).
[34] See Coe and Helpman (1995) and Keller (2002, 2004).

[35] These studies include Bhagwati (1991) and Baldwin and Cain (1997). Leamer (1998) failed to find evidence in favour of a Stolper-Samuelson explanation of rising wage inequality for the 1980s, although he did so for the 1970s. Sachs and Shatz (1994) is one of the few studies that have found such results also for the 1980s.
[36] See Lawrence (1996), Neven and Wyplosz (1996) or Lücke (1997).

all industries to produce with *lower* skill intensity. In contrast, technological change that is biased towards skilled labour could bring about *higher* skill intensity in all industries.

Berman et al. (1998) and Autor et al. (1998) provide evidence that within-industry skill-upgrading is the dominant pattern in the US. On these grounds, they conclude that skill-biased technological change must be the main explanation of increased wage differentials between skilled and unskilled labour. Lawrence and Slaughter (1993) also found that US manufacturing firms employed more non-production workers relative to production workers – an outcome that is inconsistent with the predictions of the Heckscher-Ohlin trade model.

One shortcoming of this approach, however, is that results are very sensitive to the level of aggregation.

5.2 International outsourcing and offshoring

More recently, the trade versus technological change debate has continued in the literature on international outsourcing and offshoring. To reduce costs, firms have increasingly used the opportunity to import labour-intensive intermediate products – which they earlier produced themselves – from independent or affiliated firms in low-wage countries (see Section 2.1).

The literature tries to single out labour market effects by regressing the wage bill (cost) share or relative employment of low-skilled workers in industrialised countries on imports of intermediate goods. If firms relocate the parts of their value chain that are intensive in low skills to low-wage countries, this will exert downward pressure on relative demand for this type of labour, as was discussed in Section 3. This can show up in both relative wage and relative employment developments.

Imports of intermediary inputs

Quite a few studies have examined the impact of larger imports of intermediate goods on relative wages or relative employment of skilled versus unskilled labour. As discussed in Section 2.1, the terminology varies in the literature. Sometimes the term international outsourcing is used, sometimes the term offshoring. As above, we use the term international outsourcing as synonymous with increased imports of intermediate goods.

Feenstra and Hanson (1996a,b) started off the outsourcing literature arguing that the growth of imports of intermediary inputs over the period 1979–87 explains 15–50 percent of the increase in the wage share of non-production workers in the US. In a later study, Feenstra and Hanson (1999) developed a new estimation procedure to disentangle the effects of skill-biased technological change and outsourcing on wages. Using US data from 1979-1990, they concluded in their basic specification that the former explains about 35 percent of the increase in the relative wage of non-production workers, whereas the latter accounts for 15 percent. But in alternative specifications, they found that outsourcing can even explain up to 40 percent of the relative wage change. Anderton and Brenton (1999) found, using data from 1970–1986 for the textile and electronics industries in the UK, that imports from low-wage countries may account for up to 40 percent of the increase in skilled workers' wage share during that period. Likewise, in a more recent study, Hijzen et al. (2005) found a strong negative impact of international outsourcing on labour demand for low-skilled labour in UK manufacturing industries between 1984 and 1995.

Geishecker and Görg (2006) examined the German case and provided evidence that a one percentage point increase in international outsourcing (measured as the value of imported intermediate inputs relative to the industry's total output value) reduces the real wage for workers in the lowest skill categories by up to 1.5 percent, while it increases the real wage for high-skilled workers by up to 2.6 percent. The study is particularly interesting as it captures the 1990s – the decade in which outsourcing increased substantially due to the integration of Eastern Europe in the world economy. Studying German manufacturing firms between 1970 and 1993, Diehl (1999) showed that outsourcing of intermediate inputs can be regarded as substitutes for low-skilled labour.

Strauss-Kahn (2004) undertook a similar analysis for relative employment effects in the French manufacturing industry. Her results suggest that international outsourcing explained 10–15 percent of the decline in the share of unskilled workers in total manufacturing employment for the 1977–1985 period and 25 percent of the decline in the 1985–1993 period.

Ekholm and Hakkala (2005) distinguished between outsourcing to low-income and high-income countries for Sweden in 1995–2000. While imports of intermediate inputs from advanced economies has no sta-

tistically significant effect on cost shares, the finding was that outsourcing to low-wage countries tends to reduce the cost share of workers with an intermediate level of education.

Using 84 Canadian manufacturing industries over the 1981–1996 period, Yan (2006) provides evidence that international outsourcing increased demand for high-skilled workers. For small jurisdictions like Hong Kong, the nexus between outsourcing and wage changes seems to be stronger than for bigger countries. Between 1976 and 1996, Hsieh and Woo (1999) found that outsourcing to mainland China can explain up to 60 percent of the rise in the share of the non-production workers' wage bill.

More generally, Feenstra and Hanson (2004) argue that empirical results on relative labour demand effects are very sensitive to the specification of technology. With respect to US data, taking the share of IT investment in total investment as a proxy for skill-biased technological change attaches much higher explanatory power to this factor than outsourcing.[37] However, if instead the stock of IT equipment as a share of the total capital stock is used to capture technological change – which Feenstra and Hanson claim to be a superior measure – then outsourcing turns out to be the main determinant of the increase in the relative demand for non-production workers.

Foreign direct investment

A related literature looks at wage and employment effects of relocating economic activity to foreign affiliates (offshoring). Lawrence (1994) only found a rather weak link with regard to US multinationals between 1977 and 1989. Similarly, Slaughter (2000) also failed to find strong evidence looking at US multinationals between 1977 and 1994. In constrast, Head and Ries (2002) showed that the wage bill of skilled workers in multinational Japanese firms in the period 1965–1990 was positively correlated with the share of a firm's employment in low-wage countries. Moreover, additional foreign affiliate employment in Japanese multinational firms was associated with greater use of non-production relative to production labour at home.

In a well-know paper, Feenstra and Hanson (1997) argue that foreign direct investment may bring about rising wage inequality in both the low-wage and the high-wage country. The reason is that the offshored tasks are likely to be the ones requiring the least skills in the high-wage country at the same time as they are the ones requiring the most skills in the low-wage country. Empirically, Feenstra and Hanson find that FDI to Mexican maquiladoras (companies located close to the US-Mexican border) can account for 45 percent of the rise in the cost share of non-production workers in Mexico.

Becker et al. (2007) use data on German multinationals to investigate the relationship between offshoring and the workforce composition at the parent firm. While there is no statistically significant link between foreign activity and the share of blue- and white-collar jobs in the onshore wage bill, the study finds a statistically significant positive association between the degree of offshoring and the wage-bill share of workers with upper secondary education. However, the effect is very small.

5.3 What have we learnt about relative demand?

The upshot is that there is support for the hypothesis that globalisation has contributed to the fall in the relative demand for low-skilled labour in advanced countries. The support is stronger in recent studies of international outsourcing than in earlier studies of overall trade effects, which have often suggested that skill-biased technological change has been the by far most important factor. A fundamental problem, however, is that it is inherently difficult to disentangle the effects of increased trade with low-wage economies and technological change driven by adjustment to low-wage competition.

One must also keep in mind that most of the research on relative labour demand effects has concerned the US. There could be an important difference between Western Europe and the US insofar as Western Europe has been affected much more by the fall of the Iron Curtain. Because of the geographical proximity of Eastern Europe, the costs of trade between these countries and Western Europe are likely to have fallen to much lower levels than trade costs for the US.

Another crucial consideration concerns the delineation of groups affected in different ways by globalisation. A common argument is that the distinction between high-skilled and low-skilled labour is gradually losing relevance. This view has been articulated by, for example, Autor et al. (2003), Blinder (2006) and Baldwin (2006). The idea is that the characteristic

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[37] See also Feenstra (2007).

feature of globalisation is the unbundling of *tasks* in the production process. What tasks it is profitable to relocate abroad may have little to do with the skill contents. Instead it is rather a question of the character of the tasks: whether or not they are routine ones that require direct face-to-face interaction. This distinction is likely to cut through skill differences. Call-centre services are good candidates for international outsourcing, but taxi driving is not, although both tasks are low-skill. Software programming and medical interpretation of X-rays can be profitably outsourced to a low-wage country, whereas this is not the case for personal coaching of managers or psychiatric care. Hence, globalisation can entail large shifts in relative labour demand between groups that cannot be defined in terms of skill level.[38]

6. Globalisation and overall employment – empirical evidence

Section 2 documented the fast pace of globalisation over the last 10–15 years in terms of both trade and foreign direct investment. The section also documented how both trade with low-wage economies and foreign direct investment in them had grown much faster than the overall figures.

A first observation is that the recent period of intensive globalisation has coincided with a strong improvement in the employment situation in the EU15. Figure 3.10 shows how employment as a percentage of working-age population increased from around 60 percent in 1995 to around 65 percent in 2006 in the EU15. During the same period aggregate unemployment in the region fell from around 11 to

8 percent. These favourable labour market developments contrast starkly to the strong rise in unemployment and the weak employment developments between 1975 and 1995. This represents *prima facie* evidence that recent globalisation has not had strong adverse effects on aggregate employment in Western Europe: at least the effects have not been so strong that they have offset favourable influences on employment from other factors.

This section reviews empirical evidence on the relationship between globalisation and overall employment. Section 6.1 surveys existing empirical studies. Section 6.2 reports new empirical results of our own.

6.1 Existing empirical studies

Although many studies exist on the effects of trade and outsourcing on relative demand for different categories of labour, there is an apparent lack of studies of the effects on total demand and employment. Instead, much of the discussion has come to rely on very crude business consultants' estimates of jobs lost or at risk due to international outsourcing. This is unfortunate as the estimates are usually derived from small surveys of a particular consultancy firm's clients and the actual sample data are almost always confidential.[39] Moreover, even at best the estimates are only partial-equilibrium as they likely do not capture positive employment effects due to cost savings or increased aggregate wage flexibility. Nor do such data cover any positive effects from export increases.

The econometric material available consists almost entirely of studies of labour demand equations, that is of how the relationship between total employment in a sector and the wage is affected by international outsourcing or overall import penetration. Since the estimations are conditional on wages, these studies do not capture the full general-equilibrium effects, taking possible wage reactions into account.

Figure 3.10
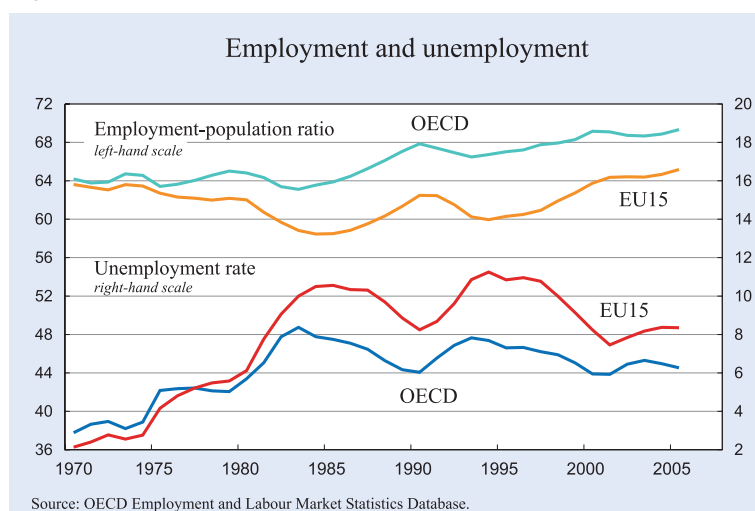
Employment and unemployment

Source: OECD Employment and Labour Market Statistics Database.

A couple of recent studies have estimated the pure substitution effect of international outsourcing and offshoring. Using two-digit manufacturing data for seven EU countries for 1995–2000, Falk and Wolfmayr (2005) studied the association between, on the one hand, the change in sectoral employment and, on the other hand, international outsourcing, output and wages. Holding both output and wages constant, they found such outsourcing to be associated with substantial employment reductions. Similarly, using cross-section data from German and Swedish multinational enterprises Becker et al. (2005) found the wage gap to affiliate firms in Central and Eastern Europe to have a statistically significant negative relationship to employment in the parent firms in regressions where they controlled for sales.[40] The studies confirm the existence of negative substitution effects of international outsourcing/offshoring on domestic employment, but say nothing about the total effects as they do not include any scale effects (nor address the issue of wage adjustments in response to globalisation).

Amiti and Wei (2005a) studied the effect of outsourcing on total sectoral labour demand in the UK in 1995–2001. They estimated both conditional labour demand equations (controlling for output) capturing only the substitution effect and unconditional equations capturing both substitution and scale effects. For manufacturing sectors, they found no significant effects of material outsourcing on employment in any specifications, whereas service outsourcing often had a positive labour demand effect.[41] For service sectors, negative labour demand effects were sometimes found, but results were not very robust.

Amiti and Wei (2005b) is a similar analysis for the US for 1992–2000. This study found a negative association between outsourcing of services and sectoral manufacturing employment when decomposing the economy into 450 sectors, but no significant effects when aggregating sectors to only 96. The likely explanation of why the level of aggregation matters is that the substitution effects on employment are larger relative to the scale effects of cost savings, the more narrowly defined the sector is. Material outsourcing was not found to have any significant effect on employment except in a few cases (when the effect

was positive). In contrast, there was a robust negative effect from import penetration in general (the overall import share in a sector). Results did not differ much between conditional and unconditional labour demand equations.

A recent OECD study (2007) uses a panel of sectors in a set of OECD countries 1987–2003, finding a negative association between overall import penetration and sectoral employment in both conditional and unconditional estimations. The effects of outsourcing are studied with cross-sectional data. Then the study finds a significant, negative association between employment and *narrow outsourcing* (imports of intermediate inputs from the same sector) if one controls for output. But there is no significant association between employment and *broad outsourcing* (imports of intermediate inputs from all sectors) if output is held constant. The unconditional effects of outsourcing when output is allowed to change, so that the positive scale effects of cheaper inputs are taken into account, are more favourable for employment: then there is no adverse effect from narrow outsourcing and a significant, positive effect from broad outsourcing. The probable explanation of the difference in results between narrow and broad outsourcing is similar to the explanation of why the level of aggregation matters in Amiti and Wei (2005b): substitution possibilities with domestic labour in a sector are larger if the imported inputs are produced in the own sector, whereas the cost-savings effects should be similar independent of whether the imported inputs originate from the own sector or other sectors.

Bentivogli and Pagano (1999) can be seen as an attempt to estimate general equilibrium effects of trade with low-wage economies on employment. They examined the employment effects of trade with the newly industrialised Asian economies in France, Germany, Italy and the UK in 1992–95, using data for different sectors and categories of employees. Although they found import penetration from Asian economies to have adverse employment effects in a couple of specifications, their overall result was that trade flows did not have a significant effect on European employment.

6.2 New empirical results

The survey of empirical studies in the preceding section casts doubt on the hypothesis that globalisation tends to reduce employment, as adverse employment effects are usually not found even when wage reac-

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[40] The estimated employment effects were, however, quite small. This is in line with earlier results for the US by Brainard and Riker (2001) and for EU15 countries by Konings and Murphy (2001).
[41] Surprisingly enough, these positive employment effects were found mainly in the conditional estimations where output was controlled for.

tions are not taken into account. This section adds to the empirical research by reporting some results of our own that attempt to capture these effects as well. We first look at some simple correlations and then estimate regressions for unemployment and employment.
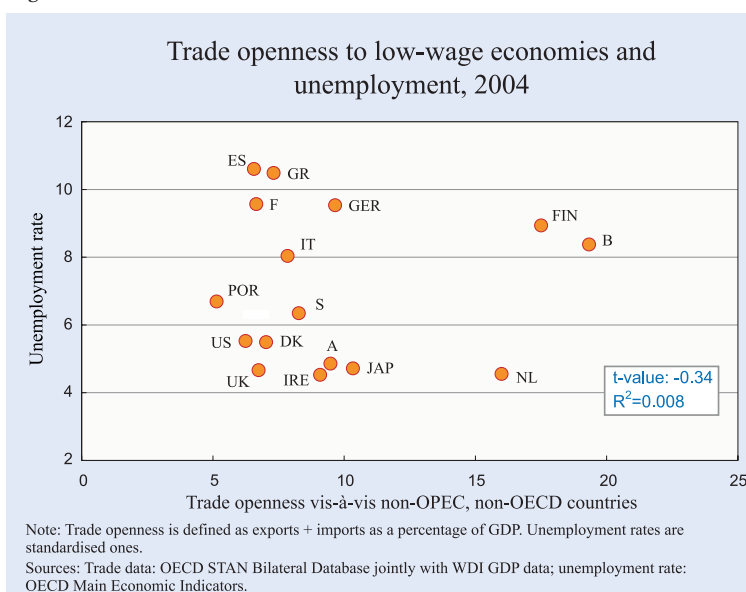
Simple cross-country correlations

A couple of OECD studies have looked at simple cross-country correlations between trade openness and employment and concluded that there is no evident relationship (OECD 2005, 2007). This applies to levels of employment-population ratios and trade openness as well as to changes in these variables. However, if the main worry is that trade with low-wage economies and capital movements to them could threaten jobs in Western Europe, it is more relevant to look directly at these factors. This is done in Figures 3.11–3.16. Low-wage economies are defined as non-OECD countries excluding OPEC countries.

Figures 3.11–3.13 plot relationships in levels. Figure 3.11 shows the relationship between trade openness (exports plus imports relative to GDP of advanced countries) to low-wage economies and unemployment, whereas Figure 3.12 shows the relationship between the same measure of trade openness and the employment rate (the ratio of employment to working-age population). Figure 3.13 shows instead the relationship between the FDI stock owned by the various EU15 countries in low-wage economies (as a percentage of the GDP of the country of origin) and the employment rate. Figures 3.14–3.16 show the relationships between changes in the same variables over the 1994–2004 period.

None of the scatter plots shows a significant, adverse relationship between economic integration with low-wage economies and the employment indicator. In fact, the only significant relationship

Figure 3.11

Trade openness to low-wage economies and unemployment, 2004

Note: Trade openness is defined as exports + imports as a percentage of GDP. Unemployment rates are standardised ones.
Sources: Trade data: OECD STAN Bilateral Database jointly with WDI GDP data; unemployment rate: OECD Main Economic Indicators.

found is a *positive* correlation between the outward FDI stock in low-wage economies and the employment rate in the country of origin (Figure 3.13).

New regressions

It is customary to try to explain differences in unemployment or employment in panel data for OECD countries (that is variations both across countries and over time) by differences in a number of labour market institutions.[42] A recent such attempt is Bassanini and Duval (2006), whose results were also reported in OECD (2006). To further highlight the possible

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[42] See also Section 4.2.

Figure 3.12

Trade openness to low-wage economies and employment, 2004

Note: Trade openness is defined as exports + imports as a percentage of GDP.
Sources: Trade data: OECD STAN Bilateral Database jointly with WDI GDP data; employment-population ratio: OECD Labour Force Statistics.

Figure 3.13

FDI stock in low-wage economies and employment-population ratio, 2002

Sources: FDI and GDP data: UNCTAD FDI Database; employment-population ratio: OECD Labour Force Statistics.
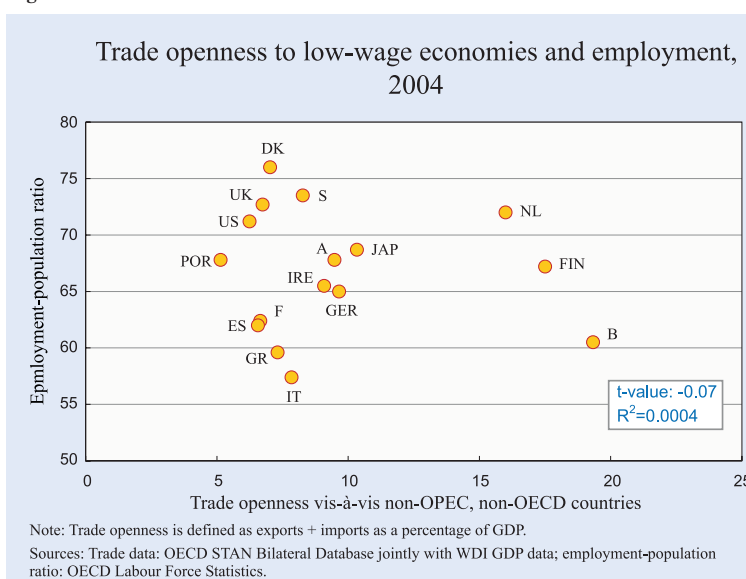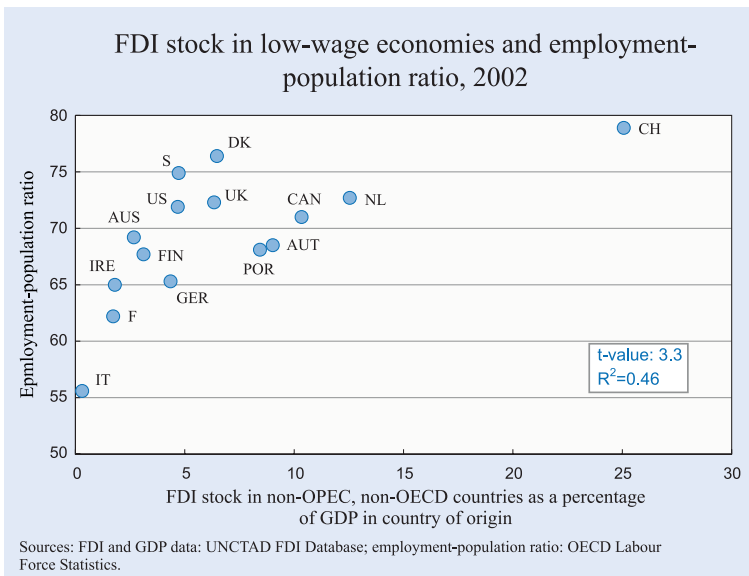
(un)employment effects of globalisation, we have augmented the Bassanini-Duval regressions with variables capturing the degree of economic integration with low-wage economies (defined as non-OPEC, non-OECD economies). We have tried variables such as trade openness (exports + imports as a percentage of GDP), import dependence (imports as a percent of GDP) and outward stock of FDI as a percentage of domestic GDP. Such equations can be seen as a way of trying to capture the general equilibrium effects on (un)employment of integration with low-wage economies, controlling for both a number of institutional variables and the business cycle. The regressions should thus incorporate the effects of induced wage adjustments.[43]

Figure 3.14

1994-2004 changes in trade openness to low-wage economies and in unemployment

Note: Trade openness is defined as exports + imports as a percentage of GDP. Unemployment rates are standardised ones.
Sources: Trade data: OECD STAN Bilateral Database jointly with WDI GDP data; unemployment rate: OECD Main Economic Indicators.
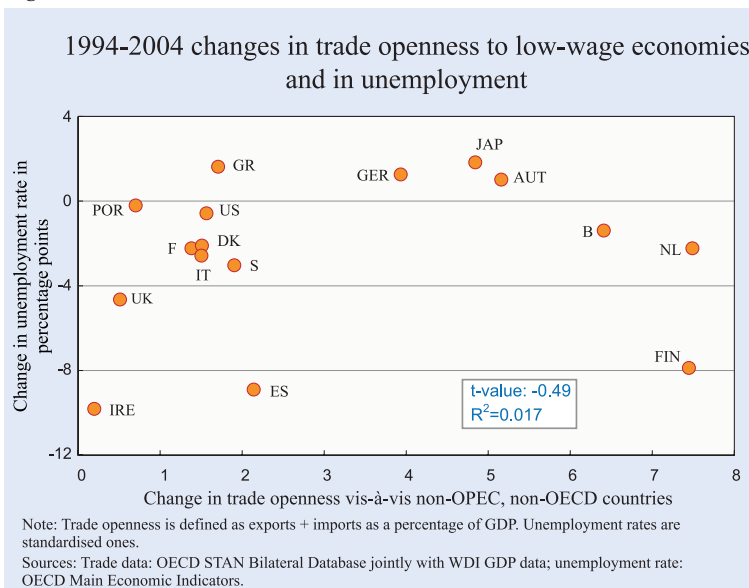
Table 3.8 shows unemployment regressions. The original Bassanini-Duval results with respect to labour market institutions and the cyclical situation of the economy remain more or less unchanged when various globalisation indicators are added: high replacement rates in unemployment insurance and high tax wedges tend to raise unemployment, whereas a high degree of coordination in wage bargaining (corporatism) and positive output gaps over the cycle tend to reduce unemployment. The only major difference to the original Bassanini-Duval regressions is that product market regulations, which tended to reduce unemployment there, are mostly insignificant in our regressions and that there is sometimes a negative, significant effect of union density but not of corporatism.

As can be seen, large trade with low-wage economies (measured either as trade openness or import dependence) has a significant unemployment-reducing effect in four of the five specifications where such a variable is included (in the fifth specification the low-wage trade variable is not significant). In two of the three regressions where it is included, the outward stock of foreign investment in low-wage economies has an insignificant effect on unemployment (but it has a positively significant effect in the third specification). When imports from low-wage economies and FDI stock in them are included in the same equation (column 7), both variables are insignificant.

Since the relative roles of globalisation and skill-biased technological change have been an issue in the analysis of relative demand for low-skilled versus high-skilled labour (see Section 5), we also experimented with including the share of ICT investment in total investment as a proxy for such technological change in the

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[43] The regressions are not, however, so general-equilibrium that they take into account that the institutions themselves may change in response to globalisation (see Section 4.5). Similar regressions have been done by Köll (2007) with partly similar results.
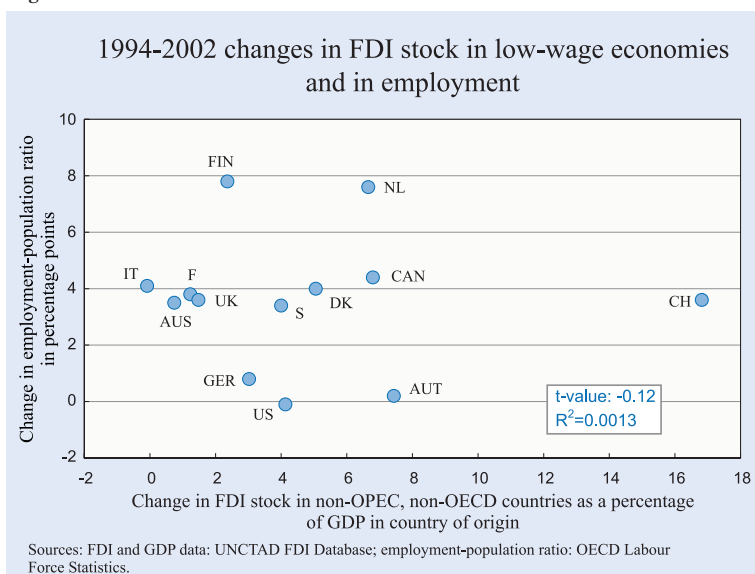
Figure 3.15

1994-2004 changes in trade openness to low-wage economies and in employment

Note: Trade openness is defined as exports + imports as a percentage of GDP.

Sources: Trade data: OECD STAN Bilateral Database jointly with WDI GDP data; employment-population ratio: OECD Labour Force Statistics.

The exercise we have performed is a very crude one. For example, we have not taken account of the possibility that causation could run also in the reverse direction, that is from (un)employment to integration with low-wage economies and labour market institutions (simultaneity bias).[44] Still, our regressions provide no support for adverse employment effects of globalisation in advanced economies if we control for labour market institutions and the business cycle. If anything, our empirical analysis rather suggests positive employment effects.

regressions. This affected the estimated coefficients of the globalisation variables only marginally. The main effect was to make the unemployment benefit and corporatism variables insignificant.

Table 3.9 shows regressions with the employment rate (the ratio between employment and working-age population) as the dependent variable. Of the Bassanini-Duval variables, the output gap is always significant here, too. The unemployment benefit replacement rate, the tax wedge and union density are sometimes significant, whereas the corporatism variable never is. The variables capturing trade with low-wage economies always have a significantly positive effect on employment. So has the outward FDI stock in low-wage economies.

7. What to do and what not to do

Our basic message is that we probably should not expect globalisation to have adverse effects on overall employment in Western Europe in the long run if one takes all effects into account. It is true that trade integration and factor mobility vis-à-vis low-wage economies are likely to cause unemployment if European labour markets remain rigid. But there is a good chance that globalisation will help reduce these rigidities. Politicians in some countries may try to swim against the tide and uphold or even strengthen regulations in the labour market, such as Germany is currently doing. But in the end, globalisation is likely to strengthen the incentives to deregulate. Therefore, the net result could be that employment is promoted.

If globalisation does not hurt employment, it will produce aggregate gains. There is a possibility that globalisation could eventually benefit almost everyone, although some will gain more than others. However, there is

Figure 3.16

1994-2002 changes in FDI stock in low-wage economies and in employment

Sources: FDI and GDP data: UNCTAD FDI Database; employment-population ratio: OECD Labour Force Statistics.

[44] We did, however, some experimentation with interaction variables, that is if the value of one explanatory variable could affect the impact of another explanatory variable on (un)employment. For example, we examined the interaction between the replacement rate and the globalisation variables, but found no support for more adverse labour market effects with higher replacement rates.

Table 3.8

Unemployment regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: Unemployment rate	1988-2003	1988-2003	1988-2003	1988-2003	1988-2003	1990-2003	1990-2003
Average replacement rate	0.094*** (4.55)	0.079*** (3.70)	0.085** (2.36)	0.076*** (3.67)	0.079*** (3.67)	0.016 (0.45)	0.104*** (2.84)
Tax wedge	0.259*** (8.77)	0.252*** (8.55)	0.075* (1.68)	0.217*** (8.66)	0.251*** (8.34)	0.045 (1.17)	0.085 (1.61)
Union density	0.004 (0.16)	0.004 (0.16)	-0.298*** (3.94)	-0.002 (0.07)	0.004 (0.16)	-0.169** (2.23)	-0.329*** (3.82)
Employment protection	-0.319 (0.85)	-0.337 (0.91)	0.207 (0.48)	-0.565 (1.51)	-0.325 (0.82)	-0.194 (0.44)	0.306 (0.69)
Product market regulation	0.327 (1.28)	0.324 (1.29)	-0.055 (0.17)	0.473* (1.96)	0.322 (1.25)	0.461 (1.46)	-0.008 (0.02)
Corporatism	-2.280*** (4.89)	-2.290*** (4.93)	0.000 (0.000)	-1.945*** (4.39)	-2.288*** (4.90)	0.000 (0.000)	0.000 (0.000)
Output gap	-0.474*** (13.51)	-0.485*** (14.62)	-0.564*** (8.04)	-0.479*** (13.50)	-0.485*** (14.53)	-0.580*** (9.73)	-0.572*** (7.54)
Total trade openness				-0.071*** (6.00)			
Trade openness vis-à-vis low-wage economies	-0.255*** (3.41)			0.003 (0.04)			
Total imports relative to GDP					0.005 (0.13)		
Imports from low-wage economies relative to GDP		-0.501*** (4.59)			-0.509*** (3.97)		-0.083 (0.49)
Total outward FDI stock relative to GDP						-0.073*** (5.20)	
Outward FDI stock in low-wage economies relative to GDP			0.102 (0.52)			0.413** (2.45)	0.188 (1.02)
Observations	311	310	103	307	310	103	98
Time and country fixed effects	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.70	0.71	0.80	0.73	0.71	0.84	0.81

Notes: t-values are given in parentheses. * significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

also a fair amount of evidence that economic integration with low-wage economies reduces the relative demand for less-skilled workers and their relative compensation. So, it is also possible that there could be a large group of losers.

If a country as a whole gains from trade, the gainers can in principle always compensate the losers by transferring money to them while retaining positive net gains. In principle, for each episode of trade reform, one could compute who gains and who loses, and agree on a set of transfers that would build (unanimous) support for the reform. In practice, of course, such a process is very difficult, as it runs into the difficulty of precisely computing the gains and the losses and is subject to capture and renegotiation. Such once-and-for-all compensation schemes have been observed in the past in the context of trade liberalisations that affected one sector only. One example is the closing of the Spanish naval construction industry in the late 1970s. But when the reforms are broader and more far-reaching, computing costs becomes trickier. One also runs into the problem that the losers should be compensated for the total present discounted value of future losses, which may entail a large transfer and associated large increases in public debt or large changes in current taxes and transfers for other groups.

It makes more sense to recast the issue in the following way: are our labour market institutions and our welfare states designed well enough so that the gains from trade reform will be broadly shared? Or are they likely to breed opposition to these reforms?

Table 3.9

Employment regressions

Dependent variable: Employment-population ratio	(1) 1988-2003	(2) 1988-2003	(3) 1990-2003	(4) 1990-2003	(5) 1982-2003
Average replacement rate	-0.074* (1.85)	-0.048 (1.20)	0.021 (0.37)	0.026 (0.46)	-0.073* (1.71)
Tax wedge	-0.233*** (4.95)	-0.221*** (4.69)	-0.031 (0.32)	0.050 (0.48)	-0.243*** (5.25)
Union density	0.052 (1.30)	0.054 (1.35)	0.466** (2.44)	0.373* (1.87)	0.102** (2.05)
Employment protection	0.513 (1.00)	0.549 (1.08)	-0.170 (0.14)	-0.108 (0.09)	0.739 (1.24)
Product market regulation	-0.531 (1.22)	-0.498 (1.17)	-0.553 (0.71)	-0.981 (1.26)	-0.586 (1.30)
Corporatism	0.609 (0.77)	0.634 (0.81)	0.000 (0.000)	0.000 (0.000)	0.634 (0.77)
Output gap	0.394*** (7.54)	0.413*** (8.11)	0.301*** (2.93)	0.305*** (3.12)	0.395*** (6.60)
Total trade openness				-0.119** (2.23)	
Trade openness vis-à-vis low-wage economies	0.449*** (4.38)				0.525*** (3.77)
Imports from low-wage economies relative to GDP		0.901*** (5.95)			
Net outward FDI stock relative to GDP					-0.030* (1.76)
Outward FDI stock in low-wage economies relative to GDP			0.640** (2.08)	0.972*** (2.72)	
Observations	311	310	103	103	279
Time and country fixed effects	yes	yes	yes	yes	yes
Adjusted R-squared	0.63	0.65	0.66	0.67	0.62

Notes: t-values are given in parentheses. * significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

We argue that rigidities such as employment protection and wage constraints, by reducing the economy's capacity to relocate labour to the sectors in which it should specialise after opening up for more trade, are poorly equipped to compensate the losers. Proactive education and retraining policies look like obvious remedies but may be more difficult to implement than most people believe. We point out that the current design of unemployment and welfare benefits is inadequate. Finally, we discuss what policies might be most appropriate to ensure a fair sharing of the gains from globalisation without at the same time causing adverse effects on employment.

7.1 The risks from rigid employment protection

The gains from trade are associated with greater specialisation to some sectors at the expense of others. An economy exposed to more trade integration must relocate labour from the sectors where it has a com-

parative disadvantage to those where it has a comparative advantage. It is the role of the labour market to perform such reallocation. Rigid employment protection both reduces the speed of job losses in contracting sectors and makes employers in expanding sectors less willing to hire. Hence, the reallocation process becomes more sluggish. This reduces the gains from trade, and allocates the gains and losses from globalisation in an uneven way. Essentially, workers in the sectors that the country should abandon, instead of relocating to the more profitable sectors, have to experience a large fall in wages or become unemployed, depending on the wage formation mechanisms that prevail. Labour immobility therefore creates a constituency of workers who suffer from large wage losses and are unlikely to be compensated as consumers by the positive effects of cheaper imports. If instead workers in contracting sectors could freely look for a job in the expanding sectors, there would only be a

moderately depressing effect on wages for the relevant skill categories (including themselves) throughout the economy and opposition to trade would be lower.[45] Furthermore, it is now more likely that the workers are compensated as consumers by the availability of cheaper imports and as producers by the scale effects of trade that we discussed in Section 4.1.

For a country to adjust well to globalisation and to reach a consensus on it, flexible labour markets that make intersectoral job reallocation easy are important. Some countries, such as the UK, do not have many such barriers to mobility and have supported globalisation. Other countries, such as France, have numerous such barriers, due to strict employment protection legislation, barriers to entry, regulated professions, and so on. These countries have tried to oppose globalisation. That leads us to our first recommendation: make labour markets more flexible by eliminating barriers to intersectoral mobility!

It is well-known that the degree of employment protection does not seem to influence the overall employment level, a result that emerged also in our regressions in Section 6.2.[46] The explanation is that the effects on employment of reductions in both job creation and job destruction more or less cancel out. This is a likely reason for why low levels of employment protection are accepted in countries like the US, the UK, Ireland and Denmark: the increased risks of job loss are counterbalanced by increased rehiring probabilities in the case of unemployment. But at the same time, attempts to reduce employment protection in a country usually meet with fierce political resistance from employed insiders.

An interesting attempt to reform employment protection is the Austrian model of decoupling severance pay from the individual employer.[47] According to this model, the employer makes regular payments to a personalised account for each employee. Employees can draw on this account in the case of dismissal. The account is portable, that is it follows the employee when changing employer, so mobility does not entail a loss of accumulated rights to severance pay. Adopting a similar model in other EU countries with high levels of employment protection would seem a reasonable way of keeping (some) benefits from employment protection for insiders, at the same time as the

adverse effects on restructuring and mobility would be reduced. Such reforms would also fit in with earlier proposals (for example in Chapter 2 of the 2004 EEAG report) of substituting more transparent systems of severance pay for uncertain, discretionary court decisions in particularly Southern European countries.

7.2 Wage rigidities and the welfare system

A common feature of the welfare system in most Western European countries is the high level of unemployment benefits. It is often claimed that generous unemployment insurance is necessary if wage earners are to accept the structural changes associated with globalisation. According to this argument, a more rapid pace of the globalisation process would motivate higher rather than lower unemployment benefits. This would also serve as a way of compensating the losers. However, such a policy would prevent the potential gains from globalisation from being realised. The reason is that generous unemployment benefits reduce the willingness of the unemployed to take up new jobs. As discussed in Section 3.4, the "turbulence" brought about by globalisation is likely to imply a faster reduction of the productivity of the unemployed on a new job and hence of the wage that employers would be willing to pay: the higher the benefit level, the more likely is the reservation wage of the unemployed to exceed the wage they can get on a new job. This risk is particularly large if benefits are indexed on previous wages.

There are strong arguments for high unemployment benefits during a limited period to help employees cope with adjustment costs when becoming unemployed. But generous unemployment benefits with a long duration are not an appropriate instrument in situations when labour needs to be reallocated between sectors and jobs. Such benefits compensate workers for being out of work but not for income losses that could be suffered when taking up a new job. In flexible labour markets, like those of the US and the UK, being out of a job is a smaller risk than in Continental Europe, because unemployment duration is much shorter. The real risk is then not joblessness but the wage losses associated with worker displacement. A number of studies have shown that these wage losses are substantial.[48] They reflect the devaluation of workers' firm- and sector-specific human capital associated with displacement.

[45] See Saint-Paul (2007) for a theoretical analysis.
[46] The relationship between employment protection and employment was discussed at some length in Chapter 3 of the 2007 EEAG report.
[47] See, for example, European Commission (2007).
[48] See, for example, Kletzer (2004) and OECD (2005).

A similar risk results from the minimum wage demands created by the subsistence minimum guarantees that the welfare state provides. Minimum wages and welfare payments impose a lower bound on the wage distribution. The result is unemployment among the less skilled strata of the population that results in part from an excessive shrinkage of the labour-intensive sectors of the economy. The labour-intensive sectors that are most exposed to international low-wage competition set capital, skilled labour and unskilled labour free which then have to move to other sectors of the economy. However, as those sectors operate in a more capital and skill-intensive way than the shrinking sectors, they cannot absorb all the unskilled workers. Unemployment, overspecialisation and sluggish growth result from this process if wages are prevented from adjusting.

7.3 Useful reforms

We suggest that one should rethink our welfare systems in light of the considerations above. The philosophy should be one of insuring people against losses in the market value of their human capital, rather than against their inability to transact in the labour market. That latter problem would be considerably alleviated by having more flexible labour markets, which globalisation itself is likely to contribute to. But more flexible labour markets would do nothing to insure workers against wage losses due to the obsolescence of part of their human capital.

It is not obvious how to design appropriate insurance schemes that could compensate the potential losers from the globalisation process. But it is easy to point to a number of possible components.

- Access to suitable *retraining* and *re-education* of displaced workers. This would appear to be the most natural policy intervention, as it seeks directly to address the reallocation problem.
- Government support to displaced workers through *severance pay.* The advantage of severance pay compared to unemployment benefits is that the money is paid upon separation and is thus independent of the subsequent job search activity. At the margin, the worker loses nothing from accepting a job offer, contrary to what happens with a system based on unemployment insurance. To prevent firms and workers from colluding to use such severance pay opportunistically by routinely laying off individual workers, it could be restricted to observable collective events such as plant closing,

massive layoffs, loss of profitability in the sector where the firm is operating, or loss of jobs in the worker's occupation.

- A *wage insurance* such that upon taking a new job with a lower pay than the previous job the government will make up for part of the difference during a specified length of time. The subsidy would be paid to the displaced worker first upon receiving a wage in a new job. Hence, wage insurance would have no adverse effects on job search activity of the unemployed: on the contrary, it should stimulate it because it raises the pay-off from finding a job.
- *Employment income tax credits* to low-wage earners in general as suggested in, for example, EEAG (2002) of the type that are used extensively in the US and the UK. Since the tax credit only applies to income from work, this measure, too, strengthens the job-finding incentives of the unemployed.

All the measures suggested would help compensate potential losers from the globalisation process. Retraining/re-education, severance pay and wage insurance target those who are likely to be the biggest losers from restructuring: those who actually have to move to new jobs and who therefore may face large wage cuts. But these measures would not help compensate those who stay on in jobs meeting declining demand and who will also suffer wage losses (although smaller). This is, however, the case with employment income tax credits to the extent that globalisation implies a relative shift in demand from low-skilled to high-skilled, as this measure would encompass all those with low wages. Because such employment tax credits imply that government benefits are paid out under the condition of working rather than the reverse, the implicit minimum wage resulting from the present Western European welfare systems would be reduced. This would promote employment. For this reason, employment tax credits are a much more efficient way of compensating potential losers from the globalisation process than imposing legal minimum wages, which in most cases raise unemployment. However, employment tax credits for low-wage earners would not compensate those groups of high-skilled, who could also be exposed to declining demand, as discussed in Section 5.3. But one might consider this a smaller problem than if low-wage earners have to face lower wages.

Although all the policies suggested would be beneficial as part of a compensation package for losers in the globalisation process, they also have drawbacks. It is easy to get everyone to agree on the desirability of

retraining and re-education programmes. But in practice it has often proved difficult to get good results from such programmes. To some extent this may have been the consequence of too large programme volumes and by the use of such programmes as qualifying devices for unemployment benefits rather than as stepping stones to jobs.[49] But the difficulty of forecasting exactly what tasks are likely to be least exposed to competition from low-wage economies calls for caution. In a world where also some high-skilled tasks can be outsourced, higher education in general may not be a guarantee against large wage losses. It has often been pointed out that ability to adapt may be much more important than a high skill level (for example, Baldwin 2007), but it is far from clear how to teach such adaptability.

Special severance pay arrangements in the case of large collective events has the drawback that it would leave out many sources of job loss. It would also involve complex design issues. Presumably, it would have to imply a large amount of discretionary decision-making, which raises serious political-economy issues of how the system could become subject to lobbying from interest groups and used in an inequitable way.

Wage insurance has its drawbacks, too. It would be more practical to implement than a discretionary severance pay system, but may lead to mismatch as workers accept inappropriate jobs: wage insurance would weaken the allocative role of wages in transmitting proper signals about the relative social values of the different jobs that the worker could have.

The problem with general employment tax credits is that they must be phased out at higher income levels if they are to function as a compensation device for low-wage earners. This means that marginal tax rates increase in the phasing-out interval and reduce work incentives there. Available empirical evidence suggests that the employment gains at lower wage levels (because participation in the labour force increases and the number of employed persons rise – the extensive margin) are likely to outweigh the negative effect on hours worked for employees with incomes in the phasing-out interval (the intensive margin).[50] However, the latter effects tend to become

larger the higher are marginal tax rates in that interval to begin with and the more compressed is the wage distribution.

There is a case for finding ways of compensating losers from the globalisation process and to try to ensure a fair sharing of the aggregate gains through measures such as the ones discussed. At the same time, pushing such attempts too far will entail large costs. It cannot be the task of governments to provide citizens with full insurance against all contingencies. The globalisation process would seem to justify some policy interventions to deal with its income distribution consequences, but one should be cautious not to put much higher requirements on government policy in this case than we want to do in other cases unless we can clearly motivate why.

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[49] See, for example, Martin and Grubb (2001) and Calmfors et al. (2004). EEAG (2007) reports on results showing that the favourable results of recent Danish active labour market programmes are due more to the ex ante "threat" effects of being placed in them than to positive treatment effects.
[50] See, for example, Hoynes and Eissa (2006).

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INDUSTRIAL POLICY

1. Introduction

Fear of globalisation and of deindustrialisation tends to raise demands for industrial policy intervention. Industrial policy today operates within a globalisation process which involves greater competition world-wide, and which calls for significant restructuring of production. These considerations add to the traditional arguments for industrial policy intervention based on aid and protection for strategic industries in terms of national security or independence. What role should industrial policy have in the face of globalisation? Is the traditional sector-based policy dead? Must EU industry be defended? Some European countries, led by France, believe that the answer to the last question is "yes". This follows the tradition to foster and protect national champions. We have had some recent examples with the French government enforcing alternative "national" solutions by blocking the merger of Aventis and Novartis and of Suez and Enel. State aid has also come to the rescue of firms such as Alstom or Bull or sectors like shipbuilding in the past.

This chapter discusses a number of issues related to industrial policy in the EU. To begin, it is necessary to ask: "What is industrial policy?" The concept is so flexible that it can cover anything from corporate action to regional development plans and there is no consensus on a precise definition. According to a definition given by the US International Trade Commission, industrial policy involves "coordinated government action aimed at directing production resources to domestic producers in certain industries to help them become more competitive".[1] This gives a clear focus to sector-specific policies. However, the Lisbon Agenda of the EU states that "The main role of industrial policy at EU level is to proactively provide the right framework conditions for enterprise development and innovation in order to make the EU an attractive place for industrial investment and job creation, taking account of the fact that most businesses

are small and medium-sized enterprises (SMEs)."[2] This makes no mention of sector-specific policies, though it does allow for policies to create conditions for innovation and development.

These differences in definition reflect underlying views as to the appropriate nature of industrial policy. We prefer the broad definition that industrial policy is the set of government actions affecting companies in different productive sectors in a country (including service companies) and, more specifically, affecting their ability to compete both domestically and abroad. This broad interpretation of industrial policy would therefore include microeconomic policies (antitrust, innovation and internationalisation), the provision of broad infrastructures (transport, communications, education, science and research) and sector-based aid to companies. In a narrow sense, industrial policy refers to the sector measures directly aimed at companies and industries.

Industrial policy forms part of government economic policy, and its goal should be to maximize the welfare of citizens. In developed economies open to the world market, this goal is closely linked to the competitiveness of companies and overall productivity of the economy. The *competitiveness* of an economy refers to the ability of its companies to compete in the international market. A company will have a competitive edge over rival companies if it can produce the same products at a lower cost or better products at the same cost, that is if it has the edge in terms of cost or demand (product quality and variety).[3] Obviously, other policies like monetary and exchange rate policy, fiscal policy, incomes policies or labour market reforms also affect the competitiveness of firms, but we do not include them under the definition of industrial policy.

Industrial policy has evolved over the course of the post-war era. The 1960s and 1970s were marked by the fostering of national champions, indicative planning, and state-owned firms with the objective of nar-

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[1] See Ch. 2 in Tyson (1992).

[2] European Commission (2007).
[3] A distinction needs to be made between competitiveness and competition. Competition refers to the level of rivalry between companies operating in a market.

rowing the technological gap with US and Japan. This was also the period of trying to "pick winners" by selecting industries that were forecasted to be successful or that had such potential if appropriate help was given (those industries also typically had important externalities for the rest of the economy).[4]

In the 1980s scepticism grew about this approach and there was a move, led by the UK in Europe, towards privatisation, the introduction of competition and horizontal measures, common across industries (and mostly focusing on developing the science base and innovation). This tendency continued in the 1990s with an emphasis on technology in the Framework Programmes and the ESPRIT Programme. The recent Lisbon Agenda, aiming to make the EU the most technologically dynamic and innovation-driven region in the world, is formulated along similar lines.

However, the globalisation process and the emergence of international players like China and India have revived proposals for targeted industry aid and the "champions" approach. France has been at the forefront of this approach. In December 2004, Hervé Gaymard, the successor of Sarkozy as Finance Minister, stated: "We must have, and not only in France but also at the European level, an extremely ambitious industrial policy. We must nurture or create European champions in the industrial sector. We strongly believe that in the face of globalisation we cannot be naïve because … the law of the jungle is always to allow the strong to gobble up the weak, and there is no reason that Europe should drop its guard in this global competition" (Financial Times, 4 December 2004). In January 2005, Jean-Louis Beffa, CEO of Saint-Gobain, submitted a report to Jacques Chirac recommending setting up a new agency for development and innovation with the mission to tackle the perceived French weakness in high technology areas. The aim was to promote French or European industrial champions that would be technology winners in a horizon of 10–15 years; the intended tools were a few major programmes which, with co-financing from the private sector, would help overcome the imperfection of capital markets in financing long-term risky projects.[5]

By contrast, the European Commission has acknowledged the challenges to the manufacturing base of the EU but has maintained a commitment to horizontal industrial policy. The Commission has argued: "The main role of industrial policy is to provide the right framework conditions for enterprise development and innovation in order to make the EU an attractive place for industrial investment and job creation … From an industrial policy perspective, the role of public authorities is to act only where needed, i.e. when some types of market failures justify government intervention or in order to foster structural change … For these purposes the public authorities can make use of policy instruments such as better regulation, single market, innovation and research policy, employment and social policies etc. that apply generally across the economy without distinction between sectors or firms, together with other accompanying measures to facilitate social and economic cohesion … The Commission is committed to the horizontal nature of industrial policy and to avoid a return to selective interventionist policies."[6]

There is thus a clear divergence of views between those who favour sector-specific policies, and those who believe that industrial policy should be limited to broader horizontal policies. We address this issue in Section 3, considering arguments for and against sector-specific policies. We first set out arguments in favour of such policies, then consider their possible side effects, as well as the serious difficulties of successful implementation. We consider that there are very limited occasions when a sector-specific policy is likely to be useful; we propose that any such policies should be limited in time and should not aim to constrain competition.

In Section 4 we go on to outline the need for horizontal policies, cutting across sectors in the economy, favoured by the European Commission. We take a broad definition of horizontal policies, and in successive subsections, we consider industrial policies, antitrust and regulation, and regional policies. Consideration of these policies raises an important issue, which we address in Section 5: at what level of government should decisions on industrial policy be made? Several issues arise here, including the costs and benefits of competition between regions or countries, the availability of information and the extent to which lobbying and capture is a problem at different levels of government. One important element of this discussion is the role of the Commission in overseeing industrial policies. We question whether it should have

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[4] For example, see the UK Industrial Strategy of 1975 and Beath (2002).
[5] See also the statement by President Sarkozy after the Strasbourg European Summit of July 2, 2007.

[6] European Commission (2005).

a paternalistic role in intervening in a member state's policies that do not have externalities beyond the member state's borders. Section 6 sets out the conclusions.

Before addressing arguments for and against sector-specific policies, it is useful to briefly review the state aid spending in the EU. Of course, not all industrial policy is reflected in state aid spending, but it is useful to examine the overall scale of such spending, and its division between horizontal and vertical dimensions. We do this in Section 2.[7]

Figure 4.2

State aid by objective, EU25

Source: European Commission, DG Competition scoreboard.

2. State aid in the EU

Figure 4.1 shows the evolution of EU state aid spending as a proportion of GDP between 1992 and 2005 as well as the amounts allocated to horizontal objectives and specific sectors. Overall, the proportion of GDP allocated to horizontal measures has been relatively stable, though falling gradually from 0.44 percent of GDP in 1992 to only 0.35 percent in 2005. By contrast, there has been much more variation in sector-specific aid. However, there was a marked fall at the end of the 1990s, with such aid falling from a high of 0.57 percent of GDP in 1997 (when it accounted for 62 percent of all state aid) to only 0.09 percent of GDP in 2005 (accounting for only 20 percent of the total). Overall state aid has fallen from 0.74 percent of GDP to 0.43 percent.
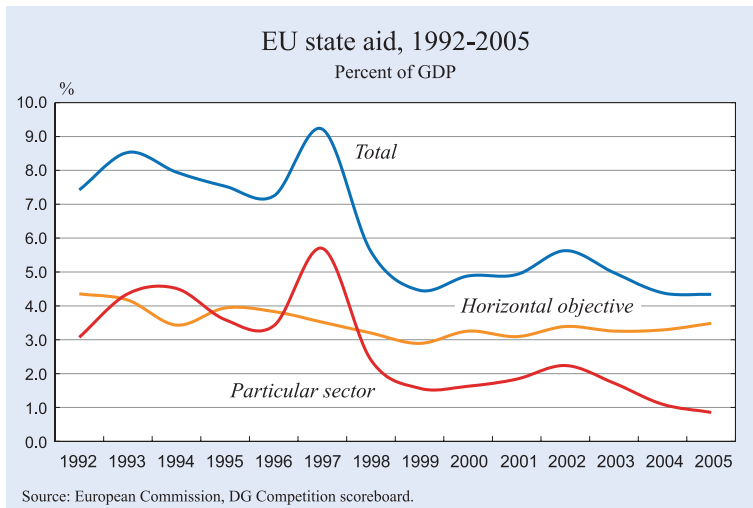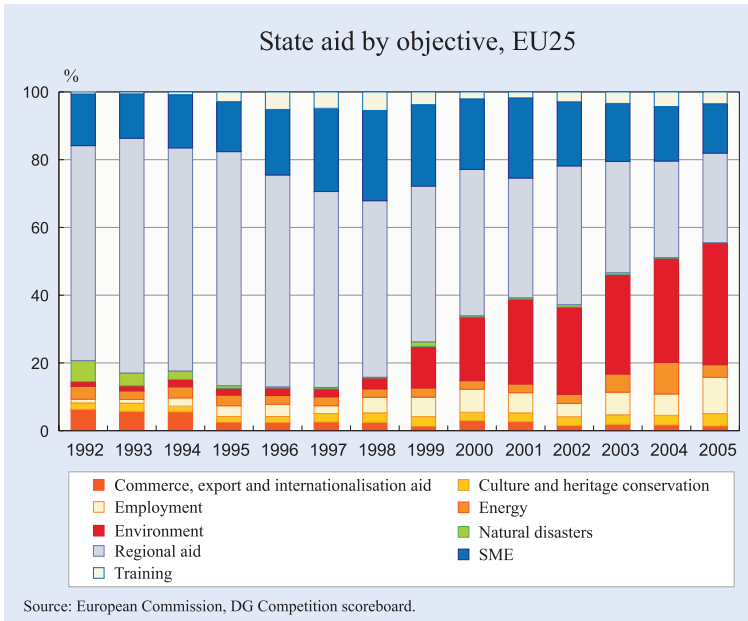
Figure 4.2 gives more detail about the composition of horizontal state aid. There are a number of different areas covered. There have also been significant changes in the composition of this form of state aid over this period of 14 years. In 1993, regional aid accounted for 61 percent of all horizontal state aid. By 2005, this had fallen to only 22 percent. By contrast, environmental aid – which effectively did not exist in the early 1990s – now accounts for 30 percent of all horizontal state aid. By contrast, the other categories in the table have been fairly stable. Aid to research and development has risen from 11 percent to 15 percent of the total (having reached 18 percent in 2001). Aid to SMEs climbed steeply in the 1990s from 13 percent of the total to 23 percent, but then fell away again to only 12 percent by 2005.

Figure 4.3 gives details about the composition of the sectoral aid over the same period. There is great variability in these proportions over time. For example, the financial sector received virtually no state aid in 1992; yet in 1997 it received as much as 57 percent of the total sectoral aid. This large increase explains the rise in total sector aid as a proportion of GDP in this year. Since then, its share has again declined substantially. By contrast, manufacturing

Figure 4.1

EU state aid, 1992-2005

Percent of GDP

Source: European Commission, DG Competition scoreboard.

[7] This chapter is partially based on Vives (2006).

Figure 4.3

State aid by sector, EU25

Source: European Commission, DG Competition scoreboard.

become more important as a recipient; it received no aid in 1992, but aid gradually increased to 20 percent in 2005. However, the largest recipient by some distance in both 1992 and 2005 – though not always in the intervening years – was coal.

More details of these aid patterns are presented in Table 4.1, which shows the aid in million euros at 1995 prices. In these terms, horizontal aid has been roughly constant over time, whereas sectoral aid has fallen by nearly half. The amount devoted to sectoral aid between 2001 and 2005 was, on average, 16 billion euros, half the amount corresponding to years 1992–1995 and half the amount devoted to horizontal objectives. In the early 1990s, sectoral aid concen-

sectors received 40 percent of total sectoral aid in 1992; this fell to only 11 percent in 2002 before recovering to 20 percent in 2005. The transport sector has

Table 4.1

State aid by sector/objective in million euros at constant 1995 prices (EU25)

	Average 1992–1995	Average 1996–2000	Average 2001–2005
Agriculture	**16410**	**15671**	**15238**
Fisheries	**436**	**354**	**404**
Horizontal objectives, of which	**31000**	**29959**	**34732**
Commerce, export and internationalisation aid	1352	602	515
Culture and heritage conservation	532	629	849
Employment	516	1172	1972
Energy	868	658	1376
Environment	477	2006	8557
Innovation			120
Natural disasters	916	123	103
Regional aid	18148	13346	9444
Research and development	3880	4500	5691
Risk capital		1	84
SME	3977	5843	5188
Social support to individual consumers			2
Training	329	1074	923
Particular sectors, of which	**30298**	**25861**	**16202**
Coal	12134	8536	7199
Financial services	1359	8990	3956
Manufacturing Sectors	14655	6377	2560
Other Non Manufacturing sectors	504	357	306
Other services	151	247	360
Transport, of which	1492	1352	1819
Land transport and transport via pipelines	1	63	213
Maritime transport	0	561	1191
Inland water transport	15	27	12
Air transport	1483	688	258
Transport (unspecified)		27	143
Total aid less agriculture, fisheries and transport	**60250**	**54864**	**49571**
Total less railways	**78629**	**72330**	**67083**

Source: European Commission, DG COMP scoreboard.

Table 4.2

State aid by sector / objective as 100 * % of GDP

	EU-25	Austria	Belgium	Cyprus	Czech	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland
Agriculture	13.3	30.6	9.2	16.2	14.3	7.0	33.0	132.0	16.2	22.4	4.8	64.1	35.7
Fisheries	0.4	0.0	0.2	0.0	0.3	0.7	0.0	0.5	0.2	0.0	1.0	0.0	0.4
Horizontal objectives, of which	31.1	23.1	23.4	44.9	39.1	50.1	13.2	35.1	33.5	54.4	13.8	52.1	19.5
Commerce, export aid	0.5	0.0	0.2	0.1	0.0	0.0	1.4	1.1	0.4	0.0	0.0	0.0	0.0
Culture, heritage cons	0.7	0.0	0.5	30.5	0.0	1.6	2.3	1.0	3.3	0.7	0.1	8.7	1.1
Employment	1.4	0.8	1.1	0.0	0.2	21.5	0.1	2.3	6.7	0.6	2.7	1.0	3.2
Energy	0.9	0.0	0.0	0.0	0.0	1.5	0.0	12.1	0.2	0.2	0.0	0.0	0.0
Environment	6.9	3.7	2.2	0.9	0.9	22.9	0.9	2.2	0.6	31.7	1.3	0.7	0.5
Regional aid	9.4	0.2	3.9	0.0	20.6	0.3	2.4	4.5	6.3	11.8	7.9	30.6	6.7
R&D	5.4	3.5	4.7	3.5	10.4	2.0	2.7	9.4	8.0	6.7	0.5	5.0	3.0
Risk capital	0.0	6.2	0.0	3.0	0.0	0.1	0.0	0.0	0.0	0.0	0.6	1.2	1.8
SME	5.1	7.2	9.2	1.0	7.0	0.1	3.1	2.6	7.9	2.0	0.7	4.3	2.6
Training	0.7	1.5	1.7	5.8	0.0	0.0	0.2	0.0	0.2	0.2	0.0	0.5	0.6
Particular sectors, of which	18.5	1.9	7.2	82.3	0.0	5.7	0.0	4.8	6.5	13.5	0.4	67.0	6.9
Coal	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.2	0.0	4.3	0.0
Manufacturing Sectors	2.5	0.0	0.0	37.9	0.0	1.5	0.0	0.0	4.3	0.3	0.1	51.3	3.7
Other Non Manufacturing sectors	0.4	0.0	0.0	15.1	0.0	0.0	0.0	0.9	0.0	0.0	0.1	0.0	0.0
Other services	0.3	1.1	0.0	2.4	0.0	0.0	0.0	0.0	0.1	0.6	0.2	0.3	3.2
Transport	1.7	0.8	7.1	26.9	0.0	4.2	0.0	3.9	2.1	0.5	0.0	11.1	0.0
Total aid less agriculture, fisheries and transport	41.7	24.3	23.5	100.3	39.3	51.6	13.2	36.0	37.9	67.5	14.2	107.9	26.5
Total less railways	58.9	55.7	40.0	143.5	53.8	63.5	46.3	172.4	56.4	90.5	20.0	183.2	62.6

Source: European Commission, DG COMP.

trated primarily in manufacturing sectors and coal; in the late 1990s, financial services received the greatest amount, followed by coal and then manufacturing sectors. Towards the mid-2000s, sectoral help has concentrated in coal, manufacturing sectors and transport. There is also considerable variation across countries, as shown in Table 4.2.

3. Sector-based industrial policies

The examination of the need for sector-based industrial policies should start by considering an apparent paradox: recent studies on industrial economies, which highlight imperfections in the market and strategic behaviour of private and public sector economic agents, have provided numerous arguments in favour of intervention in theory; yet, in practice, the consensus among economists tends to be sceptical with regard to intervention and recommends prudence. Why is this so?

In a scenario of perfect competition and fully developed markets with no frictions, there is no room for government intervention for economic efficiency purposes. However, markets are far from perfect. Phenomena such as increasing returns to scale (because of fixed production costs, for instance) and market power normally associated with them, disparities in information available to agents ("asymmetric information" in the economist's jargon), such as between producer and consumer in terms of product quality, and externalities (interactions between agents, whether in consumption or production, not transmitted via the price system, such as technologi-

cal spillovers or pollution, for instance) entail market failures and open the way for government intervention to improve the allocation of resources. However, before we jump to the conclusion that industrial policy may correct market failures, we need to realise that any intervention carries side effects that can be pernicious.[8]

3.1 Arguments in favour of an active sector-based industrial policy

Let us examine some factors that may in principle justify intervention at the industry level: fixed costs and the implications for entry to the market, strategic competition in international markets, declining industries, external effects, and coordination issues, and imperfections in the capital market.

Fixed costs and market entry

When a company considers entering a market, private profit need not match social benefit given that the company disregards the external effects of its decision (on consumers, in terms of new products and/or lower prices, and on the profit of other companies). A prime example is excessive entry in a market because potential entrants have no regard for the negative external effects of their decision on the profits of established companies. However, the theoretical results are by no means robust and they depend on the type of company rivalry (for instance, in terms of price or quantity) and product features (level of product and quality differentiation). The result is that the direction of required intervention (encouraging or limiting entry) is difficult to determine as it depends on the industry's characteristics.[9]

Strategic competition in international markets

Protection or aid for industry, and for domestic companies operating in an international oligopolistic industry – that is, with few producers – relies on several arguments that essentially boil down to the suitability of utilising market power in favour of domestic industry so as to transfer foreign revenues to domestic companies. Strategic trade policy is based on trying to endow domestic companies with a competitive edge in the world market (through export sub-

sidies or R&D aid, for instance), and/or trying to cut the native industry's production cost.[10]

Dynamic economies of scale can stem from the *experience curve*. In certain industries (such as aeronautics, shipbuilding and semiconductors), the production cost per unit falls with the total accumulated production volume by the company. In industries where the experience curve is crucial, there are reasons for the government to aid and protect the domestic industry from international competition to speed up the learning process. This is the infant industry argument.[11] It is also worth highlighting that how government ought to intervene depends on the industry's characteristics and that its benefits can be watered down by excessive entry.[12] Furthermore, if at the same time foreign countries subsidise their own firms, the home country may end up not being able to accumulate enough knowledge so as to be competitive (and learning by foreign rivals is slowed down).

The need for an active industrial policy in industries subject to international competition has been stressed on many occasions both in the US and Europe. For example, Laura Tyson (former Chair of the US Council of Economic Advisors) endorsed a defensive industrial policy, particularly in high-tech industries, designed to force open world markets to US products and offset subsidies available in other countries to certain industries (for example, in Europe for Airbus in the aeronautics industry). One of Tyson's key ideas was that in a world where free trade is systematically breached, a free-trade approach must be moderated by enabling a tit-for-tat response to commercial offences and unfair competition from rival countries. The dumping policy of the EU and even more the strategic industrial policy advocated by President Sarkozy also seem to be in line with this view.

An extreme example of strategic trade policy is support and subsidy for "national champions" practised in several European countries. However, it seems this policy, where governments help their big corporations compete in the international market, has traditionally failed to produce the expected results.[13] The empirical evidence on the effects of strategic trade

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[8] In more technical terms: any intervention is subject to issues derived from the theory of the second best. In a scenario that is not efficient, if we move towards efficiency (say perfect competition) but do not quite achieve it (increasing competition, for instance), there is no assurance of any improvement to social well-being. To this, political-economy considerations should be added.
[9] See Sections 4.3.2 and 6.6 in Vives (1999).

[10] See Brander and Spencer (1983, 1985) and Krugman (1989). Related issues were also discussed in Ch. 6 of last year's EEAG report.
[11] See Melitz (2005) for a recent formulation of the conditions under which infant industries should be protected. See Leahy and Neary (1999a) for a qualification of the argument when governments cannot precommit to a policy course.
[12] See Eaton and Grossman (1986), and Horstman and Markusen (1986).
[13] Porter (1998).

policy is not very favourable in terms of overall economic welfare. In the best of cases, gains from this policy are negligible.

A related argument in favour of national champions is to secure supplies when there is market power upstream. This applies with force in the energy sector where size is important for bargaining in international markets (for example, in gas).

Declining industries

With declining industries we have the issue of rescue, restructuring and exit of inefficient companies, and in the extreme, the demise of the industry. Theoretical studies suggest that exit and restructuring can take different forms if there is no intervention in the market. The role of rationalisation policy can therefore be to propose the best way in terms of efficiency and fairness as a focal point. In general, if we allow affected companies to collude to form a "crisis cartel", rationalisation tends to be postponed and losses build up, ultimately ending up with a much worse outcome. In a scenario of inflexible wages and labour that is costly to reallocate between industries in the short term, aid for a declining industry can be efficient if it is temporary.[14] However, the subsidy may become permanent due to pressure from stakeholders and vested interests. Many subsidies in several countries and industries were granted provisionally and became indefinite. A permanent subsidy to an industry that has had a non-transitory shock is inefficient in the long run given that it delays or prevents the industry from adjusting. It is also worth noting that subsidies to declining industries highlight the potential conflict between efficiency and fairness goals. So, for instance, considering that a provisional subsidy tends to become permanent, a drop in price in the industry concerned (say a worsening of the crisis) would result in a cutback of the optimal subsidy for reasons of efficiency, but should trigger an increase in subsidy if the goal is to maintain income. The policy to restructure failing industries has eaten up a significant portion of resources allocated to industrial policy in Europe.

External effects and coordination issues

This argument for intervention is based on *external economies* and stresses vertical connections between industries (forward and backward links) and coordination problems. Very often this argument has a regional dimension. A classic example of investment coordination problems in a region is the development of means of transportation, such as a railway, and the setting up of firms in a region. Without a railway, companies do not set up in the region, yet if there are not enough companies, the railway has no source of business. Furthermore, in general the presence of rail links will not be sufficient to ensure growth in the region; a minimum (or critical) mass of companies is also needed.

One underlying issue is the small size of the domestic market to support the required fixed costs of investment. In this context there can be two stable scenarios: one (development) with investment and broadening of the market and the other (underdevelopment trap) with no investment and maintenance of a narrow market.[15] Thus investment in certain industries generating positive external effects can be justified and can achieve a superior equilibrium by addressing the issue of coordination of investment and avoiding the underdevelopment trap. However, this argument has been the subject of criticism when applied to developed countries and high-tech industries, given that the significant market is the international one rather than a local one. And in any event, if an industry with international spillovers is aided, such as a high-tech one, a country is actually helping competitors.[16]

Similarly, protection of nascent industries can be justified. If a domestic industry with positive external effects is not protected, it might never develop given that its average unit cost may always remain higher than the international price. On the other hand, provisional protection can allow it to grow and increase overall production, cutting average cost to a point below the international price. Then the industry can be opened to foreign competition.[17]

A final example of a coordination problem that public intervention can help to resolve is in setting standards. The relative success in the development of mobile telephony in Europe is attributed to an early adoption of the GSM standard.

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[14] In fact, a negative shock in an industry would trigger, in the absence of government intervention, a fall in employment that is inefficient, because the ideal in the short term is to keep jobs (and lower wages). See Flam et al. (1983) and Neven and Vickers (1992).

[15] See, for instance, Rosenstein-Rodan (1943), Scitovsky (1954) and Murphy et al. (1989) for modern modelling of the "big push theory".
[16] See Grossman (1990).
[17] See Itoh et al. (1991).

Imperfections in the capital market

One source of market imperfection is based on information disparities between those wanting capital and those offering it. Companies needing capital may be better informed of the quality of their business project than investors. This makes it difficult for investors to assess the likelihood of success of the company needing the funds. The assessment of this likelihood is crucial given that companies have limited liability; if they fail they file for bankruptcy, and only have to meet their liabilities from shareholder funds. The asymmetry of information in the capital market will be particularly significant in new industries and fast-moving technology industries.

Given this asymmetric information problem, financial markets may push a firm into bankruptcy too soon or too late. This may depend on bankruptcy procedures. (For example, in the UK and Germany the procedures favour less reorganisation than in France or the US.)[18] Limited liability pushes in the direction of firms taking too much risk and the gamble for resurrection may keep firms out of bankruptcy too long. On the other hand, absolute priority rules (higher priory creditors being paid first and in full) may induce failure too soon, as the creditors face a coordination problem in the reorganisation procedure.

Similarly, the problem of selective interest rate subsidies for certain industries is that there are situations where the subsidy will encourage companies with a higher likelihood of success to seek loans, while there are other situations where the opposite will happen. One or the other situation will apply subject to features of the risks and asymmetry of information in the market. Accordingly, a lot of knowledge is required on industry characteristics to assess the suitability of a tax or a subsidy on the cost of capital.[19]

3.2 Side effects and problems in implementing sector-specific industrial policies

There are several broad problems with the implementation of sector-specific policies. The first issue is that, as has repeatedly been emphasised above, the type of intervention required very much depends on the industry's characteristics. Technology, demand conditions, level of product differentiation, risk level, asymmetries in information, type and level of competition, and many other factors all influence suitable industrial policy measures. This means that the *information requirements* of intervention to correct market failures are extremely high, especially so, given that in general the direction of intervention is ambiguous a priori. There are several elements of the information requirements. The government needs to correctly identify a market failure; it must also correctly identify the possibility of welfare gains from correcting the market failure in a particular way; given this, it also needs to design a policy that will induce appropriately different behaviour from economic agents that will correct the market failure. These are extremely demanding conditions. Highly detailed econometric and institutional studies, able to ascertain and measure structural characteristics and behaviour of companies, are needed in order to intervene successfully in a market. This applies to all types of intervention under examination.

A second issue in an international context involves the effects of *strategic behaviour* of countries. For instance, reprisals from countries affected by unilateral measures designed to promote or protect native industry can quickly degenerate into a widespread trade war where everyone loses. Ultimately, protection and aid can trigger reprisals in other countries, resulting in losses for all countries involved in the trade war. The outcome can be a stable situation that is inferior to free trade in terms of economic welfare.[20] Similar situations arise in international restructuring of industries in crisis where governments do their best to minimise domestic downsizing, as a whole worsening the problem of surplus capacity. Here an international multilateral restructuring agreement for the industry can be much more successful. There is evidence that in Europe, governments have attempted to transfer the cost of restructuring declining industries to other countries.[21]

Third, there are the *political economy* issues of intervention. In fact, any intervention or regulation leads to "capturing" opportunities for stakeholders and pressure groups. In this way, provisional subsidies or protection may become permanent and so intervention serves the private rather than public interest. Meanwhile, companies can incur expenditure to pressure the authorities or influence public opinion to secure benefits from government. This is particularly so in regulated markets and those subject to govern-

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[18] See White (2005).
[19] See Grossman (1990), Stiglitz and Weiss (1981), DeMeza and Webb (1987), and White (2005, 2007).

[20] See, for instance, Dixit and Kyle (1985).
[21] See Neven and Vickers (1992).

ment intervention. In fact, it has been claimed that governments pick losers (or ailing sectors) instead of winners because policy is influenced by pressure groups that lobby to appropriate rents. In sectors that are growing, entry of new firms erodes such rents but in declining sectors sunk costs of entry typically limit entry. The end result is that firms in declining sectors lobby harder because they are protected from entry. In this sense, losers pick government policy (see Baldwin and Robert-Nicoud 2007).

Fourth, protection and aid measures for industry can impair competition and have a negative effect on *production efficiency*. Protected environments tend to generate inefficiencies. To quote John Hicks (1935): "The best monopoly profit is a quiet life." Inadequate or insufficient effort to cut costs has been called X-inefficiency. Pressure from a competitive market is crucial to limit such inefficiency.[22] In particular, the role of potential competition can be highly effective at cutting costs and reducing X-inefficiency of established companies. In fact, a company that has enjoyed market dominance in the form of high costs will have a competitive disadvantage when faced with potential new entrants (as experienced for example by certain US airlines during the industry's deregulation process).

An added reason explaining cost increases due to lack of competition is the rent-seeking effort to secure a monopolistic position. Therefore, companies with market power, endeavouring to achieve or maintain their monopoly, can invest strategically in production capacity, technology, product development or advertising, in a way that does not minimise production costs and is far from ideal in social terms. Among these activities, it is worth highlighting those designed to prevent entry of potential rivals, either by installing surplus capacity or excessive proliferation of product variety. Furthermore, managers and workers attempting to extract rents from firms may only do so if those firms make supra-competitive profits in product markets. In general, actions aimed at achieving a protected or monopolistic position can generate high costs through which rents are dissipated. A significant portion of costs incurred are useless in social terms (though part of them might merely be income transfers, for instance, from business owners to managers or workers).[23]

The empirical evidence suggests that it is precisely the exit of inefficient establishments and firms and the entry of efficient ones that drive productivity improvements. The sluggishness in the exit of inefficient firms in the EU is one of the main reasons why the EU lags behind in productivity growth in relation to the US.[24] Rescue and restructuring aid may prevent the exit of such low productivity establishments.

Finally, the cost of intervention includes the *efficiency cost* of raising the required funds. These costs include both administrative and compliance costs of collecting taxes, and also "deadweight" costs generated by taxes, which distort the behaviour of economic agents. This means that the marginal cost of public funds (that is, of raising one dollar for government spending through taxes) is likely to exceed one dollar. In the US estimates range from $1.17 to $1.57. In other words, every time the US government spends one dollar, the actual implicit cost to the economy can be as much as 50 percent higher.[25] Evidence from the EU varies considerably, and also depends on the country. Some evidence suggests that the implicit cost is even higher than in the US.[26] This may be because Europe has higher marginal tax rates than the US, which hence tend to create greater distortions and "deadweight" costs. The conclusion is that on conducting a cost/benefit analysis of any industrial policy, the cost needs to be adjusted upwards to reflect accurately the implicit cost of tax collection in terms of the distortions to the economic system.

One can illustrate the difficulties of sectoral intervention with the case of industries subject to R&D spillovers in an open economy. It has been claimed that the firms generating those spillovers towards other domestic firms should be subsidised. This is so when those spillovers occur in industries characterised by monopolistic competition where there is free entry (that is, there are no excess profits and each firm is negligible in relation to the market).[27] However, if the industries are oligopolistic the situation is more complex. Then a tax or a subsidy may be optimal depending on the character of spillovers and the competition mode in the industry. Optimal subsidies should then be carefully fine-tuned for each industry.[28] This is

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[22] See also the discussion in Section 4 of Chapter 4 of this EEAG Report.
[23] There is accumulated evidence of the pernicious effect of market power on production efficiency. See Vives (2007) and references therein.
[24] See Foster et al. (2001) for the US; Disney et al. (2003) for the UK, and Bartelsmann et al. (2004) for an international comparison including Europe.
[25] See Ballard et al (1985), Jorgenson and Yun (1990, 1991), and Martin and Anderson (2005).
[26] Kleven and Kreiner (2006) generate very large estimates of the marginal cost of public funds for some countries when accounting for labour force participation responses.
[27] See Grossman and Helpman (1991).
[28] See Leahy and Neary (1999b).

obviously difficult, even without counting on possible retribution measures of trade partners.

In summary, although there are in principle a number of legitimate reasons for a sector-based industrial policy, the side effects of those policies are likely to undo the potential benefits and result in net welfare losses once all effects have been accounted for. Horizontal policies, in contrast, have a much better chance to generate net welfare gains in the social cost-benefit assessment.

4. Horizontal policies

Problems in implementing a sector-based industrial policy as well as available evidence from several countries explain the preference amongst economists and the European Commission for horizontal-type measures that are not targeted towards specific sectors in the economy. We now look at some reasons for horizontal intervention.

4.1 Horizontal industrial policies

First, *R&D* and *innovation activities* are classic cases of potential market failure that is highly significant due to its dynamic effects on productivity growth.[29] The production of knowledge and innovation both have the features of a public good and have significant external effects on the economy. The use of knowledge by an individual or company does not diminish use by others. In fact, producers of knowledge or innovations face difficulties when trying to appropriate their results because it is difficult to prevent others from using them. The patent system is designed precisely to ensure a return on investment in R&D activities. However, the prevention of innovation and knowledge leakages to the rest of the economy carries a cost, given that technology breakthroughs are disseminated less. There is a debate on whether the patent system is sufficient to foster the production of knowledge and innovation or if it, to the contrary, fosters duplication of effort and social inefficiency.[30] What is clear is that basic knowledge without direct commercial application has very substantial spillovers to the economy that cannot be appropriated by the

scientists. There is evidence of substantial knowledge spillovers at the different levels in the R&D and production processes.[31] If, to this, we add potential imperfections in the capital market to fund R&D activities (due to asymmetric information it is extremely difficult to externally assess a company's research activity), the result is that subsidising basic research may be justified in social terms. The subsidy becomes more debatable when we move towards the application and development phases that can be put to commercial use. Subsidies should be channelled directly to R&D activity rather than be subsidies for production of marketable goods (except in the case of industries subject to the experience curve, discussed in Section 3.1). Aid for research, whether basic or applied (subsidy for a university, research centres, or tax breaks for innovative companies) are generally horizontal in nature, though they can be strategically used – industry-wide – as a strategic trade policy in the international market context.

We must also stress the danger of aid becoming a transfer that does nothing to change the overall R&D effort; rather it may merely increase profits of companies that already do R&D.[32] It is extremely difficult to evaluate whether already existing government aid for private R&D activity in OECD countries is ideal, excessive or insufficient.[33] However, traditional low levels of R&D effort in Europe as compared to the US and Japan perhaps suggest insufficient aid levels.

Second, training of *human capita* represents another case of potential market failure. This is induced by externalities. There may be insufficient private incentives to accumulate human capital. On the one hand, companies tend to invest little in multi-skill training, given that once trained, workers can leave and join another company. On the other hand, workers will invest in education only if there is a sufficiently developed industrial and services sector to allow them to leverage their investment. In the sphere of higher education and basic research, the problem worsens given that benefits (which may be very important in social terms) may be difficult to appropriate privately. Potential market failure in the accumulation of human capital happens in a context of imperfect financial markets given that otherwise workers could fund their own training. Note that some horizontal human capital training measures need not be neutral across sectors. For example, if they target software

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[29] There is no theorem of dynamic efficiency analogous to the static one (that is a competitive market produces efficient results provided there are no externalities).
[30] See Boldrin and Levine (2002, 2006). According to them, markets for ideas are not different from other markets and governments should not foster innovation by providing monopoly franchises. Instead, they claim, proven mechanisms such as subsidies should be used.

[31] See, among others, Caballero and Jaffe (1993), Agrawal, Cockburn and McHale (2006), and Moretti (2004).
[32] This possibility is empirically highlighted in David et al. (2000).
[33] Grossman (1990).

engineers they would tend to favour IT-intensive sectors and firms.

Third, the establishment of a *brand image* could be associated with market failures. In markets where consumers are short of information on product quality, new producers will be at a disadvantage relative to established companies with a reputation for product quality. Poor-quality producers drag down other producers of their country who are trying to establish a reputation for quality. The way to offset this negative effect is not, however, through production subsidies; rather it is by establishing minimum quality levels and control over enforcement of warranty clauses.

These horizontal measures, and some sector-based ones, are even more significant for SMEs, which account for a substantial share of output and employment in several countries in the EU. SMEs can be severely affected by imperfections in financial markets as they have less capacity to self-finance and diversify to meet the fixed cost of directly accessing capital markets. Furthermore, they can be too small, particularly in terms of ability to establish *sales networks,* create brand image and incur fixed costs needed to *internationalise* the business. However, empirical studies show that they tend to be more *flexible and innovative,* contrary to the Schumpeterian theory that suggests that large companies innovate proportionally more than small ones due to available *economies of scale* in R&D activities and a large company's potential to diversify. In fact, empirical evidence on the relationship between firm size and R&D activity suggests that the innovation process does not provide economies of scale with regard to size of the company where R&D activities are carried out. In fact, large companies do not make a greater R&D effort, relative to size, than smaller companies: R&D expenditure grows, at most, in proportion to company size. There is also evidence that the number of patents granted per unit of R&D expenditure is higher for smaller companies. The specificity of SMEs suggests the need to design a horizontal policy adapted to their needs, to include encouragement of cooperation agreements to establish sales networks, brand image, R&D, and provision of specialist services.

4.2 Antitrust policies and regulation

Another fundamental component of a horizontal microeconomic policy is to ensure a framework for the smooth functioning of markets in order to keep them competitive. There are two aspects to this. The first is the need to preserve competition through antitrust policy. The second is to maintain regulations only where they are needed and to lessen the burden of compliance. We discuss each in turn.

Antitrust policy

An important point to realise is that keeping the markets competitive requires public intervention: this is the role of competition policy. This policy has a long tradition in the US, going back to the 19th century with the enactment of the Sherman Antitrust Act. The core antitrust principles in the EU are laid down in Articles 81 and 82 of the Treaty of Rome.

The need for antitrust policy has been questioned in a context of openness to international trade, such as, for instance, with European integration. The reasoning is based on the notion that the best antitrust policy is to open up to external trade. Industrial policy in Europe in the 1960s was based on the need for large corporations to compete effectively with the US, then unarguably the economic leader. The belief was that formation of large, European-wide corporations along with the removal of internal trade barriers, would foster economies of scale with no danger of significant increase in market power. Accordingly, the European Commission favoured mergers.

However, although it is true that opening up to the international market increases the degree of competition, two points need to be made. First, external competition as a disciplining mechanism only applies to internationally marketable goods. Industrial sectors have been increasingly exposed to a rise in overseas competition in step with globalisation. But this has not generally been the case for most services: either because they are not internationally marketable, or because of regulation, they have been mostly sheltered from competition. The lack of competition in the services industry in the EU has major repercussions on overall international competitiveness by increasing costs. The services industry is highly heterogeneous, yet in general its productivity growth rate is lower than that of manufacturing, perhaps because it is inherently more difficult to raise productivity in more labour-intensive industries. Thus, equal wage increases in manufacturing and services have a very different knock-on effect on prices.

There appears to be plenty of margin to increase competition in the services industry: in transportation,

telecoms, healthcare, the energy sector, professional services, retail trade, and also in the knowledge industry (universities and research centres).

Bringing in more competition is crucial inasmuch as opening up to international trade is only possible to a certain extent. The need for an active antitrust policy in recently deregulated industries to prevent unfair practices or dominance by ex-monopolies from undermining the purpose of deregulation should be underlined. The EU Competition Directorate has recently drawn up reports on several network industries (energy, financial services, telecoms) highlighting competition problems. Furthermore, competitive pressure is also crucial in order to induce firms to adopt innovations (this is particularly important in the service sector). The lower competitive pressure in Europe is blamed for the slower pace of IT technology adoption with deleterious effects on productivity growth relative to the US.[34]

Vigorous domestic competition can be a source of competitiveness internationally. Recent studies on international competitiveness of industries clearly suggest this. Examples of industries with a significant level of domestic rivalry and which have been internationally competitive for a long time are pharmaceuticals in Switzerland, automotive industry in Sweden, chemicals in Germany, and computers and *software* in the US.[35]

One potential conflict between competition policy and industrial policy is the control over concentration. On the one hand, concentration may increase economic efficiency by enabling economies of scale, yet on the other it may increase market power in the domestic market. Here we should distinguish between horizontal concentration, which tends to increase the market power of firms, and vertical and conglomerate ones, which typically involve efficiencies derived from the mergers of complementary activities. The conflict becomes acute when it comes to the promotion of national champions (as discussed in EEAG 2002 and 2007) and is diluted when large firms are formed in an integrated European market. Be it as it may, sometimes the protection of national champions may be accomplished indirectly (for example, setting minimum wages for postal workers in Germany raises barriers to entry in the sector).[36]

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[34] See Jorgenson et al. (2006) for the US.
[35] See Porter (1986 and 1990). See also Itoh et al. (1991) for Japan.
[36] See also Box 1 in Chapter 2 of this report.

Regulation

Another aspect of the influence of government on competitiveness is through regulation. Excessive regulation is likely to generate a loss of competitiveness for domestic firms subject to that regulation. However, there are many reasons for the establishment of regulations, such as the protection of the labour force or the environment. Regulation should also be established in situations where competition is not workable such as with natural monopoly segments like transport or distribution in electricity or gas markets.

In general, though, regulation should be non-intrusive and, in particular, the "cost of doing business" in a country should be kept low. In this respect the scores attained by several countries in the EU are not very encouraging. The World Bank *Doing Business* report collects indicators on the ease of starting a business, dealing with licenses, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts and closing a business in a universe of 175 countries.

Table 4.3
Ease of Doing Business Rank

	2007	2006	2005
Denmark	5	5	7
United Kingdom	6	6	5
Ireland	8	8	10
Iceland	10	11	11
Norway	11	10	8
Finland	13	14	13
Sweden	14	13	14
Switzerland	16	15	16
Estonia	17	18	17
Belgium	19	19	20
Germany	20	16	21
Netherlands	21	23	22
Latvia	22	20	31
Austria	25	22	30
Lithuania	26	24	15
France	31	32	47
Slovakia	32	31	34
Portugal	37	42	45
Spain	38	38	38
Hungary	45	51	60
Romania	48	55	71
Italy	53	50	69
Slovenia	55	53	56
Czech Republic	56	61	50
Poland	74	68	74
Greece	100	95	111
United States	3	3	3
Japan	12	12	12

Source: World Bank *Doing Business 2007*.

Table 4.3 provides the 2007 ranking for the EU countries and compares it with Japan and the US.

According to this ranking, the Nordic countries (Denmark, Norway, Iceland, Sweden, and Finland) are among the top 15 economies where doing business is easiest. The US, the UK, Ireland and Japan are among the top ten countries. Two Eastern European countries (Lithuania and Estonia) are ranked among the 20 most flexible economies for doing business. However, Romania, the Czech Republic, Slovenia, Hungary, and Poland are situated at the bottom of the European ranking and two southern European countries are placed at the bottom (Italy and Greece).

4.3 Regional policies

External effects in the local sphere induce a new dimension in industrial policy, linked to regional policy. Economic activity develops in a physical space, it is localised and needs *infrastructure*. Infrastructure, in broad terms including not just physical capital (for example in transport, communications and energy) but also human capital, is a classic source of *external effects* and is key to modern *growth* theories. In fact, the existence of infrastructure thresholds, notably the level of human capital below which a region is unable to take off and remains trapped in a stable, low-growth situation is a distinct possibility. In the presence of external factors, (competitive) markets need not allocate resources efficiently. We have already mentioned the issue of coordinating investment in economic development and incentives for research and innovation. The literature on economic geography suggests that a significant portion of external effects linked to market size are felt locally or regionally.[37] Consequently, support for industries with external effects need not be dissipated to other regions.

Two examples of external effects in the local sphere arise from geographic concentration of production and specialisation of the labour market.

First, industrial production tends to concentrate in certain regions. This is due to the interaction of economies of scale in production and transport costs. In the presence of increasing returns, companies seek to set up in a single location that is also near the "centre" of the market at a point with high density of demand in order to minimise transport costs.

Demand in the centre (market size) will depend on the number of companies deciding to set up shop, generating a feedback mechanism that reinforces the consolidation of industrial cities and regions ("centre" as opposed to a non-industrialised "periphery"). The consequence of these phenomena is that location of industrial production is uncertain at the outset and can be significantly influenced by industrial policy measures to encourage location of companies in a certain geographical location. Relatively small interventions can have significant effects.

European integration reduces trade and transport costs in general and will therefore tend to favour geographical concentration, leveraging economies of scale and of agglomeration (recall for instance that in the US – a large and integrated market – industry is more geographically concentrated than in Europe). The reorganisation of production gives rise to major uncertainties: the periphery (the new entrants, say) still has lower wages, yet it may be far from the market centre. Depending on circumstances (and in particular reductions in trade and/or transport costs), proximity to market or cost advantage can take precedence. Without international trade, periphery countries (small and with lower wages) cannot achieve economies of scale and a high level of competition. Total openness (with no frictions, with low transport or trade costs) favours them, yet a partial reduction in trade costs (and/or transport costs) can result in concentration of activity in the centre.[38]

Second, a large local market facilitates development and training of *human capital.* We have already seen how there may be insufficient private incentives for training human capital. It should be stressed that workers themselves will only invest in education if there is a sufficiently diversified industrial and services sector to ensure the return on their investment. Furthermore, where companies endure idiosyncratic shocks, a larger market can provide insurance mechanisms both for companies, to avoid bottlenecks due to excess labour demand, and for workers, by providing diversified employment options.

The potential significance of external effects provides a potential field of action for an industrial policy intertwined with local and regional policy. This involves devising policies geared to the environment where positive external effects occur.[39] Their existence

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[37] See Krugman (1991).

[38] Krugman and Venables (1990).
[39] Obviously, from a certain size of local or regional entity, external negative effects, such as congestion, appears.

is indicated by existing company groupings in a physical space (such as the software industry in Silicon Valley). In fact, a recent study (Greenstone and Moretti 2004) shows positive net results for regions in the US that have subsidised the installation of new productive plants. García-Milà and McGuire (2002) argue that agglomeration externalities may justify local subsidies for the establishment of headquarters. Davis and Henderson (2004) and Strauss-Kahn and Vives (2006) provide evidence in favour of this conclusion.

However, it should be noted that those studies do not analyse the potential neutralising effects of the subsidy game among regions. In fact, any government action will give rise to the problems mentioned above in discussing sector-based policies, due to the introduction of strategic inter-regional (or international) competition. This raises the more general question of the level of government at which industrial policy should be determined. We now turn to this issue.

5. At what level of government should industrial policies be determined?

Industrial policy could be determined at a sub-national, national or supra-national level. The choice between these is not straightforward and depends on a number of factors. Most important is the possibility – if policies are determined at anything lower than a supra-national level – of strategic interaction between competing governments. This mirrors the issues discussed in our 2007 EEAG report on tax competition between EU member states.[40] Whether industrial policy should be subject to competition between governments depends on the nature of the competition and the likely outcome of that competition. Other important factors in the choice of the appropriate level of decision-making, either for government or for the regulator, are information, degree of competence and capture possibilities. Regional governments and regulators may have better information than the central government, their degree of competence may be lower because of a lack of scale, and different forces impinge on capture possibilities. On the one hand, the central government may be more easily captured by lobbyists than regional governments because of the concentration of efforts of lobbyists where it is more effective. On the other hand, the proximity to the

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[40] See Chapter 5 of the 2007 EEAG Report.

regional government/regulator is greater and may facilitate capture.

5.1 Regional competition

Governments may compete over a variety of policies in order to attract capital, firms, profit and other income flows to its jurisdiction. Probably the most debated policy concerns the taxing of corporate profit. Here it is most likely that governments compete for mobile capital and firms, driving down source-based taxes on capital; the reduction in tax revenue from these sources implies the need either to raise revenue from other (less mobile) sources or to reduce public spending. But governments may also compete over the provision of infrastructure, regulation of labour markets, financial markets, product standards and the environment. Several of these policy measures might form part of industrial policy, as defined earlier.

There are two possible models of *competition between regions* that are not mutually exclusive. Under the first, regions compete in terms of location, variety of resources and perhaps also in terms of "culture", both generally and in corporate terms. This would be a *horizontal* competition model where all regions would have a role to play.

Under the second model, regions are differentiated by the quality of the core services and infrastructure they have to offer. Therefore they compete *vertically*: given the same tax rates, all companies would favour regions offering higher quality. Clearly, without external aid, regions that seek to offer more services will generally have to levy higher taxes. The implications of this sort of competition are significant, because in the event that investment in "quality" is inherently fixed in nature, such as spending on infrastructure, there may be a "natural oligopoly" in the inter-regional market. In other words, given certain basic conditions, there is a maximum number of active regions in the sense that only a few can attract investment and/or demand for services. Entry of new high-quality regions can displace low-quality regions that until then had competed successfully in the international market. So, for instance, a country with low-quality tourism infrastructure can de displaced by the entry of regions with a better quality offering forcing other high-quality countries to compete fiercely via pricing. Furthermore, the entry of low-price competitors can ultimately erode the first country's

options. The absence of an active infrastructure policy can therefore lead to the downfall of a region "sandwiched" between better quality and cheaper offerings.

If vertical differentiation components dominate, the number of successful "enclaves" might be limited in Europe and the success of some regions might be linked to the downfall of others. The optimal policy to follow for a large and a small region need not be the same. Take the case of innovation activities. Large metropolitan regions such as London and Paris may afford to pursue a laissez-faire policy. By investing in infrastructure (in terms of human and technological capital), large areas can build on critical mass, profiting from a dense market of versatile, skilled personnel, to allow global connections to bloom. In contrast, smaller regions may need to rely on a few key sectors and a battery of more active support policies in the area of innovation to overcome the critical mass problem.

Even so, a tendency towards diversification can also be observed in the smaller cities. This is the case in Stuttgart and Dublin, for example. The regional government in Stuttgart intervened to initiate a restructuring of production based on innovative sectors to confront the crisis at the beginning of the 1990s due, among other factors, to international competition from low-cost countries. The basic clusters in Baden-Württemberg revolve around the area of mechanical engineering and the automobile industry, with an expenditure on R&D only below that of Bavaria. Bavaria has banked on implementing an industrial policy of establishing centres of excellence in certain technological fields to promote synergies between research and enterprise. The most notable are the clusters of ICT (led by Siemens, Infineon and subsidiaries of Oracle and Microsoft), media and biotechnology (which have made it the second European centre after London). [41] In Dublin, an active policy has been followed in the electronics, pharmaceutical and financial sectors (though there is more production than R&D). Helsinki has led the transformation of Finland towards high technology with Nokia at the head. The ICT cluster was promoted by a rapid liberalisation of the telecommunications market, a tradition in advanced engineering and a culture of cooperation among companies in the cluster, and between companies and universities and research centres. Helsinki is also trying to diversify outside ICT

into fields such as biomedicine and creative activities. In the case of Finland, the coordinated effort between the public and private sectors in R&D is perceived to be a key to success.

Strategic competition between regions of either horizontal or vertical form will, in principle, fail to produce efficient results in global terms given externalities that exist between regions. So, for instance, if regional investments in infrastructure are substitutes – generating negative external effects between them – there tends to be too much investment. If they complement each other, generating positive externalities, there will tend to be too little investment. This implies that theoretically regions could improve their situation by cooperating instead of competing. This relates to the idea of the "selection principle" (Sinn 1997, 2003). Industrial policies (and other policies) reflect governments' attempts to correct the failures of markets. Within a single country, the national government may be in a position to offset the existence of positive or negative externalities arising in the private market. However, if that country is open to flows of trade, capital and even labour, then externalities will not stop at the border. Just as competition between private firms cannot correct the externalities, neither should we expect competition between governments to correct the externalities. It is in precisely the areas in which governments may intervene to attempt to correct market failure that competition between governments cannot result in such a correction.

However, in asymmetric situations, and in the presence of information disparities, competition among regional governments could increase welfare. The reason is that competition induces firms to locate where they add more value since a government will offer more than another only if the external benefits are larger in the first region than in the second. Subsidy competition elicits information and is efficient as in an auction.[42] Competition among regions to attract firms will produce efficient outcomes when the deadweight loss of taxation is low and regions are asymmetric in the sense that external benefits of firms' location are unevenly distributed.

As well as problems concerning competition, two other factors should influence where industrial policies are determined. First, as noted above in the con-

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[41] See Vives and Torrens (2005).

[42] See Besley and Seabright (1999) and Fumagalli (2003).

text of sector-specific policies, any successful industrial policy requires a considerable amount of information. It is possible that information about a specific region may be available to policy-makers in central government, but it seems plausible that information problems are more severe at the central level than a regional level. This therefore represents a factor which suggests that policy should be determined at a regional level.

Second, also as noted above, governments may be subject to capture by lobbyists. It seems plausible that this is more likely to happen at a centralised level. Lobbying is costly; lobbyists will therefore concentrate their resources on those policy-makers who have the most influence. For example, if a small number of policy-makers are influential in setting policy for the whole of the EU, then we can expect them to be the target of lobbyists who may be willing to invest large amounts in influencing their decisions. However, at the other extreme, if policy is determined at a regional level then (a) the gains from influencing the regional policy-maker may be smaller and (b) the cost of having an influence in all regions is much higher. These considerations indicate that the problems of lobbying will be more severe in a world of centralised decision-making: this may help explain the larger frequency of such lobbying activity in the US compared to the EU, which is much less centralised. Despite this, proximity to a regional or national government may work in the opposite direction and facilitate capture at lower levels.

To complicate matters further, the degree of competence of a government may be directly related to its size (for example, only large institutions can afford to hire the best civil servants).

Two interesting casual observations may be made here. First, there is a tendency towards the formation of larger regions to cooperate in certain matters in the EU, fostered by improvements in transport and communications, and the benefits to profit from economies of scale. Second, however, it is smaller states (that correspond more closely to economic regions) that tend to adopt more innovative measures in the face of globalisation (for example, Finland in education, R&D and IT, Denmark and the Netherlands in the welfare state, and Sweden for the reforms discussed in the 2007 EEAG Report).

Overall, we believe there are good reasons to consider allowing regions to determine industrial policy,

possibly competing with each other. This is so because externalities are basically at the regional level and the regions have an information advantage in choosing policies. Competition should not be wasteful as long as the costs of public funds is not too high and asymmetries between regions important. Note that there is notable diversity of performance across the regions of the EU, and that this diversity does not tend to diminish (though there is convergence across nation-states).[43]

However, there is in any case a role for the EU to play in providing a framework of common rules to internalise externalities and limit rent-shifting incentives. For example, it could be argued that European funds (such as R&D support) should be allocated on a merit basis through competitive bidding procedures, which should be decided by committees of experts insulated as much as possible from political pressures. The model of the European Research Council to allocate funds to science, modelled after the US National Science Foundation, is a good example. The EU seems to be well placed to determine general horizontal industrial policy measures as a response to the challenges posed by globalisation. Another example would be to set a common energy policy that diversifies supply sources and the portfolio of technologies in a large integrated EU energy market.

Before turning to the process of reform of state aid control in the EU, let us mention that decision making at the national level (for large multi-regional countries) may suffer from lack of scale to confront the problems posed by globalisation and high capture possibilities. This would suggest deferring decisions on matters that involve only local externalities to the regions, while allowing the EU to deal with matters with important cross-regional externalities, which will naturally lead to cross-border spillovers.

5.2 State aid control in the EU

EU policy has moved towards requiring a well-defined objective, market failure or other objective of common interest, in order to allow the state aid. In the traditional approach economic analysis was downplayed. The definition of what constitutes state aid (according to Article 87(1) of the Treaty) was dealt with by the "market investor principle" – according to which investments by public authorities

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[43] See Boldrin and Canova (2001), Ezcurra and Rapún (2006), Martin (2005) and Puga (2002).

in companies carrying out economic activities are considered free of aid if they are made on terms that a private investor operating under market conditions would have accepted – and "selectivity" of the measure in terms of granting the advantage. The "distortion of competition" and "trade affectation" criteria were dealt with in a summary, and sometimes inconsistent, way. The presumption of positive effects (such as spillovers) in different situations led to setting different thresholds for aid (for example, R&D industrial research expenditure could be funded up to 50 percent of eligible costs).

With the State Aid Action Plan[44] the guideline has become "less and better targeted state aid". That is, "state aid should only be used when it is an appropriate instrument for meeting a well-defined objective, when it creates the right incentives, is proportionate and when it distorts competition to the least possible extent." The statement implies the following "balancing test" to check whether state aid should be allowed: (1) State aid must address a market failure or another agreed common interest objective; (2) it must be targeted to the objective; and (3) possible competitive and trade distortions must be limited so that the balance is positive. The Research, Development and Innovation Framework (R&D&I) is an example of this approach (for example, it delineates four market failures relevant for R&D&I aid – externalities/knowledge spillovers; public goods/ knowledge spillovers; asymmetric information and coordination failures – and asks whether the aid changes the behaviour of the firm).

This approach seems to be consistent with forbidding state aid which does not respond to a market failure or common interest objective, even though the aid may neither distort trade nor competition across borders. This implies a paternalistic approach from the Commission towards member states and seems at odds with the provisions of Article 87 of the Treaty and some case law from the European Court of First Instance (such as Philip Morris 1980, Le Levant 2006, Wam 2006).[45]

The big issue, obviously, is whether the Commission should be paternalistic in the way that it oversees the policies of the member states – even if they do not distort trade or competition in the EU. A potential benefit of a paternalistic approach is the commitment provided by the EU in helping to alleviate

political economy problems and dynamic inconsistency in the decisions at the national level. Indeed, there is some evidence that the allocation of aid at the national level has been determined more by political than by economic factors.[46] The control of state aid by the EU has been seen as a way for national governments to resist the pressures of lobbies and political biases and to commit to sound policies.[47] The question is whether the EC can and should continue to play this role. The "blame Brussels game" may not last forever. And control at the EU level, which does not respond to cross-border externalities, may be eventually a victim of powerful national and big firm lobbies.[48]

The present evolution of state aid control seems to stand in contradiction to the lack of advance in political integration. In the foreseeable future it is not likely that states will relinquish more national sovereignty. If so, then it would be better to stick to state aid control purely based on limiting negative cross-country externalities and interventions to shift rents across boundaries. The present, more ambitious approach may not be sustainable and may backfire since it is not backed up by a sufficient degree of political integration.

6. Conclusions

The first challenge of industrial policy in the EU is to foster the competitiveness of its companies and the productivity of the economy. From the analysis set out in the chapter, certain principles and general considerations on industrial policy can be derived.

1. There are several arguments which in principle favour an active sector-based industrial policy: to provide suitable incentives for companies to enter and exit the market, to help to achieve a strategic edge in the international market, to assist in efficient (and fair) restructuring of declining industries, to leverage positive external effects, to address issues in coordinating investment, and to alleviate imperfections in the capital market.

2. However, any intervention gives rise to side effects that can make it undesirable. Thus, sector-based

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[44] See Kroes (2005) and Friedeiszick and Röller (2007).
[45] See Spector (2007).

[46] Neven and Röller (2000).
[47] See Dewatripont and Seabright (2006), and Besley and Seabright (1999)).
[48] This discussion mirrors that of whether fiscal rules at the EU level can offset "political distortions" at the national level. These issues have been discussed in the 2003, 2006 and 2007 EEAG reports. See also Calmfors (2005).

intervention requires highly detailed information on the industry, can trigger strategic behaviour from rival countries with potential spiralling trade reprisals, can be captured by specific interests against the general interest, can restrict competition, damage production efficiency, and is costly to the public purse over and above nominal cost, due to the distortionary taxation needed to finance state aid.

3. Therefore sector-based intervention must be studied very carefully. International evidence and experience as well as theoretical studies suggest that any intervention, and in particular protection of productive sectors, (a) must be limited in time with credible and irrevocable commitments, and (b) must maintain a healthy level of competition between companies. In this way, the potential negative consequences of intervention are minimised. These observations particularly apply to declining industries where established interests tend to prolong protection well beyond what is required in terms of efficiency and fairness.

4. Horizontal policies, not targeted to any specific sectors, have gained increasing prominence. Promotion of R&D activities, training of human capital, promotion of internationalisation (brand image, sales networks, etc.), aid for SMEs are important factors in any policy that seek to promote competitiveness and productivity growth. European countries still allocate an important (though shrinking) portion of their spending to sector-based policies. Sector-based aid is mainly for failing or restructuring industries (steel, shipbuilding, coal).

5. Horizontal policies to lower the cost of doing business and encourage competition have an important impact on the competitiveness of companies and the productivity of the economy. A microeconomic framework that maintains an efficient functioning of markets is crucial, and in particular a light but appropriate regulation and an active antitrust policy. This factor is particularly important in many EU countries where restrictive practices and lack of competition have been the norm in many sectors.

6. Industrial policy is naturally interwoven with local and regional policy. With growing international competition, a regional policy to promote infrastructure (in a broad sense including human capital and the science and technology base) and to strengthen external effects of geographical groupings of companies should be allowed under the general competition and state aid rules of the EU.

7. Regional governments should be allowed to develop their own industrial policy, if necessary competing with other regions. The role of the EU should be to provide a common industrial policy in European-wide issues and a framework of common rules to internalise externalities and limit rent-shifting incentives. By contrast, national governments should engage much less in industrial policy. Instead, the regions, on the one hand, and the EU, on the other, are in the better position to design policy measures to confront globalisation.

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GLOBAL WARMING: THE NEGLECTED SUPPLY SIDE[1]

1. Introduction

Since the publication of the Stern Review (2006), the problem of global warming has been put high on the political agenda. Tony Blair stressed the need for urgent action, it was the main theme during Germany's EU presidency in the first half of 2007, and the G8 Summit in Heiligendamm in June 2007 focused on it. The Bali conference in 2007 called for rapid action.

Indeed, the scientific evidence for an increase in the carbon dioxide (CO_2) content and a subsequent warming of the atmosphere is overwhelming. The facts are undeniable.

- From measuring the CO_2 content of air bubbles in ice cones drilled in Greenland and Antarctica one knows that it was 280 ppm (parts per million) before industrialisation, whereas now it is 380 ppm.
- Although 380 ppm is tiny, implying that less than 0.04 percent of the air is CO_2, the impact on average world temperature is enormous. If carbon dioxide and other, less important, greenhouse gases[2] were absent from the atmosphere, average temperature of the earth's surface would be – 6°C. With the greenhouse gases, the present average temperature is 15°C, about 21°C more than without them. Obviously, the temperature is extremely sensitive to even small variations in greenhouse gas concentration.
- Since pre-industrial times, average world temperature has increased by 0.8°C. The acceleration in recent decades has induced a rapid melting of Greenland ice and of glaciers. The northern polar cap has shrunk sufficiently to raise expectations that the Northwest Passage between the Atlantic and the Pacific will soon be navigable. The sea level has risen by 20 cm relative to pre-industrial times.

There is broad agreement among climate forecasters that with a business-as-usual scenario the temperature increase will be in the order of 3°C between 2035 and 2050 relative to pre-industrial times. The Stern Review fears a 5°C increase in a business-as-usual scenario by 2100. The authors of the review argue that 5°C is a threshold at which mankind will be entering "unknown territory". As a comparison, a 5°C increase is equivalent to the temperature increase since the last ice age, some 15,000 years ago. The costs in terms of floods, storms and countervailing investment in heat-protected dwellings and air-conditioning will be huge by all standards, whatever the assumptions of the forecasts are in detail. Migration waves from arid to fertile parts of the world could even threaten the political stability of the world. Thus, there is broad political agreement that policy measures against global warming are needed.

2. The current policies

A major policy move was the so-called Kyoto Protocol of 1997. The Protocol stipulates that the contracting parties (most of them industrialised countries) reduce their emissions of greenhouse gases in the commitment period 2008–2012 by 5.2 percent compared to the level of 1990.

The Protocol has been signed by 175 countries to date, but for most of the countries signing implied no costs, as emissions were not effectively constrained. Of the 175 countries, only 51 countries are required to reduce greenhouse gas emissions below levels specified for each of them in the treaty. The rules of the treaty effectively constrain only 29 percent of current worldwide emissions of carbon dioxide (CO_2).

Important countries like China and India signed, but are not constrained, and the US did not even ratify the contract. Australia, one of the largest polluters in per capita terms, initially did not ratify the contract

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either but has recently signed documents to ratify it in Bali. The EU15 countries are among those effectively constrained by the Kyoto Protocol. They committed to reducing their CO_2 output by 8 percent by 2008–2012. They mutually agreed on an allocation plan distributing the required CO_2 reductions internally. Some countries have advanced substantially in fulfilling these requirements, others lag behind. In 2005, Germany, for example, had already accomplished nine tenths of its reduction target of 21 percent. Some of the Western European countries like France, Finland, Sweden and the UK are good performers too, whereas other countries are still amiss in living up to their commitments. Spain was allowed to increase its emissions by 15 percent but in fact had increased them by 52 percent by 2005; Ireland increased its emissions by 25 percent, although it was allowed to increase them only by 13 percent. In Portugal the actual increase is 40 percent, while the country's limit was set at 27 percent. Italy is obliged to cut its emissions by 6.5 percent but increased them by 12.5 percent instead. Austria promised to reduce its emissions by 13 percent but actually increased them by 18 percent.[3] To be sure, by the end of 2005, the non-complying countries still had up to seven further years to meet their targets. However, as two thirds of the adjustment period had already passed by then, it seems unlikely that the violators will still be able to comply. Hence, it must be feared that the treaty is not even working for the countries that signed and ratified it.

The bad performance is surprising insofar as there is a Compliance Committee that supervises the countries' efforts and that may even impose sanctions. It may require a non-complying country to reduce its emissions by a further 30 percent of its target deviation and it can suspend this country from making transfers under an emissions trading program.

Hopefully, the new emissions trading system introduced by the EU in 2005 will make a difference. The European Emissions Trading System covers energy producers and energy-intensive industries of the manufacturing sector such as the production and processing of ferrous metals or the mineral oil industry, in total about 45 percent of the EU's CO_2 emissions and about 30 percent of the EU's overall greenhouse gas emissions (European Commission 2005). Emissions from other sectors, private households and traffic are not included in the trading system, although they are

noted in the Kyoto Protocol. At this stage it is difficult to evaluate the performance of the system, as there are no reliable data on the emissions before the introduction of the system. However, according to a statement by EU Commissioner Dimas, it can be assumed that CO_2 emissions decreased by a few percent in the first year of the new system.[4]

The EU system involves two trading periods. The first was from 2005 to 2007, the second is from 2008 to 2012. At the beginning of the second trading period the reduction targets for energy producers and energy-intensive industries will be tightened, and perhaps the EU will then be able to come closer to its target than now seems likely. In 2011, the European Commission plans to include air traffic in the emissions trading system.

Other EU measures to reduce CO_2 emissions include targets for renewable energy sources, research and development programmes and guidelines for taxing energy as well as sector-specific measures to be implemented by the member countries. EU guidelines were to induce member countries to levy taxes on energy consumption or introduce feed-in tariffs for alternative energy producers and quotas for renewable energy sources. The EU has set a binding target to have 20 percent of the EU's overall energy consumption coming from renewable energy sources by 2020. In 2005 this share amounted to 6.3 percent in the EU and to 4.7 percent in Germany. Some EU countries like Austria, Portugal and the Scandinavian countries have reached shares of more than 15 percent because of their large supplies of hydropower. In the UK, Ireland, the Netherlands and Belgium renewable energy sources have a share of less than 3 percent.

In addition, the EU countries are carrying out a number of voluntary measures that are designed to reduce CO_2 emissions or unintentionally have this implication. In 2005, France was generating 78 percent of its electricity from nuclear power, while the average of the EU25 countries is 31 percent. Other countries with a relatively high share of nuclear power in electricity generation are Lithuania at 72 percent, Belgium at 56 percent, Sweden at 47 percent, Germany at 26 percent and the UK at 20 percent.

In general, the measures implemented in the EU countries may be classified as in Table 5.1.

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[3] European Environment Agency (2007).

[4] European Environment Agency (2007).

Table 5.1

Common EU policies against CO_2 output
- Direct fuel demand reductions   Better insulation of homes, lighter cars and traffic reduction
- Green electricity   Wind, water, sunlight, biomass or hybrid cars
- Nuclear energy   Electricity and hydrogen technology

- Other green energy sources
    Pellet heating, bio diesel, heat pumps, solar heating,
    geothermal heat

- More efficient combustion   Common rail diesel engines, optimized power plants

As most of these measures are discussed in great detail in the media, we forego repeating a discussion of their technical and economic effectiveness here. Two remarks are appropriate, however.

First, the policy measures do not include sequestration and afforestation. We will argue below that these are two particularly effective measures that deserve more attention than they have received thus far.

Second, all measures listed in Table 5.1 are similar in the sense that they want to solve the CO_2 problem by reducing the demand for fossil fuels. Better insulation, lighter cars and a reduction of traffic diminish demand directly. Producing electricity from wind, water, biomass or sunlight means using a replacement technology to produce energy which also reduces the demand for fossil fuels. The hybrid car belongs to this category because it transforms brake energy into electricity. Nuclear energy from splitting atoms is the most important replacement technology in use today, and perhaps one day nuclear fusion reactors will be

available. Nuclear energy can be transported via the grids, but it could also be used in vehicles if the electricity is converted to hydrogen, which is a storage device rather than an energy source of its own. Green, non-energy sources like pellet heating, bio diesel, heat pumps, solar heating and geothermal heat are already frequently used in Europe due to high subsidies paid.

Finally, there are ways to improve the efficiency of combustion processes by avoiding the waste of unburned fuels such as power stations with finer coal powder and common rail diesel engines. They also reduce the demand for fossil fuels.
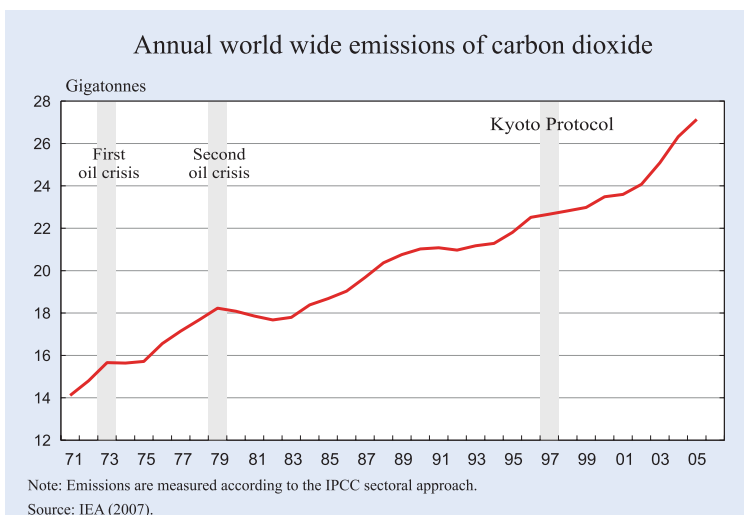
The measures taken to reduce the demand for fossil fuels and the emissions of carbon dioxide stand in striking contrast to the development of actual emission figures. As Figure 5.1 shows, worldwide emissions of carbon dioxide have continued to grow even after the Kyoto protocol was signed. There is not even a dent in the curve. If anything, emissions have accelerated in recent years. This poses a puzzle for economic theory and raises doubts about the efficacy of the demand-policies taken thus far. The subsequent sections will explain how we believe the puzzle can be solved and what type of policy conclusions follow.

3. The missing supply side

The rationale behind the demand policies is that they contribute to providing a global public good. If only a few "green" countries reduced their CO_2 exhaust, there would be less CO_2 in the air, the temperature of the atmosphere would remain lower, and some of the costs of global warming could be avoided. All countries would benefit from the actions of the green countries. To be sure, it would be better if all countries reduced their demand, but even if only a few countries do, global warming is at least mitigated somewhat.

Unfortunately, this rationale is incomplete to say the least, because it neglects crucial links between the green countries and other countries via the underlying energy markets. The amount of CO_2 emitted into the air depends on the carbon consumption of the green countries, on the carbon consumption of non-

Figure 5.1

Annual world wide emissions of carbon dioxide

Note: Emissions are measured according to the IPCC sectoral approach.
Source: IEA (2007).

green countries and on the supply of the extracting countries. Only if world wide supply is very price-elastic, such that suppliers are willing to follow demand at minimal price changes, is the assumption correct that demand changes of green countries translate directly into changes in CO_2 emissions. If supply is not very price-elastic, things are different.

Suppose, to illustrate the problem, that world supply of fossil fuels does not react to price changes. In that case, the green countries' demand restraint is useless. The restraint will depress the world market price of carbon sufficiently to induce other consumer countries to consume so much more carbon that the overall output of CO_2 remains unchanged. If this case prevailed, the demand restraint of the EU countries would simply subsidise Americans to enable them to drive even bigger SUVs and the Chinese to finance a further acceleration of their CO_2-intensive growth process. The contribution to slowing down the pace of global warming would be nil. Figure 5.2 illustrates this case.

The distance between the two vertical lines marks the world flow supply of carbon in a particular year t. Assume for the sake of argument that it does not react to price changes. This assumption will be removed further below. From left to right, the diagram measures the demand of the green countries and from right to left the demand of the other countries. The demand reduction by the green countries depresses the world price of carbon from $P*$ to $P**$ and reallocates the given supply from the green countries to other countries as is shown by the arrow below the diagram.

Figure 5.2

How the green countries subsidise the rest

Source: Sinn (2007c).
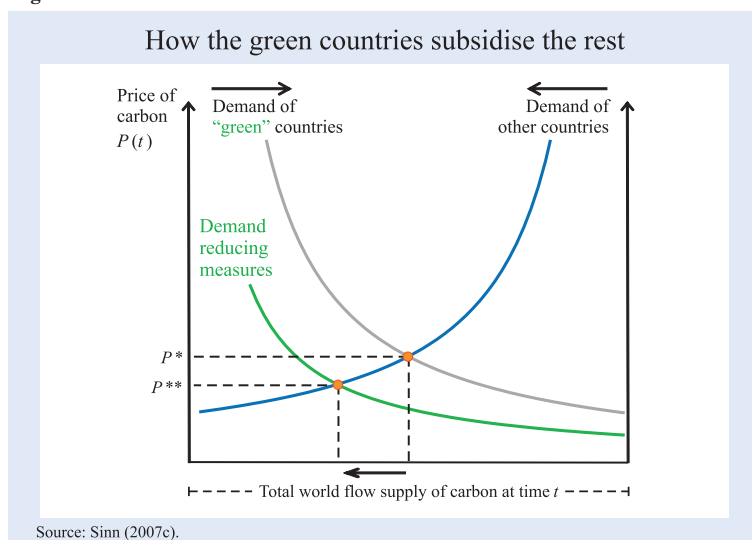
When carbon supply is price-inelastic, there are other implications for environmental policy that are worth noting:

- The use of alternative energy sources, such as electricity from wind, water, sunlight or nuclear power, does not mitigate global warming but simply increases world energy consumption.
- The production of bio diesel, ethanol or wood pellets will likewise increase energy consumption. In addition, it will exacerbate the problem of global warming to the extent that it implies the conversion of forests so that the average stock of cut wood in buildings or living wood in trees is reduced. (Note that wood, in whatever form, is a store of carbon as long as the wood is not degrading.) If the production of bio fuel does not imply the conversion of forest land but the conversion of land used for food production, it will increase food prices. The net effect on carbon dioxide in the atmosphere will be zero in this case. Likewise the net effect will be zero if bio-energy is produced from material that otherwise would be wasted, degrading by oxidation.[5]
- Improvements in combustion processes that do not involve the reduction of the waste of heat but operate via a more complete combustion of fossil fuels, such as using finer coal powder for power stations or the common rail diesel technology, will increase CO_2 output and increase global warming. (Improvements reducing the waste of heat such as those resulting from a better motor management are CO_2 neutral in the aggregate.)

Although all of this is only a thought experiment, it demonstrates how futile it is to carry out demand policies without knowing how they affect supply. To predict the effects on global warming, it is essential to understand the supply side of the world energy market. Only to the extent that demand policies succeed in inducing the owners of carbon to keep their stocks underground will they be able to mitigate the problem of

[5] If degrading occurs without oxidation such that methane is produced and evaporates to the atmosphere, the production of bio fuel can slow down global warming as methane is six times as dangerous a greenhouse gas as carbon dioxide over a period of 500 years and 25 times as dangerous over a period of 100 years. See IPCC (2007), p. 33.

global warming. This trivial fact has often been overlooked in the public and scientific debates of the problem.

4. The supply potential

To understand supply, it is useful to first focus on the available and exploitable stocks of reduced carbon in the ground, for these stocks are the source of the CO_2 problem. Reduced carbon that can be used for combustion (oxidation) is contained in coal, oil and methane. Combustion combines the carbon with oxygen to produce CO_2. Burning one tonne of carbon generates 3.6 tonnes of CO_2. Carbon occurs normally in conjunction with other elements, in particular hydrogen as so-called hydrocarbons. Hydrogen can also be burned and contributes to the energy content of fossil fuels. As hydrogen turns to water upon combustion, it is harmless for the environment. The larger the hydrogen content of the fuel, the lower is the CO_2 output per unit of energy produced. Methane, in particular, is advantageous in this regard. For each carbon atom it has four hydrogen atoms, each of which produces about 30 percent of the energy of the carbon atom. Thus, with methane, the CO_2 output per unit of energy is less than half of that of coal which predominantly consists of carbon.

Whatever the fossil fuel is, the amount of CO_2 produced upon combustion is strictly proportional to the amount of carbon burned. In fact, combustion just means transporting the carbon from below ground to above ground where it enters the atmosphere. About 55 percent of the CO_2 entering the atmosphere is quickly absorbed by the oceans and the biomass, because it enters near the earth's surface. Unlike other greenhouse gases, carbon dioxide spreading into higher layers of the atmosphere disappears only very slowly with the passage of time. 45 percent of the emissions stay in the atmosphere after about 100 years, and another 20 percentage points disappear in the next 200 years. The remaining 25 percent build a very robust stock that will practically never disappear. The IPCC (2007) argues that it takes many thousands of years for the anthropogenic (caused by man) CO_2 to disappear from the air, so that emissions are extremely persistent. Archer (2005) as well as Archer and Brovkin (2006) find that the mean lifetime of CO_2 from fossil fuel combustion in the atmosphere is about 30–35 thousand years.

The Stern Review has provided a summary estimate of past, present and future CO_2 concentrations in parts per million (ppm) and the corresponding implications for the temperature of the atmosphere. The estimates considered most plausible by the authors of the report are listed in Table 5.2, together with information on the corresponding absolute

Table 5.2

The carbon supply potential and global warming

		Carbon content of the atmosphere (GtC)	CO_2 concentration of the atmosphere (ppm)	Average temperature (°C)
Short term	Pre-industrial	600	280	14
	Today	800	380	15
	2035 (Stern estimate)	1,200	560	17 (15.5–18.4)
	All reserves burned: 850 GtC (estimated range 766-983)	1,183	555	17 (15.5–18.4)
	2100 (Stern estimate)	1,900	900	19 (16.2–22.3)
Long term (over 300 years)	All resources burned: 4773 GtC (estimated. range 3967-5579 GtC)	2,948	1,384	?
	All resources burned: 4773 GtC (estimated range: 3967-5579 GtC)	1,993	936	19.5 (16.8–22.3)

Note: Estimates about reserves and resources are taken from the World Resource Institute (2006), the World Energy Council (2000, p. 149) and EIA (2007). With regard to the estimates from BP (2007 pp. 6, 22, 32) as well as BGR (2005, p. 6 n.) we calculated the respective carbon contents. The short term is defined as the next 100 years, the time beyond 2300 we call the long term. According to the recent literature 45 percent of anthropogenic CO_2 emissions stays in the atmosphere after 100 years. After 300 years only 25 percent of emissions remain in the atmosphere forever. These estimates about the lifetime of anthropogenic CO_2 are taken from Archer (2005), Archer and Brovkin (2006) and Hoos et al. (2001). Temperature projections are according to the 5–95 percent climate sensitivity ranges from IPCC TAR 2001. See also Stern et al. (2006, p. 12).

stock of carbon (without the oxygen content of CO_2).[6]

The translation of the Stern results into absolute carbon quantities makes it possible to reconcile the forecasts with estimates of the world's reserves and resource. Reserves are those stocks that are known and worth exploiting at current prices. Resources also include stocks that are not well known and/or will become profitable only at substantially higher prices.

Estimates of reserves and resources are given by the World Resource Institute, the World Energy Council, the Energy Information Administration of the US Government, British Petroleum and the German Institute for Geosciences and Natural Resources (BGR). The carbon content of the respective published figures can easily be calculated (the carbon content itself, not the energy equivalent carbon contents). Accordingly, the values for carbon reserves range from 766 GtC (British Petroleum) to 983 GtC (World Energy Council). The values for resources range from 3967 Gt of carbon (BGR) to 5579 Gt of carbon (World Energy Council). In its second column, Table 5.2 lists these ranges as well as the average values of the sources screened.

Obviously, the average reserve estimate of 850 GtC yields a carbon content in the air that is about twice as much as in pre-industrial times and comes close to the Stern estimate for 2035, according to which the temperature will rise by 3°C, relative to pre-industrial times, from 14°C to 17°C. The scenario that the Stern report associates with the year 2100 and that would result in a temperature increase by 5°C to a level of 19°C, is associated with a carbon exhaustion of 1900 Gt. This is more than burning all reserves but much less than burning all resources.

The more interesting question is what happens when all resources are used up. The last two rows of the diagram refer to this case. If reserves were burned very quickly, say up to 2100, this would imply more than a quadrupling of the pre-industrial carbon content of the air. This would clearly be a catastrophic scenario where the temperature would rise way beyond 19°C

where, in the words of the Stern Review, humans enter "unknown territory". We know of no forecasts that would dare make predictions about this case, and fortunately it seems very unlikely that resources could be burned over such a short period of time.

Over the very long run, say 300 years from now, where only 25 percent of the emissions stay in the air, the implications of burning all resources might be more manageable, as the temperature would then only increase to 19.5°C, as in the Stern scenario, up to 2100. Thus it would be essential for mankind to extract the carbon dioxide slowly enough to give nature a chance to absorb most of it and avoid catastrophic concentrations. Even then, however, the temperature would be high enough to cause permanent damage to the earth, as Stern et al. have convincingly demonstrated in their voluminous and carefully prepared report.

Nature has endowed mankind with a supply of reduced, oxidizable carbon in the ground. Economic decisions of resource owners transform the natural supply into a market supply, supply finds its demand via the price mechanism, and by the laws of chemistry the extracted carbon becomes CO_2 output. Obviously, therefore, the economics of global warming cannot be understood without understanding how the markets for fossil fuels work. The next section will go into this question.

5. The determinants of carbon supply: the ideal case

Supply reactions in the carbon markets are fundamentally different from supply reactions in normal markets for the simple reason that the stock of carbon in the ground is depletable and cannot be reproduced. The supply of nature is indeed as constant as was supposed in the thought experiment made above. However, there are two economic decisions by the resource owning firms that transform the supply of nature into a market supply. The firms have to decide (i) which parts of the given stock to extract in the long run and (ii) how to distribute this extraction over time. As a result of these decisions they implicitly also choose the current flow supply that determines the current CO_2 output and hence the current pace of global warming.

The first of these decisions depends on how the price of the extracted resource behaves relative to the unit extraction cost as the stock underground and with it

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[6] The stock of CO_2 in the atmosphere is calculated by using 5.137x10^{18} kg as mass of the atmosphere, which means that 1 ppm of CO_2 corresponds to 2.13 Gt of carbon (Trenberth 1981). The Stern Review reported 380 ppm of CO_2 in the atmosphere, which corresponds to 800 Gt of carbon. The UN Environmental Program (1998) estimated about 750 Gt carbon in the atmosphere for the early 1990s; the CDIAC (2000) estimated 369 ppm of CO_2 and about 787 Gt of carbon in the atmosphere for the year 2000.

the current flow of extraction becomes smaller and smaller. If the resource is an essential, it is plausible to assume that the price will increase beyond all bounds as the extraction flow dwindles to zero. Thus a bit of extraction will always be profitable as long as some of the stock is left over, and no part of the stock of resources will be permanently exempt from extraction.

To be sure, the higher prices are, the larger are the endogenous incentives to avoid the combustion of fossil fuels by using other energy sources from solar to nuclear power and to avoid the waste of energy by a better insulation of homes or the use of hybrid engines and sophisticated common rail diesel engines. The spectrum of direct and indirect demand-reducing measures discussed above will be activated when prices increase, and this will in turn mitigate the price increase. This is what is behind the demand curves shown in Figure 5.2 and what is formally modelled in Sinn (2007a and b). However, it will be difficult to find perfect substitutes for carbon fuel that would limit the possible price increase sufficiently to make extraction unprofitable. For example, it is hard to imagine that air craft could ever be run on electricity from batteries or on non-carbon fuels such as hydrogen and still carry significant amounts of cargo, as the storage devices for such energy are huge and heavy. If a replacement fuel is used for aircraft, it will probably be bio fuel, which is based on carbon, too. However, the price of bio fuel will rise when more of it is demanded, as the land available for its production is very limited. According to the International Energy Agency, an area of 1.4 gig hectares, which is equivalent to all of the world's current arable land, would be necessary to completely satisfy the fuel requirements from world transport (IEA 2006, p. 289), which is less than one fifth of current fossil fuel consumption. The actual amount of land available for the production of bio fuel will be a tiny fraction of this area, as increasing food prices will create vigorous resistance against this type of energy production. The Tortilla Crisis of Mexico City in January 2007 illustrates the kinds of problems that will be encountered.[7] Thus, it is very unlikely that the possibility of substituting fossil fuel with replacement energy will ever be able to impose a price cap on fossil fuels. At higher prices, the demand for fossil fuels will be less, but it will never become

zero. The last helicopter of the Chinese president will not stop operating until the stock of fossil fuels has been nearly exhausted.

Admittedly there are other theoretical possibilities, but they hinge on very special limiting assumptions on the extraction cost and the price as time approaches infinity which cannot, in principle, be observed in this historical period of time. In what follows we will therefore assume gradual exhaustion as time goes to infinity, albeit at a speed that dwindles towards zero.

This does not mean that we presuppose the answer, for in our opinion the true problem of global warming is not whether some of the stock of fossil fuels underground will not be touched even after tens of thousands of years, but how resource owners allocate over time whatever they plan to extract over the next few hundred years.

In solving the intertemporal allocation problem, firms implicitly face a perpetual portfolio optimisation problem like an investment banker, choosing continuously between storing their wealth in the stock in situ and storing it in the form of financial assets. As fossil fuels become scarcer as depletion proceeds, their market price tends to increase over time, and sites of unexploited stocks become more valuable, generating capital gains for postponed extraction. On the other hand, present extraction generates financial income that can be invested in the capital markets where it also generates a return. Like the investment banker, clever resource-owning firms will allocate their wealth between financial assets and the resource in situ so as to maximise their total return. They will postpone extraction if the capital gain from doing so exceeds the interest that otherwise could have been earned in the capital markets. And they will extract at present and invest the proceeds in the capital markets if they expect a capital gain from the resource in situ that is lower than the interest on financial assets.

As all resource-extracting firms follow a similar decision rule, the emerging extraction pattern must be such that the resource in situ and financial assets generate roughly the same expected rate of return. If the capital markets are more attractive, because current resource prices are high and expected future prices are low, most firms will decide to increase current extraction at the expense of future extraction. This will reduce current prices and raise future prices, thereby increasing the potential capital gains from postponing

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[7] The Tortilla Crisis, culminated in protests in Mexico City in January 2007. The price of maize, half of which was imported from the USA, more than doubled in the course of a year, primarily because of the increase in maize used for the production of bio ethanol. Mexico tried to solve the problem by imposing a state-administered price ceiling for tortillas made of maize, combined with duty-free imports of maize.

extraction. Conversely, if the expected capital gains exceed the return offered by the capital markets, firms will decide to postpone extraction such that current prices will rise and future ones will fall, reducing the capital gains. In equilibrium, when firms are indifferent between postponing extraction and investing in the capital market, the extraction path is chosen such that the capital gain just matches the return on financial assets.

In the simplest theoretical case where there are no extraction costs, this implies that the price of the resource in situ rises at a rate given by the market rate of interest. This implication is called *Hotelling's rule* according to Hotelling's (1931) seminal work on the behaviour of resource extractors.

Hotelling's rule is a piece of positive economics, describing how markets work. Interestingly enough, however, his market rule is equivalent to an intertemporal efficiency rule developed by Solow (1974) and Stiglitz (1974), disregarding the externalities from global warming, which was not seen as a problem at the time. Solow and Stiglitz saw the portfolio problem from the viewpoint of mankind rather than individual firms. Mankind has two alternatives for transferring wealth and hence consumption to future generations: it can bequeath the resources in situ or it can extract the resources now and use them for additional production of investment goods, such that a larger stock of man-made capital generating more GDP can be transferred to the future. Bequeathing an additional unit of man-made capital has the advantage of generating a real return equal to the marginal product of capital in production. Bequeathing an additional unit of the resource in situ may have the advantage that the extracted resource is able to make a greater contribution to the production of goods in the future than in the present, as a dwindling resource stock and hence a dwindling extraction flow makes the resource scarcer over time and increases the marginal product of the resource as an input to industrial production. In a social optimum, the growth rate of the marginal product of the extracted resource equals the marginal product of capital. If this condition, the so-called *Solow-Stiglitz efficiency condition,* is satisfied, an intertemporal Pareto optimum prevails, which means that it is impossible to find another extraction path that would provide future generations with a higher living standard without reducing the living standard of the current generation. The efficiency condition is the normative equivalent to the positive Hotelling's rule, as in a market equilibrium the marginal product

of the extracted resource equals its price and the marginal product of man-made capital equals the market rate of interest.

Both Hotelling's rule and the Solow-Stiglitz efficiency condition can be generalised to the more realistic case of extraction costs. As the stocks of fossil fuels in situ are not all equally accessible, their extraction involves different unit extraction and exploration costs. Firms normally extract the stocks with lower unit costs first and then gradually proceed to those with higher unit costs as the resource becomes scarcer and buyers are willing to pay higher prices. Thus, unit extraction costs are stock-dependent, the unit cost being the higher, the smaller the remaining stock in situ.
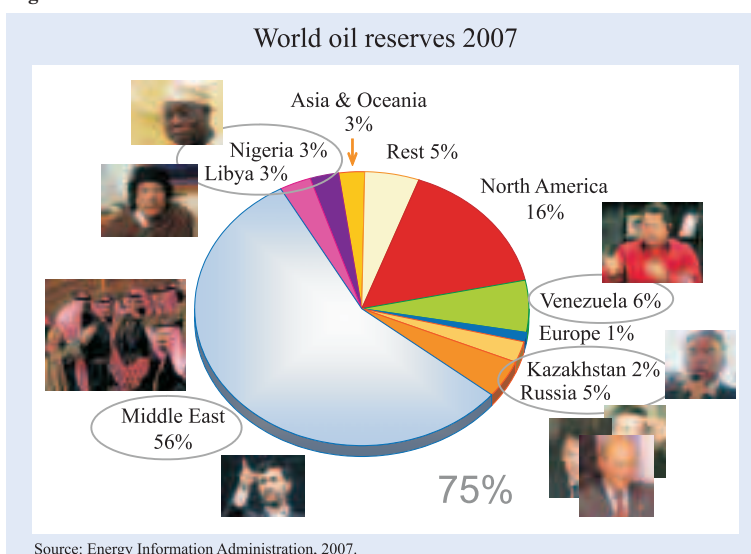
With stock-dependent extraction costs, the intertemporal market equilibrium, as discussed above, is modified insofar as the rule that the capital gain from postponing extraction be equal to the interest on a financial investment now translates into an equality between the rate of interest and the price increase of the resource relative to the price net of the unit extraction cost. Similarly, without considering the damage from global warming, the condition for intertemporal Pareto optimality has to be modified. It now requires that the marginal product of capital be equal to the increase of the marginal product of the extracted resource relative to the marginal product net of unit extraction costs. However, the modified Hotelling's rule still coincides with the modified Solow-Stiglitz condition, implying that, in principle, markets ensure an efficient intertemporal extraction path.

6. Sources of market failure

In reality, resource markets do not work as efficiently as the above discussion suggests, because there are various sources of market failure, the most important ones arguably being insecure property rights and global warming.

Insecure property rights constitute a severe problem for resource owners given that substantial fractions of fossil fuels are located in countries with unstable political conditions. This is only a limited problem for coal, huge sites of which are located in China and the US. Methane and, in particular, crude oil, however, are heavily affected by this problem. Figure 5.3 illustrates the problem for the case of crude oil reserves as quoted in 2007.

Figure 5.3

World oil reserves 2007

Asia & Oceania 3%
Nigeria 3%
Libya 3%
Rest 5%
North America 16%
Venezuela 6%
Europe 1%
Kazakhstan 2%
Russia 5%
Middle East 56%
75%

Source: Energy Information Administration, 2007.

75 percent of the world oil reserves are located in Venezuela, Kazakhstan, Russia, the Middle East, Libya and Nigeria, regions with unstable political conditions and unstable property rights. It is not José Manuel Barroso or Angela Merkel but people like Hugo Chavez, Vladimir Putin and his oligarchs, Mahmud Ahmadinejad or Muammar al-Gaddafi who determine how quickly the oil is extracted and how quickly the world is warming up. And unfortunately, there is every reason to fear that it will be warming up too quickly.

Insecure property rights in oil fields imply that resource owners have little interest in leaving the oil underground, because they feel uncertain about whether their descendants or their clans will be able to enjoy them in the future. Perhaps a revolution will take place that brings a rivalling faction to power. Perhaps democracy will be introduced, sweeping away the previous ruling class of the country. Given these uncertainties, it is better to extract the oil as quickly as possible and invest the proceeds in Swiss bank accounts.

From a more formal perspective, insecure property rights imply that a capital gain that matches the market rate of interest is not enough to make resource owners indifferent between extraction and conservation. Instead, the extraction path must begin with a higher current rate of extraction which over time shrinks faster so that the capital gain on the resource in situ will rise sufficiently to compensate for the expropriation risk. This diminishes the hope that market forces will be able to generate the Pareto optimal extraction path.

This is even more true as the Pareto optimal extraction path itself may require more resource conservation than is implied by the modified Solow-Stiglitz efficiency condition. The reason is that the extracted carbon (or rather 25–45 percent of it, as argued above) is accumulated in the atmosphere in the form of CO_2, creating ongoing damages whose repair absorbs a certain fraction of GDP. The possibility of avoiding some of these damages by postponing extraction makes postponing more attractive from a social perspective. Postponing not only means that the resource is able to make a higher marginal contribution to GDP in the future because it will be scarcer then. It also means that a higher consumption level will be possible because a lower fraction of GDP is needed to repair and accommodate the damages global warming will cause. Thus future generations' consumption of produced goods can be increased without reducing the present generations' consumption of such goods when more of the resource stays underground and less man-made capital is produced.[8]

The two externalities both tend to widen the gap between efficient and actual extraction of fossil fuels. Insecure property rights mean that markets extract the fossil fuels faster than they would in the case of secure property rights, and Pareto efficiency in the case of global warming implies that extraction should proceed more slowly than even a perfect market with secure property rights would achieve. In other words, insecure property rights speed up global warming, while extraction should in fact be slowed down relative to what would have been optimal without global warming.

7. The green policy paradox

Let us now return to the question of how demand policies affect global warming. Stern et al. (2006) emphasised the effect of price signals on the consumers of fossil fuels. They implicitly seem to assume that the time path of producer prices is fixed, such

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[8] See Sinn (2007a) for a formal proof of the condition for intertemporal Pareto optimality in the presence of global warming.

that supply at each point in time is perfectly elastic and demand alone determines the transactions volume. However, the truth is far from this assumption. As nature's supply of carbon fuels is given, the market supply that resource owners generate from nature's supply may also be rather rigid and may therefore ultimately determine the transactions volume in the fossil fuel markets and hence the pace of global warming. Thus, how the demand-reducing measures and the price signals they cause for the producers affect the supply path of fossil fuels becomes the crucial question.

The reactions of the supply of fossil fuels have little in common with the supply reactions of reproducible commodities, as the intertemporal allocation problem implies that a supply reduction in the present will lead to a supply increase in the future and vice versa. To be sure, an exogenous demand reduction in the present that depresses the price today will give producers the incentive to produce less; but producing less today simply means postponing extraction. In the future, when prices are back to their normal path, supply will even be higher than otherwise would have been the case. Conversely, exogenous demand reductions in the future that depress future prices will imply less extraction in the future but more in the present. Whether global warming slows down after the introduction of demand-reducing policy measures therefore depends on the whole time path of such measures from now into the future expected by the suppliers. If the expected exogenous demand reductions are balanced over time, the extraction path may not react at all, so that no environmental benefits are achieved.

Long and Sinn (1985) gave these thoughts a more precise meaning. They showed for a very general class of extraction cost functions that the supply reactions depend on how the fall in demand induced by policy measures would change the time path of the present value of producer prices, given the old supply path as would have prevailed without government intervention. Call the difference between the old and the new price at a particular point in time the "absolute price wedge" and call the ratio of the absolute price wedge and the old price the "relative price wedge". If the present value of the absolute price wedge induced by policy measures declines over time, the supply path will become flatter because firms will prefer to postpone extraction. If the present value of the absolute price wedge rises, the reverse is true; and if the present value of the absolute price wedge is the same for all points in time, supply will be time invariant.

To translate that into a specific policy measure, assume all governments of the consuming countries levy a time-invariant ad-valorem tax on the consumption of fossil fuels. With the given old supply path this tax would depress the producer price at all points in time by a given percentage of the respective old price, which means that the relative price wedge is constant. Now assume for a moment that extraction costs are negligible implying that, according to Hotelling's rule, the consumer price rises at a rate given by the rate of discount. The absolute price wedge will then also rise at this rate and hence be constant in present value terms, as required for the neutrality result cited. Thus, a constant ad valorem tax on fossil fuel consumption will indeed leave the time path of extraction unchanged if there are no extraction costs.

However, governments cannot easily commit to levying a tax at a constant rate. What if resource owners expect the rate to be increased over time, say due to an increasing awareness of the CO_2 problem by the public? As shown in Sinn (1982) and Long and Sinn (1985), in this case they will advance their sales to avoid the increasing future tax burden. Global warming will accordingly accelerate, a phenomenon that Sinn (2007b) has called the *green paradox*. The green policy paradox gives a deeper meaning to the initial remark that the supply reactions of firms that sell exhaustible natural resources follow another logic than those of normal firms, showing that the price signals that taxes yield do not depend on the level of taxes but on their change over time.

This contrasts sharply with the views expressed by Stern et al. (2006) as well as Newberry (2005), who argue that the carbon consuming countries should introduce carbon taxes to create a common worldwide price signal for the consumers of fossil fuels inducing them to curtail their demands. It is true, of course, that a carbon tax that, at each point in time, reflects the present value of the stream of marginal social damages from a unit of carbon extracted at that point in time would, in principle, be able to induce an efficient extraction path. However, such a tax would not in general be constant over time but would have to follow a particular time path that cannot easily be calculated and would involve the risk of major policy mistakes, as the above discussion has shown. When extraction costs are negligible and the tax is constructed on an ad-valorem base, the tax would be neutral if its rate stayed constant over time, and it would even exacerbate the problem of global warming if the tax rate increased over time.

The green policy paradox can be generalised to the more realistic case with extraction costs as well as to other demand-reducing policy measures such as sub-sidising bio fuel, wind mills and photovoltaic devices and investing in research and development to find a technical break-through in nuclear fusion. Let $\tau(t)$ be the expected relative price wedge produced by a demand reducing policy or, to be more precise, the expected relative decline of the producer price of carbon at time t that would be induced by that policy if the entire supply path from now to the distant future remained unchanged. As shown in Sinn (2007b), the neutrality condition for the supply path that ensures that this path will indeed remain unchanged is

$$\hat{\tau} = r \, \frac{g(S)}{P(R)} \quad \text{, (borderline case for neutral demand reducing policies)}$$

where $\hat{\tau}$ is the growth rate of the relative wedge τ; r is the rate of discount; $g(S)$ is the unit extraction and exploration cost, which depends on the stock of resource in situ, S; and P is the price of the resource at a particular point in time before the policy-induced demand reduction. If τ rises faster than given by this equation, firms have an incentive to advance sales. The extraction path becomes steeper with more extraction in the present and near future and less extraction in the more distant future. Conversely, if τ rises more slowly, which could mean that it stays constant or declines, the supply path becomes flatter and global warming will slow down, as is intended.

The equation shows that in the absence of extraction costs ($g = 0$), the demand reducing policy is neutral if $\hat{\tau}$ is zero, that is if the relative price wedge τ is a constant. If the demand- reducing policy is brought about by an ad valorem tax on resource consumption, τ can be interpreted as the tax rate, and as such the equation confirms the result cited above. However, as explained, τ has a more general meaning applying to all demand-reducing measures that would dampen the producer prices of fossil carbon fuels with a given supply path.

When extraction costs are taken into account, the criterion for neutrality is a moderate rise in the relative price wedge in line with the terms on the right-hand side of the equation. The neutral rate of increase in the relative price wedge caused by demand-reducing policies is a fraction of the discount rate given by the share of the price needed to cover the extraction cost. It follows that a demand-reducing policy that would dampen the price path proportionately at all points in

time, if the extraction path remained unchanged, will result in a flatter extraction path and will therefore slow down global warming. This is indeed the reaction expected by the green policy-makers.

However, the problem is that the green policy makers must be able to credibly commit themselves to no tightening of the demand-reducing policies in the future. This condition is not typically met in reality. To the contrary, green policy programs are often defined such that the respective measures are gradually phased in, gaining strength over time. This may then give rise to the green policy paradox even if extraction costs are not negligible.
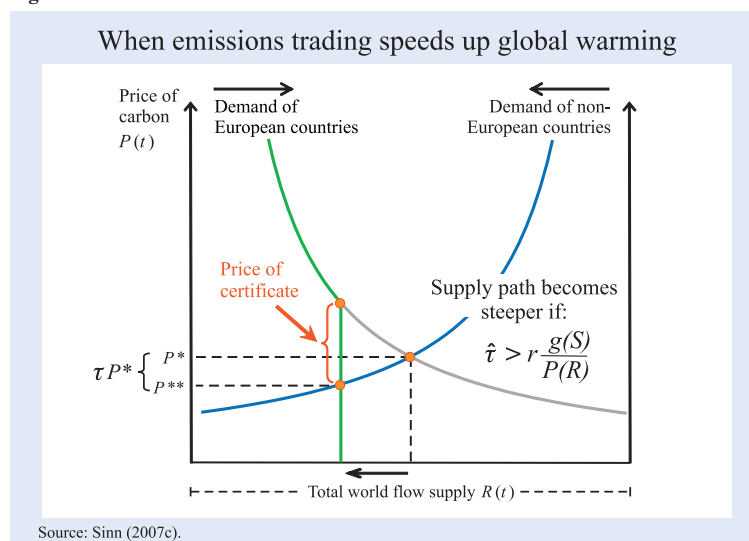
There are many examples. As explained above, the Kyoto Protocol of 1997 defined the target to reduce CO_2 output by 8 percent over the period from 1990 to 2010. In 2007, the EU Council decided to reduce EU emissions of greenhouse gases by as much as 20 percent relative to the 1990 level. The Council promised to stick to that decision irrespective of what other countries would do and it offered an even larger decrease of 30 percent provided that other developed countries committed themselves to similar emission reductions. The tools to reach these goals include an increase in energy efficiency, an increase in the share of renewable energy sources and an increased use of bio fuels (the additional emissions from deforestation not being counted). Moreover, the EU is planning to limit CO_2 emissions of newly licensed cars to 120g per km by 2012 (a policy criticised as hidden protectionism for the small cars produced in France and Italy) and the inclusion of air traffic in the emissions trading system by 2011 for flights within the EU and by 2012 for all international flights to and from EU countries. All of this means that the demand-reducing policies will become stronger over time.

Even if the strengthening of demand-reducing policies is not formally announced, a growing intensity of green arguments in the media makes it very likely that additional policies to reduce fossil fuel demand will be put in place in the future. An important goal of all environmentalists is to bring the US, China and India on board. If that goal is achieved, major price cuts in world carbon and oil markets, relative to what the price otherwise would be, will result. All of this is likely to make resource owners expect a sharply increasing price wedge. If this wedge increases faster than the cost share times the discount rate, they will tilt their extraction path towards the present and global warming will accelerate.

The green paradox is possible with all the demand-reducing measures cited in Section 2 to the extent they do not follow endogenously from the foreseeable price increases but from exogenous policy measures that change the resource owners' expectations of future market conditions. Subsidies to alternative fuels, demand-reducing constraints on car manufacturers and public programmes for the development of new energy sources are all bad news for the resource owners, inducing them to speed up their extraction. Unfortunately, even the EU emissions trading system may have this implication, as its standards are to be tightened over time. While 1734 million tonnes of CO_2 allowances were allocated to the first trading period from 2005 to 2007, aggregate allowances were reduced to 1623 million tonnes in the second period running from 2008 to 2012,[9] and it can be expected that further cuts will be enacted upon the prolongation of this system.

Figure 5.4 helps to determine the effect of emissions trading on the pace of global warming. As in Figure 5.2, there are (green) European countries and others, each endowed with their specific carbon demand curves. The graph refers to any given year and demonstrates the implication of the trading system relative to a situation where such a trading system is absent. For other years, there will be similar graphs with other positions of the curves and other widths between the vertical axes, as the extraction volumes change over time. Suppose for a moment, to be able to apply the theorem cited above, that the time path of the flow of worldwide carbon supply remained unchanged by the policy measures such that the diagram has the same width in each year as it would without the policy change. Suppose further the European countries impose a quantity constraint on their CO_2 emissions which they implement by way of the certificate trading system. The reduced European demand for fossil fuels will then depress the world market price as shown in the figure with the move from P^* to P^{**}. The European price, which fossil fuel consumers have to pay, will be P^{**} plus the price of certificates, indicated by the curly bracket. The absolute price wedge is τP^*, and the relative price wedge is τ.

For each year, a graph like Figure 5.4 defines a specific relative price wedge. Due to the tightening of emissions standards in a growing world economy, the relative price wedge is likely to be higher in the future than in the present. It follows from the result cited above that when the rate of growth of this price wedge is greater than the cost share times the rate of discount, the extraction path will, in fact, not remain given but will become steeper, giving rise to the green policy paradox. There will be more extraction in the present and the near future, and less extraction in the more distant future relative to what would have prevailed without the emissions trading system. Thus, the graph shown in Figure 5.4 would become wider in the present and near future and narrower in the more distant future. Global warming accelerates. Good intentions do not always breed good deeds.

8. Useful policy measures

What are the policy measures that avoid the risk of adverse supply reactions discussed in the previous sections and do work? How can global warming really be mitigated? We distinguish here

- fiscal measures that flatten the supply path
- measures to protect property rights
- binding quantity constraints with an improved Kyoto Protocol
- storing CO_2.

Figure 5.4

When emissions trading speeds up global warming

Source: Sinn (2007c).

[9] See EU press release IP/07/459.

A fiscal measure to flatten the supply path would be the introduction of an ad valorem tax on the consumption of fossil fuels that shrinks over time. While this would be a straightforward and safe policy from an economic perspective, it is hard to imagine it in practice, as no government could convincingly commit to it. As the world becomes warmer, the voices calling for action will become stronger and stronger. It strikes us as impossible from a public choice perspective that a gradually declining tax on fossil fuels could ever be introduced.

Alternatively, one could try to internalise the positive externality resulting from not extracting the fossil fuel resources by subsidising the stock underground, so that resource owners would find it more rewarding to postpone extraction. Again this is only a theoretical possibility without a chance to be implemented. Given that, in the opinion of the consuming countries, the resource-owning countries are already charging excessive prices, the public will never agree to subsidise the resource owners in addition.

A somewhat more promising solution is the introduction of a unit tax on fossil fuel consumption. If the tax remains constant over time, its present value declines, and hence, as shown in Sinn (1982), markets will postpone extraction. In fact, such a tax could even be efficient under special theoretical circumstances. Suppose that a marginal unit of carbon extracted creates a constant marginal damage, b, in all future years from the time of extraction to infinity, and suppose further that the rate of interest, i, is time invariant. In that case, the present value of the stream of marginal damages would be equal to b/i at all points in time regardless of when the extraction takes place. A constant absolute tax wedge of b/i would therefore be able to correctly compensate for the distortion resulting from global warming. However, under realistic conditions, b will be far from being a time-invariant constant such that no simple tax rule will be available. Moreover, even a unit tax could produce the green paradox if its rate were to increase sufficiently fast due to the increasing awareness of the public about the problem of global warming.

Another option is to make alternative investment less attractive for the resource owners, who extract fast in order to invest their proceeds in financial assets. If, say, the Western world made an active attempt to close the tax heavens of this world and imposed source taxes on the capital income earned by resource owners, the resource owners would face a permanent incentive to postpone extraction and keep larger stocks of the resource in the ground. The measure would reduce the discount rate of resource owners and would be a powerful policy instrument to flatten the supply path and mitigate global warming.

A similar implication could be expected if the Western world threatened the resource owners with the expropriation of their financial savings. This threat would also reduce the discount rate of resource owners and counteract the threat of expropriating their resources in situ which in itself tends to accelerate extraction and global warming. However, it would be very difficult and dangerous to implement such a policy if only because it would also undermine the credibility of the financial system as such and scare off normal savers. But increased legal efforts to sequester the financial assets of current or past dictators (and their entourage) in oil-producing countries charged with various criminal offences could serve the same purpose.

An alternative possibility to make resource conservation more attractive for the resource owners would be a strengthening of their property rights in the resources themselves. If the dictators of the oil exporting countries were less afraid of being replaced by their rivals or, for that matter, by a Western style democracy, there would be less reason for them to rush to convert their resources into financial assets. However, again, both from a practical point of view and from the perspective of humanitarian values, these conclusions are disquieting, to say the least. It is beyond our expertise to come up with policy conclusions regarding war and peace.

Despite the disappointing results of our analysis concerning demand policies, the policy of imposing quantity constraints via an emissions trading system could be given another try. It would be essential though to make the system tight without any exceptions to avoid the countervailing demand increases resulting from the relative decline in world energy prices. A truly strict monopsony of the consuming countries would be able to dictate its quantity constraints on supply and force the resource owners to adjust their extraction quantities to whatever demand the monopsony chose.

Mind, however, that this would basically be a central planning solution with all the errors and inefficiencies history has shown. Its success would depend on politicians having the proper knowledge to implement the

right extraction paths and being benevolent agents who act on behalf of mankind's future. We are sceptical whether such a solution would feasible, but we are afraid that mankind may ultimately be forced to choose it. We agree with the Stern Review that convincingly argued that the problem of global warming is the world's largest externality ever. The choice will undoubtedly be one between various evils.

What remains as policy options goes beyond the attempt to modify supply and demand for fossil fuels but seeks the solution in storing the CO_2 generated by combustion processes away from the atmosphere. There are two promising alternatives. The first is sequestration. In addition to the pipeline and transportation network linking the fuel sites with the places of combustion, there could be a second one to transport the CO_2 back to the "mines" from where the carbon came and store it there in liquid form under extremely high pressure. The space emptied underground could be refilled with the remainders of the combustion process. Unfortunately, this would not only be very expensive but one could doubt whether it is technically feasible, because much more storage space would be needed than that emptied by extraction. For example, upon combustion one cubic meter of anthracite generates 5.4 cubic meters of liquid CO_2, and one cubic meter of crude oil generates 3.6 cubic meters of liquid CO_2 (55 bar at 20°C). Hence, additional space would have to be sought. But even if the search were successful, the safety problems involved would be large. After all, CO_2 is heavier than oxygen so that any leakage from below ground could have fatal risks for the population living above. A similar remark is appropriate with regard to attempts to pump the CO_2 into the sea. The risks for maritime life and the nutrition cycle could be larger than the advantages from slowing down global warming.

A much safer storage device is trees. Not too long ago, a much larger area of the world's surface than today was covered by trees. Trees store the reduced carbon that photosynthesis filters out of the atmosphere. It is estimated that each year deforestation contributes 18 percent to the increase in the CO_2 content of the atmosphere, more than all the traffic of the world.[10] If deforestation could be stopped and true afforestation in net terms, which leads to an expansion of the world's forests, could be brought about, a substantial contribution to solving the problem of global warming would be made.

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[10] See Houghton (2004, p. 250 n.) and Stern et al. (2006, p. xxv).

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