Will the Great Recession Lead to a Lasting Impact on Potential Output in Austria?

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Based on the European Commission's (2009) projections for potential output, we calculate a permanent potential output loss of between 4% and 6% until 2013, while we expect that the growth rate will eventually return to its precrisis level of close to 2% in the medium run before the effects of population aging set in. We do not expect high growth rates of actual GDP during the recovery. In a more pessimistic view, the effects of the crisis may seamlessly link with the effects of population aging on potential output, implying a decrease in trend potential output growth to about 1.5% by 2030. In an optimistic scenario, by 2011 most of the structural effects of the crisis will have disappeared and productivity growth will accelerate by 2020 to compensate for declining labor input, stabilizing the path of potential output. While uncertainty is high, it is likely that anti-climate-change policies, energy scarcity and an increase in both competition and demand from emerging markets will provide powerful incentives to innovate and invest. Adequate economic policies will be required in order to respond positively to these incentives. The crucial role of policies in raising medium-term output after severe recessions is also demonstrated by countries such as Finland, Sweden and Japan.

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The economic and financial crisis which began in 2008 has already led to the biggest drop in GDP in 2008 and 2009 since the Great Depression of the 1930s, earning it the name "Great Recession" (Rampell, 2009). Chart 1 shows that the Austrian recessions since 1980 have barely affected the path of potential output, which grows at around 2% a year but was on a downward trend even before the crisis. Will the impact of this crisis be limited to a short-lived deviation of actual output from longer-term trend output, or will it have lasting effects on the level or growth rate of output?

We examine this question by looking at the possible evolution of potential output in Austria in light of the crisis. Section 1 defines the concept of potential output that we will use in this study. Section 2 discusses the potential influence of the crisis on the determinants of potential output and surveys estimates of the cost of previous financial crises or recessions. In section 3 we present estimates of the level and the growth rate of Austrian potential output derived using different methodologies. These estimates will serve as a baseline for a second article on potential output in Austria by Grossmann et al. (2009), which will focus on the consequences of lower potential output for fiscal policy in particular and ways to spur potential output growth in general. Section 4 concludes with possible growth scenarios.

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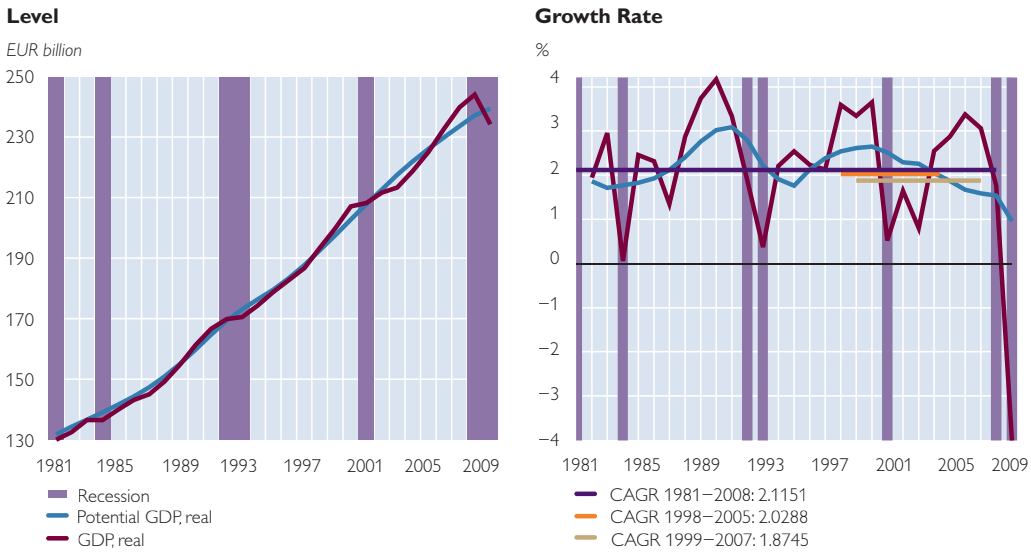
Chart 1

ECFIN Medium-Term Projections



Source: European Commission's Directorate-General for Economic and Financial Affairs (ECFIN).

Note: European Commission (2009) projections for potential and actual GDP. The reported averages are long-run compound annual growth rates (CAGR).

1 The Concept of Potential Output: Why Does It Matter?

Basu and Fernald (2009) distinguish between three concepts of potential output. The first is akin to longer-term trend growth, a steady-state measure of growth based on trend growth of the production factors labor, capital and technological progress. Solow (2001) thinks of "growth theory as precisely the theory of evolution of potential output." Many long-run growth studies focus on productivity as a driver of living standards only, but long-term potential output – which includes capital deepening and hours worked – matters for policymakers as well: It affects the sustainability of the general government budget and debt and determines the long-run demand for fixed investment, infrastructure and government services (Gordon, 2008).

The second is a more short-term concept which refers to the level of output the economy would have if there were no nominal rigidities, the "flexible-price output." This concept is explicitly modeled in New Keynesian models, where the sluggish adjustment of prices and wages to their long-run equilibrium values can lead to a gap between actual and potential output which is related to inflation. This "output gap" is an important variable for stabilization policies – for both monetary and fiscal policymakers – as it may serve as an indicator of the balance of aggregate demand and supply and hence guide the stance of monetary and fiscal policy. Although real-time estimates of the unobservable output gap are often unreliable (Orphanides and van Norden, 2002), they will certainly inform exit strategies from the currently expansionary macroeconomic policies. This short-term view of potential output corresponds to the older Keynesian version of potential output as the supply side-determined level of production at which there is no inflationary pressure. In the long run, flexible-price output is usually modeled to converge to steady-state output.

A third concept views potential output as the current optimal rate of output in an economy where firms have at least some degree of monopoly power. This definition of potential output is the one employed by most modern dynamic stochastic general equilibrium (DSGE) models (e.g. Christiano et al., 2005), where a central bank has the objective to offset nominal rigidities (i.e. to exploit a short-term New Keynesian Phillips curve), given that the monetary authority is aware of the fact that it cannot offset the monopoly distortion present in the economy. In such a situation, targeting the output which would prevail in a world with flexible prices and perfect markets (concept two) does not necessarily lead to a welfare-efficient allocation.

In our discussion of Austrian potential output we will use the first concept for medium- to long-term projections, but will also discuss the shorter-term evolution, as we aim to produce figures which can guide the fiscal policy stance. Given that monetary policy refers to the output gap of the euro area, not that of Austria, less emphasis will be placed on inflation in Austria. In the above-mentioned policy article on potential output (Grossmann et al., 2009) we implicitly use the third concept, as some policy measures to raise potential output must assume market imperfections which can be alleviated.

2 How Can the Financial and Economic Crisis Affect Potential Output? Channels and Historical Experience

Although long-term potential output follows a rather smooth path, lasting structural changes can affect its level and growth rate. Examples include the still not fully understood productivity slowdown of the 1970s and the effects of an aging population, which will almost certainly reduce the contribution of labor to potential output from around 2020. Short-term (flexible-price) output may in addition be influenced by a variety of other factors, such as lagged medium-term demand patterns (as illustrated in Germany, where depressed investment growth rates from 2001 to 2003 reduced the contribution of capital to potential output), or more structural features, such as changes in short-term structural unemployment.

Hence, to look for change, we need to identify the most important features of the current and previous financial crises and to examine how they may affect potential output in the medium to long run. As real-time estimates are very difficult, a closer look at the transmission channels in theory and at past empirical lessons will help us to gain a deeper understanding of these issues. As a result, this section will also serve to underpin our estimates of potential output in section 3.

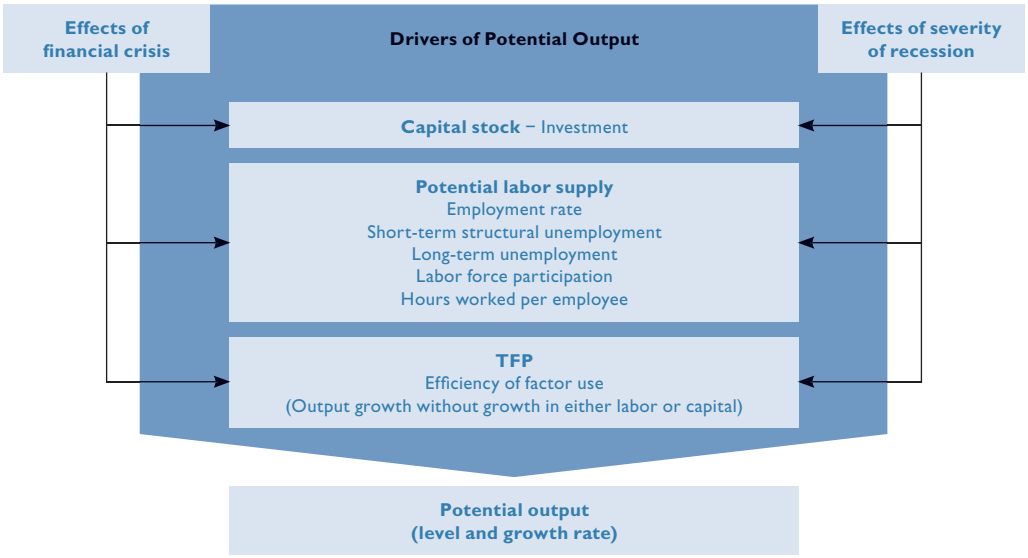
2.1 Distinctive Features of the Great Recession: Severity and Financial Constraints

We propose that two distinctive features of the current Great Recession are its economic severity (in terms of duration, reach and output lost) and the prevailing financing conditions. Chart 2 summarizes the impact of financial constraints and of the severity of the crisis on the drivers of potential output.

Chart 3 plots quarterly GDP two quarters before and eight quarters after the economic peaks preceding all Austrian recessions since 1980, as identified by Ragacs and Vondra (2009). The economic peak or turning point of the economy is set to 100. In this contribution, recessions are defined as periods including at least one quarter of negative GDP growth.

Chart 2

Effects of Two Distinctive Features of the Crisis on Potential Output



Source: OeNB.

Actual data are used until the first quarter of 2009, after which point the chart follows the official OeNB forecast of June 2009. Looking at GDP and its private sector components consumption, demand and investment, it is clear that this recession is by far the most severe that Austria has known in a long time.

This matters for potential output at the aggregate level, as the large output loss associated with financial crises is highly persistent and is frequently never recovered at all, pointing to a level shift in potential GDP (Cerra and Saxena, 2008)[2]. Comin and Gertler (2006) propose a model mechanism through which non-technological shocks at the business cycle frequency can have sustained effects on productivity over the medium term, working through the pace of both research and development (R&D) activities and the adoption of new technologies. Strong sectoral demand shocks can also give rise to a medium-term effect on potential output, if lasting sectoral reallocation processes require a change in the skill composition of the workforce and structural unemployment rises for some time as a consequence. We will discuss some mechanisms in detail when we examine the channels capital, labor and productivity.

Indirectly, the severity of the crisis may lead to primarily short-term policies that dampen potential output in the long term. On the other hand, the crisis may focus a country's political energies on reforms which could foster potential output growth.

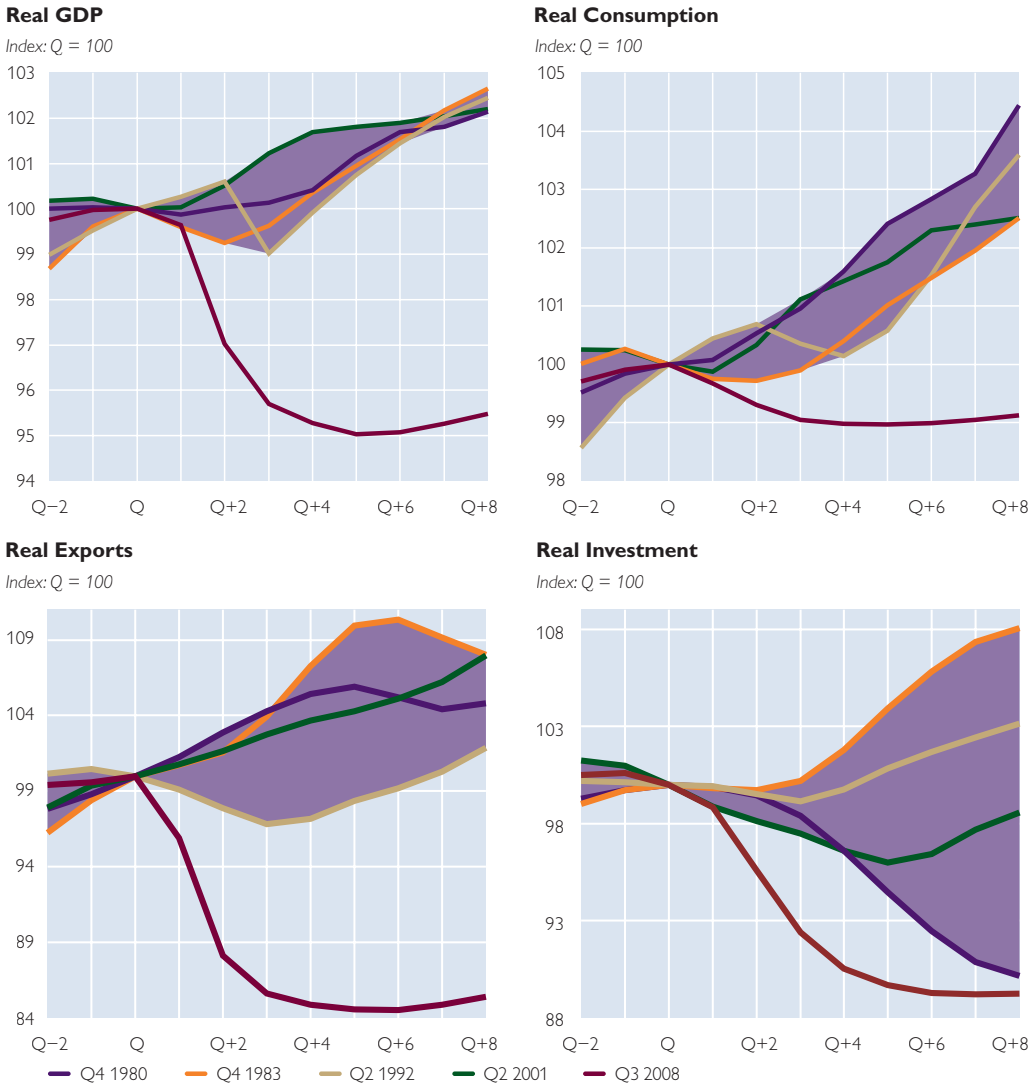
Financial Constraints

Tighter conditions, in terms of both quantity and cost, for raising external finance could have a lasting effect on

[2] *There is also a wider literature examining the consequences of output volatility for growth, starting with Ramey and Ramey (1995). The analysis by Barlevy (2004) suggests that if it were possible to eliminate fluctuations, this could increase the growth rate by 0.35 percentage points to 0.40 percentage points. For a survey of the literature on cycles and growth, see Gaggl and Steindl (2007).*

Chart 3

GDP and Its Components in Austria during Recessions since 1980



Source: OeNB.

Note: The dates of the recession peaks (indicated in the legend) and the data are drawn from the OeNB's official June 2009 forecast based on Eurostat data. The data for responses to the current economic crisis end with Q1 2009 (Q+2); thereafter, the OeNB's June 2009 forecast data are used.

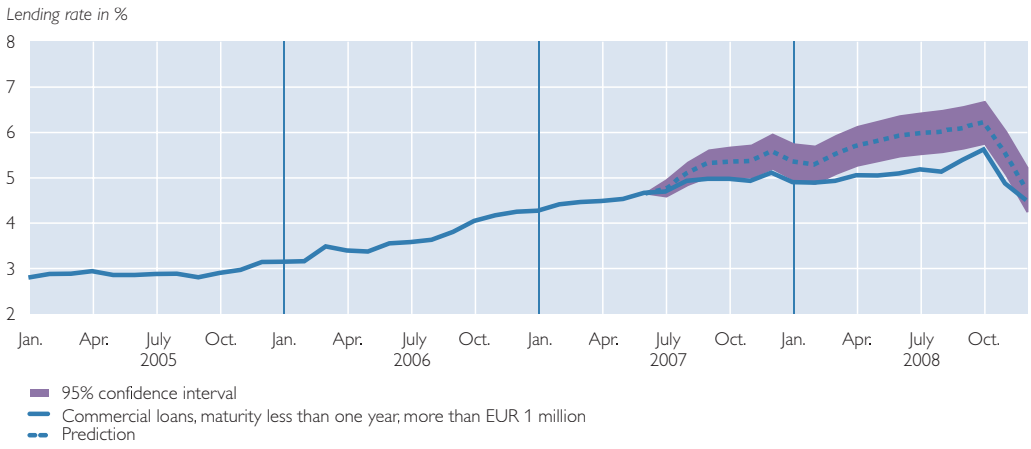
the user cost of capital, thereby dampening investment. While the scope of the financial crisis has certainly been unprecedented, the most current data for Austria show an easing of financing conditions, both for corporate bonds and for bank loans, relative to the peak of the crisis in autumn 2008. The left-hand panel of chart 8 shows the spread between the yields of AAA and BBB corporate bonds over time, which is often used as a proxy for the premium on risk, as well as average bank loan interest rates for large, variable-rate loans (i.e. those with an initial rate fixation of less than one year, which amount to 79% of total loans). While the risk premium is still high, it has come down a long way since autumn 2008 and again since

March 2009.[3] It has often been argued that a return to the financing costs or the prevailing risk premiums of the 1980s or 1990s would have a major impact on investment (e.g. European Commission, 2009). However, the average risk premium in the period from 2000 to 2007 was actually higher than in the 1990s; the level in the 1980s was about 50 basis points higher (as euro area data are only available since 1999, we use the U.S. spreads as a proxy).

Bank loan interest rates have also followed the reduction in rates by the ECB. We use the updated estimations by Jobst and Kwapil (2008), who show that actual interest rates are even lower than the forecast retail interest rate reaction to ECB rates (chart 4).[4] For the moment, the monetary transmission channel via bank lending does not seem to be impaired, as no significant deviation from the historical pattern of the pass-through of money market interest rates to retail interest rates can be detected. There has also been no change in the composition of loan flows toward more short-term loans. On the contrary, long-term loans over five years still amount to roughly 60% of total loans, while their growth rates since July 2007 – the start of the subprime crisis – have been much higher than those of short-term loans (0.5% versus 0.1% on a monthly basis) (OeNB, 2009). This rather positive pattern may be due to the prevalence of relationship banking in Austria.

Chart 4

Commercial Loans:
Comparison of Estimated Interest Rate Pass-Through and Actual Data



Source: OeNB, Jobst and Kwapil (2008).

Note: The chart plots lending rates on Austrian commercial loans with maturity less than one year and a value of more than EUR 1 million as reported by the OeNB. The dashed line illustrates the predictive power of the EURIBOR as of June 2007 including 95% confidence intervals around each point prediction based on an error correction specification by Jobst and Kwapil (2008). These predictions test whether the structural relation between the EURIBOR and commercial lending rates prevailed after June 2007.

[3] *This is mirrored by the spreads between corporate AAA bonds and the German or Austrian 10-year benchmark bonds: The spread between corporate AAA bonds and German 10-year government bonds fell from a peak of 350 basis points to 40 basis points by mid-September 2009, while that between AAA bonds and Austrian 10-year government bonds declined from 260 basis points to 0 over the same period.*

[4] *Interest rates for smaller variable-rate loans of below EUR 1 million show the same pattern. Variable-rate loans amount to 91% of total loans to nonfinancial corporations in Austria, while 79% of total loans are for amounts above EUR 1 million.*

Actual loan volumes continue to grow in 2009, if at a slower pace (5.5% in April 2009; see OeNB, 2009). Disentangling supply and demand effects is notoriously difficult, as firms also demand less credit in a recession. Moreover, there have been shifts from capital market financing into loan financing: Bank loans became more important in 2008, accounting for almost 73% of external financing in the second half of 2008 (up from around 31% in the first half of 2008, as compared with almost 50% in 1995) (Waschiczek, 2008). Capital market financing, e.g. via the issuance of quoted shares, has however come to a standstill since 2008, while the market for corporate bonds has recovered since April 2009, with over EUR 8 billion raised by Austrian firms. Continuing credit growth may also be due to reduced cash flow.

The Austrian results of the euro area-wide bank lending survey point to a tightening of credit standards such as margins, collateral requirements and covenants, although the tightening in the second quarter of 2009 was less pronounced than that in the first quarter, pointing to a turning point in the tightening cycle in line with the rest of the euro area (ECB, 2009a). Refinancing conditions for banks have improved, partly due to the injection of public capital (OeNB, 2009).

On balance, the financial constraints for Austrian firms in the wake of the crisis may be somewhat less pronounced than in other countries, where bank lending is actually declining. In particular, a survey by the ECB on access to finance for small and medium-sized enterprises (SMEs) in the euro area (ECB, 2009b) reveals that SMEs reported a worsening of overall financing conditions to a somewhat greater extent than large firms, while in Austria, large firms were hit through impaired capital market financing. However, both the euro area-wide bank lending survey (ECB, 2009a) and the OECD's economic assessment of September (OECD, 2009a), which includes the OECD's summary indicator of financing conditions, point to an easing of financial constraints and indicate no significant rationing of credit supply.

In view of this evidence, the severity of the economic crisis may have a stronger impact on potential output than financial constraints. This picture could change, of course, as rising firm insolvencies may put banks under renewed stress. Great caution and a close monitoring of financing conditions are necessary to assess their impact on potential output.

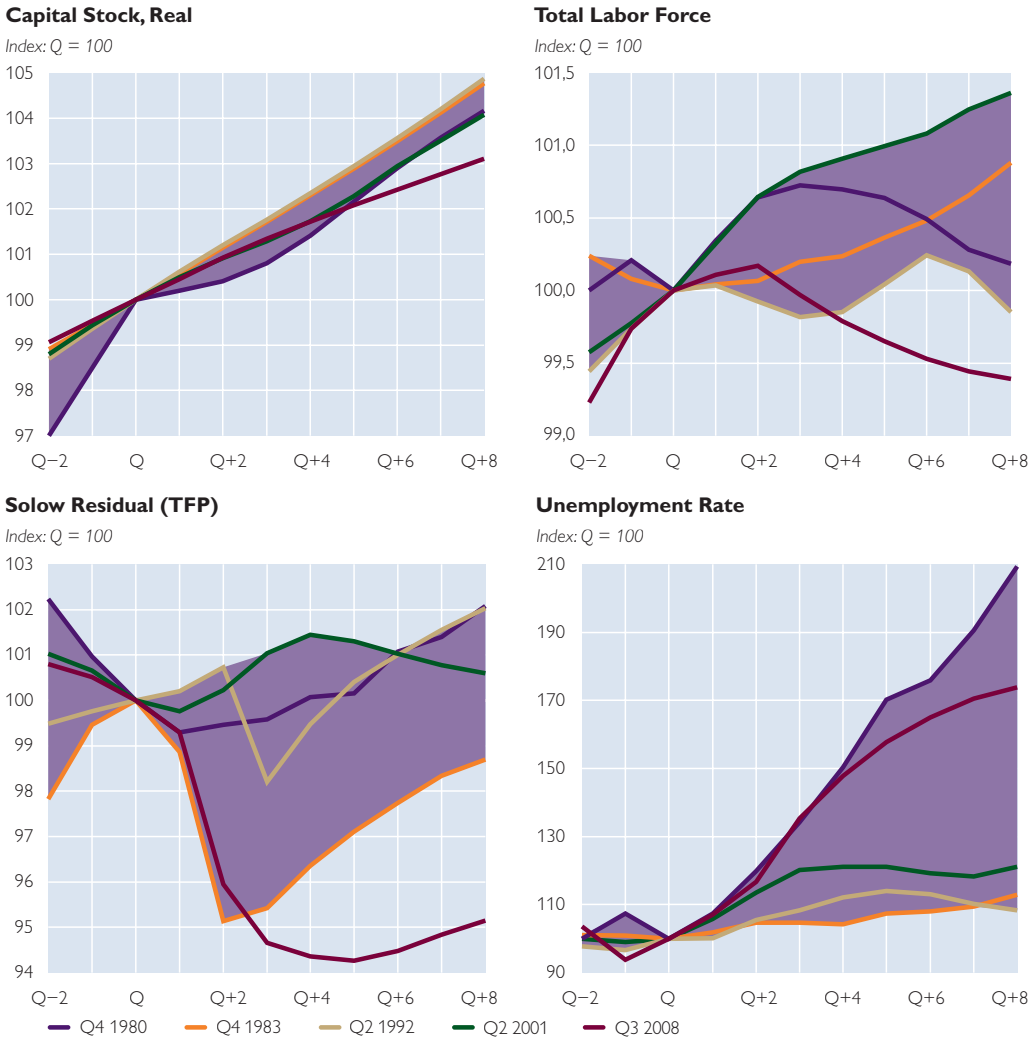
2.2 Transmission Channels from the Great Recession to Potential Output

This subsection looks at the possible impact of the Great Recession on the three components of potential output: potential labor supply, trend total factor productivity (TFP) and the actual capital stock. Chart 5 shows the actual evolution of these factors.[5] For capital and labor inputs, the subsection broadly shares the view put forward in the studies of three international organizations (European Commission, 2009; IMF, 2009a; OECD, 2009b) on which it draws. We have slightly different views on the impact of the recession on TFP, which we see as being more unequivocally negative. However, we also look

[5] *Note that TFP is estimated as the residual after subtracting labor and capital growth from GDP growth. Hence, it also reflects factor underutilization and the changing quality of factors. Short-term TFP in recessions will always look very bad, unless it is utilization-adjusted.*

Chart 5

Austrian Recessions since 1980



Source: OeNB.

Note: The dates of the recession peaks (indicated in the legend) and the data are drawn from the OeNB's official June 2009 forecast based on Eurostat data. The data for responses to the current economic crisis end with Q1 2009 (Q+2); thereafter, the OeNB's June 2009 forecast data are used.

at the more long-term evolution of TFP, which we find to be rather positive. We will examine each production factor in turn.

Capital

In the short term, the contribution of capital to potential output may be reduced by four effects:

(1) The low investment rates induced by the recession (through lower demand) lead to slower growth of the capital stock.

(2) Financial constraints may further depress short-term investment (i.e. viable investment projects fail due to financing problems) and, more generally as a result of the crisis, we could see a lasting upward shift in the user cost of capital via higher risk premiums, which would reduce the amount of capital held. Barrell

and Kirby (2009) note that the trend-like fall in the user cost of capital during the "Great Moderation" from the early 1990s to 2005 led to a period of capital deepening which may now be over. The increase in risk premiums may lead to a loss of 3% to 4% of GDP in the U.K.

(3) Financial constraints may be reinforced by lower asset prices which weaken corporate balance sheets and reduce available collateral (Kiyotaki and Moore, 1997).

(4) The scrapping or depreciation rate of existing capital may accelerate because of insolvencies, sectoral reallocation (e.g. away from construction and the car industry) and the reduction of overcapacities which had built up before the crisis. In the medium to long term, it is likely that only the second effect, that of the higher cost of capital, will persist, although medium-term effects caused by persistently low demand cannot be ruled out.

Labor Input

Potential labor supply is equivalent to trend total hours worked and is determined by the size of the working age population, the participation rate, structural unemployment – which is often measured by the non-accelerating inflation rate of unemployment (NAIRU) – and average hours worked per employee.

Its contribution to potential output in the short term will be affected by a temporary increase in the short-term NAIRU due to processes of sectoral reallocation and the rise in actual unemployment: Because nominally rigid prices and wages slow down the adjustment process, the considerable increase in unemployment during the crisis cannot be reduced quickly without temporarily raising inflation (European Commission, 2009). A short-term positive effect may come from wealth effects: As pension funds have suffered sizeable losses, older workers may stay in the labor force for longer. This effect is likely to be very small in Austria, as the share of funded pensions is small.

In the medium to long term, the contribution of labor to potential output may be reduced by the durably higher user cost of capital, which squeezes firms' profit margins and increases structural unemployment (Gianella et al., 2008), and by the permanent destruction of human capital as a result of long periods of unemployment. This also depends on labor market policies and institutions. Especially in Europe, negative economic shocks have been found to interact with labor market institutions to produce "hysteresis in unemployment" (Blanchard and Wolfers, 2000). However, many reforms have been carried out since these findings were made, and the European labor market structure has changed. The OECD (2009b) assumes in its NAIRU projections that only two-thirds of long-term unemployment is transformed into structural unemployment, as opposed to three-quarters during the 1990s.

In Austria, long-term unemployment as a share of total unemployment was relatively low before the crisis, at 25% over the period from 1999 to 2008. This was below the EU-15 average of 43% and the OECD average of 30%, similar to the levels of the Scandinavian countries (Denmark: 20%; Finland and Sweden: approximately 25%), but above the levels of some Anglo-Saxon countries (the U.S. and Canada recorded levels of approximately 10%). A further strength of the Austrian labor market is high real-wage flexibility and

strong wage moderation since 1995, leading to high price competitiveness. However, the skill profiles of Austrian workers are heavily based on firm- and industry-specific skills, mostly acquired via vocational training. As a result, in comparison with countries which rely more on general skills, dramatic sectoral reallocation processes – e.g. a shift out of the car industry – may raise structural unemployment. Estimations of the NAIRU are notoriously difficult. For example, in 2006 the European Commission estimated Austrian unemployment related to the business cycle (i.e. not structural) at 20%, while figures from the Austrian labor market service institution AMS pointed to a figure of around 45%. Such differences give rise to significantly different levels of potential output (Steindl, 2006).

Overall, short-term labor input will crucially depend on the severity (in particular in terms of duration) of the crisis and on the scope of sectoral reallocation processes, as well as on future user costs of capital. Time will tell whether labor market institutions have changed.

Total Factor Productivity

TFP measures the efficiency of factor use: TFP growth reflects output growth without growth in other inputs. Most empirical studies of the determinants of long-term growth find that growth in TFP is the major driver of growth in advanced industrial economies (see Hall and Jones, 1999, for the general case, and Gnan et al., 2004, for Austria). There is a large theoretical and empirical literature on how recessions and credit market frictions affect the contribution of TFP to potential output. On balance, a survey of the available evidence points to the conclusion that recessions are bad for TFP growth even without credit market frictions, i.e. that TFP is procyclical.[6] The presence of financial constraints usually reinforces the negative effect of recessions on TFP.

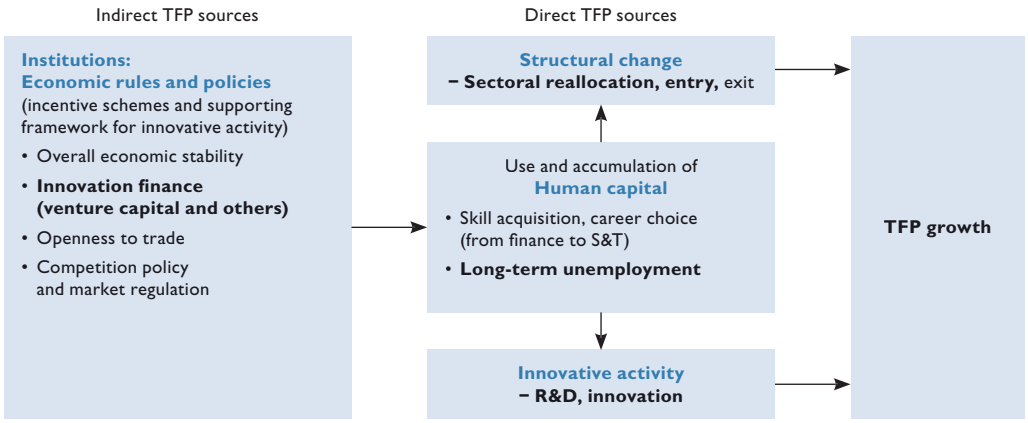
Chart 6 summarizes some of the drivers of TFP, based on the article by Gnan et al. (2004). It distinguishes between indirect sources of TFP-enhancing activities, namely institutions and policies which provide incentives and support for such activities, and direct sources of TFP growth, i.e. innovation and structural change.[7] Both rely on the available human capital. Procyclical TFP drivers are indicated in bold in the chart. Studies which refer to the countercyclical effects of recessions on TFP usually mention two mechanisms. The first is grounded in the classic Schumpeterian idea that during a recession inefficient firms exit the market and the remaining efficient firms gain market share (see e.g. Caballero and Hammour, 1994, on the "cleansing" effect of recessions). Productivity is gained – ceteris paribus – through shifts between firms (or sectors). The second effect is based on the idea that in times of recession the opportunity cost of R&D, innovation and restructuring activities is lower. Idle resources stemming from underutilization during a recession can be shifted from current production to future productivity-enhancing activities within firms (see e.g.

[6] *By contrast, Fernald and Matoba (2009) apply a new method for estimating utilization-adjusted TFP developed by Basu et al. (2006) to show that real-time TFP in the U.S.A. is currently rising, not falling. This approach is, however, very recent and will need to be checked against historical data.*

[7] *Chart 6 is based on the results of many empirical studies, which usually look at one of the drivers at a time. Coe et al. (2009) recently estimated the impact of several TFP drivers in one approach.*

Chart 6

Determining Factors of TFP Growth in Austria



Source: OeNB.

Note: Procyclical factors in black bold print.

Aghion and St. Paul, 1998), implying countercyclical R&D spending.

While both mechanisms may indeed occur in practice, the limited evidence on recessions as drivers of productivity is mixed (see Barlevy, 2003, for a short summary). By contrast, empirical studies usually find strongly procyclical R&D and innovation activities (Barlevy, 2007; Bundesministerien, 2009). Positive productivity effects are definitely derived from the exit of inefficient firms, but microdata reveal that their contribution to overall productivity growth is small compared with the productivity gains achieved within existing firms (Bartelsman et al., 2004), and that the contribution of reallocation to aggregate productivity is only modestly countercyclical (Foster et al., 2001) or even procyclical (Eisfeldt and Rampini, 2006).

Barlevy (2002) finds that, empirically, jobs created in recessions are likely to be low-paid and temporary. To explain this "sullying" effect of recessions – as opposed to the "cleansing" effect mentioned above – he shows that while recessions do destroy some inefficient job matches, firms also post fewer job vacancies during recessions and, as a result, workers move more slowly toward their most productive job match. More specifically, while productivity jumps in the early stages of a recession due to the destruction of inefficient job matches, aggregate productivity falls over the duration of a recession as more inefficient job matches are created during the recession.[8]

Spending on research and development is procyclical not because firms adapt their R&D activities to their cash flow; Barlevy (2007) shows that firms increase the rate of growth of their R&D regardless of their cash positions. Rather, firms are biased toward the short-term return on R&D activities, which leads them to undertake too much R&D in booms at a higher cost than necessary. In the presence of credit market frictions, the scope for making use of recessions to alleviate underlying resource misallocations is

[8] *This could explain the pattern observed by Fernald and Matoba (2009) of currently rising TFP in the U.S.A.*

further inhibited in terms of both sectoral reallocation and R&D activities.

Barlevy (2003) argues that in the presence of credit market frictions, reallocation actually directs resources from more efficient uses to less efficient uses, which is likely if more efficient production arrangements are also more vulnerable to credit constraints. In recessions, it is difficult to obtain credit and, as a result, projects that need less credit are undertaken irrespective of their efficiency. This result is corroborated by Hottenrott and Czarnitzki (2008), who find that credit constraints reduce cutting-edge R&D activities which are most likely to boost productivity growth, while they do not reduce "routine" R&D activity. In Aghion et al. (2005), long-term productivity-enhancing investment has a higher liquidity risk than short-term investment as it takes longer to complete. With credit constraints, such long-term investment turns procyclical, implying lower mean growth for a given total investment rate. Aghion et al. (2008) use French firm-level data to show that in recessions the share of R&D in investment falls in the presence of credit market frictions, and does not increase proportionally during upturns.

In Austria, a micro-level study (Falk and Hake, 2008b) shows that in particular young firms (those which have been in existence for under 10 years) are credit-constrained with respect to their innovation activities. Public direct subsidies and venture capital alleviate these credit constraints. The impact of the crisis can be seen from two angles. On the one hand, bank loans are of little relevance for young technology-intensive firms without substantial collateral; even before the crisis, such firms never had access to "cheap money" and always faced difficulties in raising external finance, even in times of very low risk premiums. On the other hand, however, they will suffer from a drop in the supply of venture capital, which was already low before the crisis.[9] This is to some extent a specifically Austrian problem (see Janger, 2009, for a discussion), which could be alleviated by national policies.

To illustrate the magnitude of the effects, an increase of 1% in domestic and foreign business R&D spending leads in the long term to an increase of between 0.3% and 0.6% in TFP in Austria (Falk and Hake, 2008a). When GDP falls by 1%, business R&D spending falls by 1.7% (Bundesministerien, 2009). The OeNB forecast for Austrian GDP for 2009 is –4.2%. This would imply a reduction of approximately 7% in R&D spending, leading to a decrease of between 2.1% and 4.2% in the level of TFP in the long term, if the effects on productivity in recessions are symmetric to the effects in upturns. Of course, these figures are purely illustrative and cannot be taken at face value, but they confirm the point that recessions matter for R&D and for TFP growth.

Other drivers of TFP, such as market entry, are also strongly procyclical (Bilbiie et al., 2007). Access to finance reinforces this pattern: Aghion et al. (2007) find that access to finance matters most for the entry and the post-entry growth of small firms and in sectors that are more dependent on external finance. Skill acquisition, however, is found to be countercyclical (Dellas and Sakellaris, 2003). A worldwide boost in TFP could be brought about by a change in the career choices of sci-

[9] *Venture capital is strongly procyclical (Romain and van Pottelsberghe, 2004).*

ence and technology graduates: Instead of choosing careers in finance, where they might contribute to negative externalities and reduced potential output, they could boost research capacities around the world. The countercyclical effects of skill acquisition only work in the medium to long term, however; in the short term, the contribution of human capital to TFP may be reduced by long periods of unemployment which destroy human capital. In Austria, some features of the education system render it difficult to make full use of the available potential (OECD, 2009c).

In order to assess the immediate impact of the crisis more closely, we tried to establish a picture of real-time innovation activities. Interviews with leaders of small hi-tech firms[10] and newspaper articles convey the impression that a large amount of short-term optimization and sectoral reallocation is taking place, e.g. suppliers of products which help big firms to save costs are actually growing during the crisis. Innovation pressure not least due to competition from Asia is as strong as ever.[11] The semiconductor manufacturer Infineon believes that the industry will look different after the crisis. In addition, data from the Austrian research promotion agency FFG show that the participation of firms in longer-term, riskier programs has declined, whereas smaller-scale programs are on the rise. As in the models constructed by Barlevy (2002) and Aghion et al. (2005), ceteris paribus this anecdotal evidence seems to point to productivity gains in the short term, but to a reduction in efforts to increase productivity further in the long term.

As with the other determinants of potential output, misguided policies can reinforce the impact of the crisis. In Japan, the political and regulatory response to the large drop in stock and land prices from 1989 to 1992 was denial. As a result, large banks often kept credit flowing to otherwise insolvent borrowers to avoid writing off the capital which they needed to comply with regulatory minimum capital requirements. In effect, the competitive process was suppressed, and industries with a high share of de facto insolvent borrowers experienced low productivity growth (Caballero et al., 2008).

What are the prospects for productivity growth over the medium to long term? For the U.S.A,, there are several "structured guesses" (Oliner and Sichel, 2002), which focus mainly on the contribution of information technologies to future productivity growth, from the perspective of both IT-producing and IT-using industries. Jorgenson et al. (2008) are optimistic, projecting that the increase in U.S. productivity growth witnessed since 1995 will persist, due to both the effects of IT and the favorable business environment in the U.S.A. (flexible labor markets, competitive product markets and deep capital markets). Gordon (2008), by contrast, believes that most of the benefits of IT have already been reaped and projects that productivity growth will be more in line with the values recorded in 1987 to 1997.

In our view, this discussion is backward-looking and overlooks several im-

[10] *See some of the discussions held in the Technology Forum within the European Forum Alpbach (2009).*

[11] *At the international level, the Federal Reserve Bank of San Francisco compiles the Tech Pulse Index, a measure that attempts to track real-time economic activity in the U.S. information technology sector (FRBSF, 2009). This index suggests that the IT sector has been affected less severely by the current downturn than by the downturn in 2001 (which, however, hit the IT sector particularly hard).*

portant developments. As Solow (2001) observed, endogenous growth theory leads us "to focus on the analysis of the economic incentives to create new technology." The challenges posed by the emerging market economies (in particular China), economic mechanisms to limit carbon dioxide emissions, such as a worldwide cap-and-trade mechanism, and the growing scarcity of commodities will considerably increase the incentives for innovation and investment not just in a few sectors, but across the board. The construction, energy and manufacturing sectors will all have to adapt to both rising competition and legislative pressure for innovation.

Overall, we believe that the crisis will have a negative impact on short- to medium-term TFP growth, owing to both the severity of the crisis and financial constraints. However, the medium- to long-term outlook is more positive.

2.3 Historical Experience

There are now several studies on the effect of financial crises on potential output or on output over the medium term, bearing in mind that no other crisis was as severe as the current one. Table 1 presents the estimates of these studies for output loss over the medium term. The IMF (2009a) and the OECD (2009b) summarize the conclusions of several studies as follows:

- Following banking crises, output growth is depressed and does not rebound to the precrisis trend rate over the medium run, often leading to a permanent loss of output; eventually, growth does return to its precrisis rate for most countries.
- Employment, investment and TFP contribute in roughly equal proportions to the output loss.
- The severity of the crisis as measured by the first-year change in output is a good predictor for the medium-term outcome, as are high investment and saving rates before the crisis.
- The medium-run output loss is not inevitable. Countercyclical monetary and fiscal policies in the short run and structural reforms can help to improve medium-term outcomes.
- Employment losses may not be recovered until 10 years after the crisis.

Many national authorities have already phased in revisions to their output growth estimates until 2010 (on average, a cumulative 2.75 percentage points) (OECD 2009b).

Table 1

A Range of Estimates for Potential Output Loss

	Persistent Output Loss	Persistent Potential Output Loss
	%	
Cerra and Saxena (2008)	4–16	×
Furceri and Mourougane (2009)	×	1.5–3.8
Cecchetti et al. (2009)	9.2	×
IMF (2009a)	10	×
Kim et al. (2005)	1.25–5.25	×
IMF (2009b) for the U.S.A.	×	5.75

Source: Cited studies.

Note: Cecchetti et al. (2009) reports averages. IMF (2009a) reports averages after seven years. Kim et al. (2005) considers only recessions without financial constraints. IMF (2009b) estimates the potential output loss by 2014.

The European Commission (2009) and Haugh et al. (2009) contrast the experience of Finland and Sweden with Japan's lost decade to make the point that policies matter for output growth over the medium term following a large financial crisis. While Finland and Sweden experienced a strong rise in structural unemployment after their crisis in the early 1990s, they quickly resolved their banking problems, which, together with policies aimed at structural change, accelerated reallocation and productivity growth. They were also to some extent lucky, as the external environment was favorable and they specialized in the booming IT sector. Japan prevented sectoral reallocation by failing to resolve its banking problems, which led to a long-lasting deterioration in productivity performance. TFP growth can thus be seen as pivotal in reigniting growth after severe crises.

3 How Will the Crisis Affect Potential Output in Austria? A Range of Estimates

The previous sections illustrated Austria's past experience during economic downturns (charts 3 and 5) as well as the past development of various indicators which are crucial in the assessment of potential output. In this section we try to quantify the medium- to long-term prospects for Austria's growth potential. We first analyze the European Commission's (2009) medium-term projections and compute a cumulative loss of potential output up until 2013. We then assess the contribution of a dramatic shock to risk premiums on investment to our assessment of medium-term potential output loss. Further, using the European Commission's QUEST III model, we also project the effects of those shocks to risk premiums on investment 20 years ahead in order to gain an impression of the long-run consequences of various (mainly policy-driven) scenarios.

3.1 Potential Output in the Medium Term

To gauge the medium-term effect of the current financial crisis, we consider the European Commission's (2009) projections of Austria's potential output. These forecasts were computed following the production function approach of the European Commission's Directorate-General for Economic and Financial Affairs (ECFIN), as described by Denis et al. (2006). The strategy behind this approach is to quantify the supply-side potential of an economy. Assuming Austrian GDP is produced with an aggregate constant returns-to-scale production technology, which combines the factor inputs labor and capital, this amounts to quantifying the potential labor supply as well as the potential capital supply at each point in time. Since neither of these measures are observed, the European Commission (2009) employs the Kalman filter technique to deduce the NAIRU as a measure of structural unemployment, which in turn implies potential labor supply, and uses the perpetual inventory method to quantify the economy's total capital stock at any point in time. As discussed in section 2.2, various issues surround the measurement of any of the components of potential output. The most important caveat to keep in mind when interpreting the data is the following: The European Commission's (2009) estimates of potential output, even for years before the financial crisis, are biased downward through the statistical assumption of mean reverting stochastic processes. This means that an apparent decrease in potential output growth in the years 2005 through 2008 (table 2) is at least in part a purely statistical phenomenon and

Table 2

A Range of Estimates for Potential Output Growth

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2007–2020	2021–2040
	%										
Austria											
European Commission											
Production Function	1.9	1.7	1.6	1.5	1.0	1.1	1.4	1.8	1.8	×	×
HP filter	1.8	1.6	1.4	1.2	1.0	0.9	0.8	0.8	0.8	×	×
Ageing Report	×	×	×	×	×	×	×	×	×	2.1	1.4
OECD											
Economic Outlook	1.7	1.8	2.0	2.0	1.2	0.8	×	×	×	×	×
Euro Area											
European Commission											
Production Function	1.8	1.8	1.8	1.5	0.8	0.8	1.3	1.5	1.6	×	×
HP filter	1.6	1.3	1.0	0.7	0.4	0.1	−0.0	−0.2	−0.2	×	×
Ageing Report	×	×	×	×	×	×	×	×	×	2.3	1.6
OECD											
Economic Outlook	1.5	1.6	1.7	1.9	1.2	0.6	×	×	×	×	×

Source: European Commission (2009). OECD Economic Outlook 85 (2009). European Commission Ageing Report (2009).

need not reflect an actual fall in potential output growth. Table 2 lists the projections of potential output growth conducted by various institutions on the basis of different estimation methods.[12] It can be seen, for instance, that the OECD estimated increasing potential output growth during the period 2005 to 2008, while the European Commission found a slight decrease in potential output growth even before the onset of the current economic crisis.

In addition to the problem of mean reversion, these estimates are computed with real-time data that could be (and generally are) revised several times in the future, and the "true" data can only be observed several years after the

Table 3

Unemployment versus NAIRU

	2005	2006	2007	2008	2009	2010
	Change in percentage points					
European Commission (2009)						
NAIRU	×	0.2	0.2	0.2	0.4	0.4
Unemployment rate	×	−0.4	−0.4	−0.6	2.2	1.1
WIFO						
Unemployment rate (EU)	×	−0.4	−0.4	−0.6	1.5	0.5
Unemployment rate (AMS)	×	−0.5	−0.6	−0.4	1.6	1.1
European Commission (2009)	%					
NAIRU	4.4	4.6	4.8	5.0	5.4	5.8
Unemployment rate	5.2	4.8	4.4	3.8	6.0	7.1
WIFO						
Unemployment rate (EU)	5.2	4.8	4.4	3.8	5.3	5.8
Unemployment rate (AMS)	7.3	6.8	6.2	5.8	7.4	8.5

Source: Eurostat, European Commission (2009), AMS, WIFO.

[12] *The annex contains a full table of the contributions to potential growth and the determinants of labor and capital accumulation as calculated by the European Commission.*

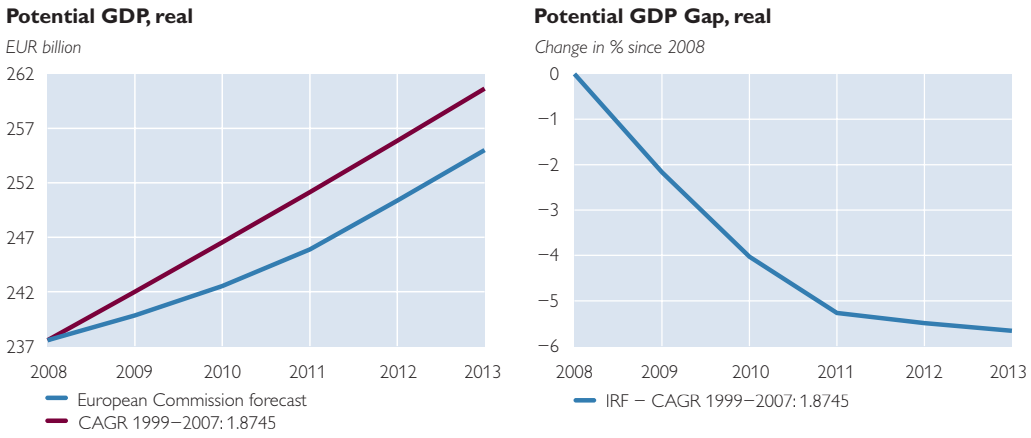
forecasting exercise. For instance, as already discussed in section 2.2, the European Commission's (2009) data on unemployment for the most recent years diverge significantly from those of the Austrian employment service, AMS, as well as the most recent projections by Austrian Institute of Economic Research (WIFO) for unemployment for 2009 and 2010 (both the AMS and the EU definition; see table 3). Furthermore, the Austrian NAIRU estimate rises throughout the whole period 2005 to 2010, while actual unemployment rates fell from 2005 through 2008. This clearly reflects the "end point problem" of trend filters based on stationary time series. Table 3 illustrates that the unemployment rate of 6% in 2009 (May forecast) pushes up the trend estimation from 2006 to 2008. With those caveats in mind, we try to assess the medium-term growth prospects of the Austrian economy based on the European Commission's (2009) potential output estimates.[13]

In order to quantify the medium-term effect of the financial crisis, it is useful to examine the deviation of potential output growth from its long-run trend growth. This thought experiment is called an impulse response function, defined as the difference between the expected path of the variable of interest, given that the crisis took place, and the expectation conditional on the crisis not having happened.

The left-hand panel of chart 7 plots these two conditional expectations, where the expected path conditional on the crisis not having happened is proxied by a projection based on the compound annual growth rate from 1999 to 2007 (CAGR 1999–2007 = 1.87%). Of course, the choice of proxy for the "steady state" growth rate, with which we compare the medium-term projections, crucially influences the eventual

Chart 7

Medium-Term Projections



Source: European Commission's Directorate-General for Economic and Financial Affairs (ECFIN).

Note: The left panel shows the European Commission (2009) projections of GDP in comparison to a projection using the precrisis (1999 to 2007) annual compound growth rate (CAGR; 1999–2007 = 1.87%) as deviations in EUR billion from the 2008 level. The right panel illustrates the difference between the two as percentage deviations relative to 2008 (impulse response function).

[13] *There are two reasons for the choice of estimates: First, the European Comission's (2009) estimates are the official EU statistics, and second, the projections range up until 2013, which allows us to conduct a medium-term assessment of the impact of the economic crisis on potential output.*

loss in potential output. We consider this particular horizon for our "steady state" proxy in order to capture Austria's average growth performance in the period between the establishment of monetary union and the onset of the financial crisis in the U.S.A.[14] This precrisis average is illustrated in the right-hand panel of chart 1.

Chart 7 clearly illustrates that the response to the current economic crisis is a drastic reduction in the growth rate of potential output relative to its precrisis long-run growth path. The cumulative percentage deviation in 2010 is projected to be around –4%. Given the current projection for potential output, the output loss by 2013 would be as high as –6%. Even if the estimates are biased slightly downward in absolute value because of the end point problems mentioned above, this forecast suggests the most dramatic fall in potential output since the Great Depression of the 1930s. It is thus crucial to implement adequate policies to prevent a widening of this gap and to support a return to the precrisis potential growth path. To assess the important consequences of structural policy, the following section considers various long-run scenarios in order to quantify the long-run risks and emphasize the significant role of structural policy measures.

3.2 Gauging the Long-Run Effects

Following the European Commission (2009), we make use of its QUEST III model (Ratto et al., 2009) to simulate various scenarios for plausible long-run effects of the current financial and economic crisis on Austria's potential GDP.[15] In particular, we focus on shocks to the risk premium on physical investment, motivated by a significant increase in the spread between yields on European corporate AAA- and BBB-rated bonds. The left-hand panel of chart 8 depicts this indicator from April 1999 to June 2009. We focus on European rather than Austrian corporate bonds, since there are not enough data available on the local bond market and, more importantly, we believe that the market for such assets is well integrated across Europe. As illustrated in chart 8, average corporate bond spreads from April 1999 to June 2007 were about 110 basis points, rising rapidly to levels of around 300 basis points thereafter.

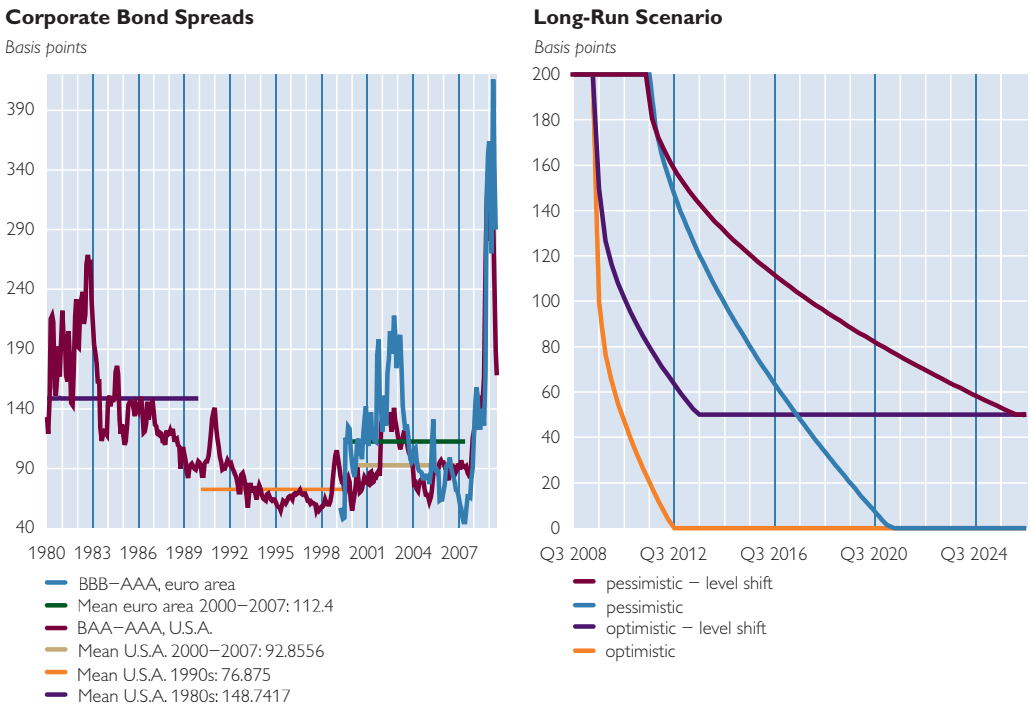
For our QUEST III simulations, this translates into an initial 200 basis point increase in risk premiums on investment relative to the precrisis steady state. As well as quantifying the initial impact, in order to form a picture of plausible long-run scenarios, we also have to take a decision on the plausible long-run paths of these risk premiums. For instance, it is very unlikely that risk spreads will remain as elevated as in the period from 2008 through 2009, but it is also far from clear whether they will eventually revert to (all-time low) precrisis levels or whether a less pronounced (but still permanent) level shift in risk premiums will prevail. Since euro area bonds can only be tracked back until 1999, the left-hand panel of chart 8 additionally plots

[14] *As can be seen in table 2, the choice of estimate for potential output is also significant. For instance, average potential output growth between 1999 and 2007 as estimated by the OECD economic outlook is somewhat higher, at around 2%, which seems more realistic in the light of the statistical biases discussed above. However, since we are using the European Commission's (2009) projections up until 2013, we also compute our proxy for the "steady state" growth rate from the same time series in order to ensure consistency.*

[15] *The QUEST III model is a modern monetary DSGE model which includes risk premiums on various forms of capital. The European Commission has estimated (and calibrated where appropriate) the structural parameters of the model for Austria. We use those parameterizations to simulate possible scenarios for potential output.*

Chart 8

A Shock to the Risk Premium on Investment



Source: St. Louis Fed, Thomson Reuters, Authors' calculations.

Note: The left panel plots the spread between yields on European BBB and AAA corporate bonds as reported by Thomson Reuters for the euro area and spreads between BAA and AAA corporate bond yields as reported by the St. Louis Fed for the U.S.A. For both series we also compute selected long run averages. The right-hand panel depicts four long-run shock scenarios which were considered for QUEST III simulations of shocks to the risk premiums on tangible as well as intangible (R&D) investment.

spreads between yields on BAA- and AAA-rated U.S. corporate bonds, for which a significantly longer time series exists. The strong correlation between the two time series for the overlapping period allows us to consider relative movements in U.S. risk spreads as a reasonable proxy for the corresponding movements in European premiums on risky investment. In the U.S.A., the "Great Moderation", extensive deregulation and a rise in the number of new and creative forms of investment led to a continuous fall in risk spreads throughout the 1990s, e.g. on average risk premiums in the 1980s were about 50 basis points higher than in the period from 2000 to 2007 (chart 8).

In accordance with the suggestive evidence above, we run QUEST III simulations for the following four hypothetical paths of risk premiums on both tangible and intangible (R&D) investment:

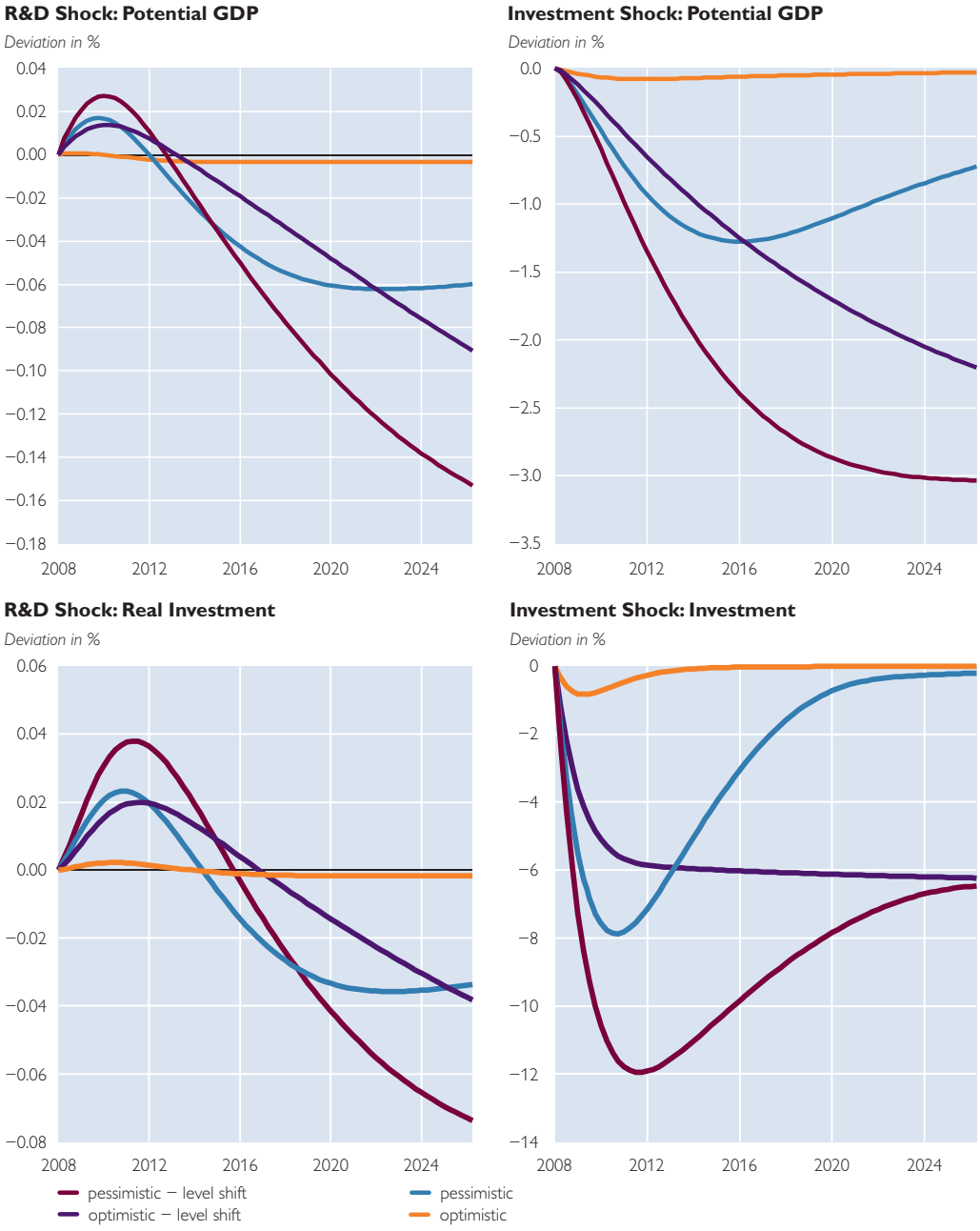
(1) a pessimistic scenario in which the risk premium stays elevated at 200 additional basis points for three years and only slowly reverts to a level 50 basis points above the former average in 2026;
(2) a slightly less pessimistic decline after three years, with levels eventually returning to the precrisis average in 2020;
(3) a more optimistic version, where the reversion starts after only one year and the risk premium returns to a level 50 basis points above the precrisis average in 2013; and
(4) the most optimistic scenario, in which spreads start to fall after one year and eventually return to the precrisis average already in mid-2012.

The hypothetical paths of each shock are illustrated in the right-hand panel of chart 8.

Chart 9 shows the impulse responses of Austrian potential GDP and investment growth, as predicted by QUEST III, corresponding to the four hypothetical paths of risk premium shocks. It can immediately be seen that the particular path of risk premiums

Chart 9

QUEST III: Long-Run Effects of a Risk Premium Shock



Source: Authors' calculations.

Note: The right-hand panel depicts impulse response functions generated by QUEST III simulations for the four shocks to the risk premium on physical capital investment illustrated in the right panel of chart 8. The left-hand panel plots impulse responses to the same types of shocks to the risk premium on R&D investment. Our measure of potential output within the QUEST III model is derived by the forumla OS_YPOT(t)=exp{ln(OS_Y(t))-OS_YGAP(t)}.

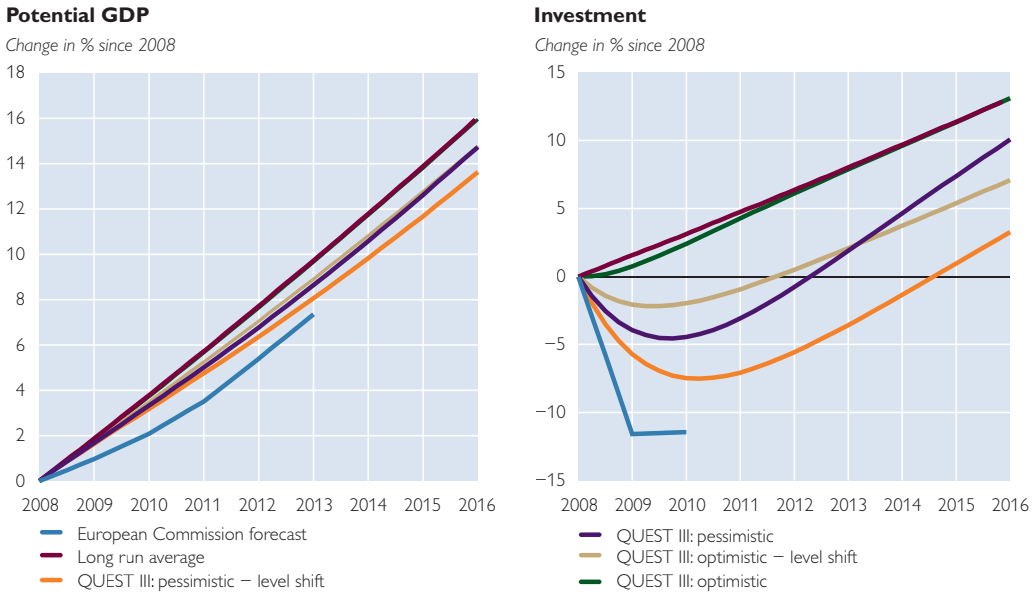
has significant long-run consequences for both the level and the growth rate of potential GDP and real investment. The faster confidence in financial markets is restored, the more rapidly investment activity will return to its precrisis level. Further, depending for instance on future financial regulation, the eventual long-run level of risk premiums will determine whether potential GDP returns to its precrisis level or whether a permanent level shift will result.

The chart also shows that the shocks to R&D investment have a very insignificant influence, with a maximum fall in potential output growth of about 0.15%, while the shocks to physical investment may lead to a 3% decrease in potential output growth relative to precrisis steady-state growth rates. In addition to the fact that risk shocks to R&D investment have less of an impact on long-run potential growth rates, it is unlikely that R&D investment will shrink significantly in the medium to long term, considering current developments regarding climate change and the trend toward energy efficiency (section 2.2).

Chart 10 compares the QUEST III simulations of pure risk premium shocks to physical investment and the European Commission's (2009) medium-term projections discussed in section 3.1. As noted in section 1, standard DSGE models use a different concept of potential output from the one employed in the European Commission's medium-term projections. Unlike standard DSGE frameworks, however, the QUEST III model incorporates a (statistical) notion of potential output that is equivalent to the one considered in the production function approach. Therefore, we can meaningfully compare our QUEST III scenarios to the impulse responses constructed

Chart 10

QUEST III Scenarios and ECFIN Medium-Term Projections



Source: ECFIN, authors' calculations.

Note: The charts depict a comparison of QUEST III simulations of the shocks specified in the right panel of chart 8 to the risk premium on tangible investment and the European Commission's medium-term projections. Here we treat the QUEST III shock as if it had occured in the first quarter of 2008.

from the European Commission's medium-term projections for Austrian potential output.

Note that shocks to the risk premiums alone, if severe enough, are able to explain most of the potential output loss over the medium term. In the short run, however, factors such as the severity of the recession seem to be the main determinants of the medium-term effect of increased risk premiums, which mainly has an impact through long-run investment behavior.

This leads us to two important observations: First, the financial impulse has severe negative consequences for the real economy that go far beyond the effects of a (ceteris paribus) shock to risk premiums on physical investment on their own. Second, on the one hand, a (ceteris paribus) risk premium shock alone can explain a significant part of the medium-term potential output loss if confidence in financial markets cannot be restored quickly. On the other hand, in the most optimistic scenario, in which confidence in financial markets is completely restored as early as 2012, the shock to risk premiums in isolation does not have any lasting effect whatsoever. Realistically, neither of these two extreme scenarios is very likely, since at least some form of stricter financial regulation can be expected,[16] which will eventually be priced in by market participants, and a moderate level shift in risk premiums seems plausible. However, the financial restructuring and tighter market oversight by regulators should reinforce a quick return to confidence. We thus consider the optimistic scenario with a 50 basis point level shift to be the most realistic long-run scenario for Austria.

A comparison of our QUEST III simulation results with those of the European Commission (2009) shows that the reaction of the Austrian economy to the financial crisis is somewhat smaller in size than that of the overall euro area estimates. There are several reasons for this. First, the full QUEST III model for the euro area explicitly models spillover effects across all EU Member States. The version calibrated to match the Austrian economy does not take these spillovers into account and the resulting projections are thus likely to be biased somewhat downward in magnitude. Second, some of the other EU countries (e.g. Spain, Ireland and France, which experienced major housing bubbles) were hit considerably harder by the financial crisis and hence push up the EU average. Third, the European Commission (2009) simulated a combination of risk premium shocks to physical investment, as well as housing investment and house prices, while the Austrian version of QUEST III does not explicitly allow for an analysis of the housing sector and these shocks could thus not be taken into account. However, since the housing market in Austria has not been affected too severely, compared with that of other European countries, this omission most likely does not bias our projections too much. Nevertheless, this should be taken into account as another potential reason for a downward bias (in magnitude) of the overall effects. Keeping these potential biases in mind, we believe that our simulations are broadly consistent with the euro area evidence, especially since the shape of the impulse response functions is completely identical and the only difference is in terms of magnitude.

[16] *We expect stricter market regulations in the banking sector since we believe that policymakers will want to avoid following the Japanese example (Caballero et al., 2008) of a prolonged slump after a financial crisis.*

4 Conclusions and Outlook

We estimate that the potential output loss could amount to approximately 4% by 2010, and could rise as high as 6% by 2013 (production function approach according to Denis et al., 2006). The output loss would be slightly greater if the "true" precrisis path of trend potential output were higher. This is in line with current labor market figures, which suggest a smaller increase of the NAIRU than projected by the European Commission (table 3). Like the European Commission (2009), we believe that a permanent level shift in potential output is most likely, i.e. that the output loss due to the crisis will never be recovered, but that the growth rate of potential output will return to its precrisis level after a period of transition, until the effects of an aging population set in by about 2020. This also means that actual growth rates in the recovery will not be as high as is usual after recessions. The policy implications of this scenario will be discussed in Grossmann et al. (2009). Of course, many methodological problems and uncertainties about the real course of events are attached to these projections. Of crucial importance will be the short- to medium-term path of actual output growth, as it is difficult to differentiate between the effects of a prolonged period of subdued aggregate demand and reduced potential output.

A quick V-shape emergence from the recession seems unlikely, as deleveraging and the problems in the financial sector will have some lasting effects, and the next oil price shock may not be far away (IEA, 2009). In the light of both theory and evidence on the impact of severe recessions on TFP growth, the statistical trend method for projecting TFP growth is probably too optimistic in the medium term. A worldwide, sustained recovery will most probably require an increase in U.S. net exports and a corresponding decrease in the rest of the world, in particular Asia. This will be difficult to achieve (Blanchard, 2009). In a pessimistic scenario, the effects of the crisis may seamlessly link with the effects of population aging on potential output, implying a fall in trend potential output growth to about 1.5% by 2030. This would reduce the policy space available (the window of opportunity) to counter the effects of aging through productivity-raising reforms.

On the upside, current financial indicators show that financial constraints are not as bad as feared following the collapse of Lehman Brothers in 2008. Medium- to longer-term TFP growth prospects are rather positive: In our view, the current discussion on potential output growth too often has a short-term or backward-looking focus, trying to gauge the effects of ICT on productivity, when very powerful economic incentives to innovate and to invest arise from anti-climate-change policies, energy scarcity, new smart power and telecommunications infrastructure, as well as the increasing competition and growing demand from emerging markets. In an optimistic scenario, by 2011 most of the structural effects of the crisis will have disappeared and productivity growth will accelerate by 2020 to compensate for declining labor input, stabilizing the path of potential output at around 2%.

The final outcome crucially depends on the economic policies implemented worldwide and in Austria. The Great Recession may lead to policies which further reduce potential output or it may instead foster breakthrough reforms.

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Annex

Table 4

European Commission's (2009) Projections of Austrian Potential Output Growth

	Actual output growth (annual change in %)	PF Potential Growth	Contributions to potential growth					Determinants of labor potential and capital accumulation			
			Total labor contribution (hours)	Labor contribution (persons)	Changes in hours (per employee) contribution	Capital accumulation contribution	TFP contribution	Growth of working age population (annual change in %)	Trend participation rate (% of working age population)	NAIRU (% of labor force)	Investment ratio (% of potential output)
	%										
1981	−0.1	2.3	−0.3	0.1	−0.4	1.2	1.4	1.4	72.1	1.7	23.6
1982	1.9	1.9	−0.4	0.0	−0.4	0.9	1.3	1.3	71.4	1.9	21.2
1983	3.0	1.7	−0.4	−0.1	−0.3	0.8	1.3	1.1	70.7	2.2	20.8
1984	0.1	1.8	−0.3	−0.0	−0.3	0.8	1.3	1.0	70.2	2.4	20.4
1985	2.5	1.8	−0.3	−0.1	−0.3	0.9	1.3	0.5	69.9	2.6	21.3
1986	2.3	1.9	−0.3	−0.0	−0.2	0.9	1.3	0.3	69.8	2.8	21.3
1987	1.3	2.1	−0.1	0.1	−0.2	0.9	1.3	0.1	70.0	2.9	21.7
1988	2.9	2.4	−0.0	0.2	−0.2	1.0	1.4	0.1	70.2	3.0	22.7
1989	3.7	2.8	0.3	0.5	−0.2	1.0	1.4	0.4	70.6	3.1	23.2
1990	4.2	3.0	0.4	0.7	−0.3	1.1	1.5	0.7	70.9	3.2	23.8
1991	3.3	3.1	0.4	0.8	−0.4	1.2	1.5	0.9	71.1	3.3	25.0
1992	1.9	2.8	0.1	0.7	−0.6	1.1	1.5	1.0	71.3	3.4	24.3
1993	0.4	2.2	−0.3	0.4	−0.7	1.0	1.5	0.7	71.3	3.5	23.6
1994	2.2	1.9	−0.7	0.1	−0.8	1.1	1.5	0.2	71.3	3.5	24.4
1995	2.5	1.8	−0.8	−0.0	−0.7	1.0	1.5	0.0	71.3	3.6	24.0
1996	2.2	2.1	−0.4	0.1	−0.5	1.0	1.5	0.1	71.4	3.7	24.6
1997	2.1	2.4	−0.0	0.3	−0.3	1.0	1.4	0.2	71.7	3.7	24.0
1998	3.6	2.5	0.2	0.4	−0.1	1.0	1.3	0.3	71.9	3.8	24.2
1999	3.3	2.6	0.4	0.5	−0.0	0.9	1.2	0.4	72.1	3.8	23.8
2000	3.7	2.6	0.5	0.5	0.0	1.0	1.1	0.5	72.3	3.9	24.5
2001	0.5	2.5	0.6	0.6	0.1	0.8	1.0	0.7	72.5	3.9	23.5
2002	1.6	2.3	0.6	0.6	0.0	0.7	1.0	0.8	72.7	4.0	22.0
2003	0.8	2.3	0.6	0.7	−0.1	0.7	0.9	0.7	73.0	4.1	22.5
2004	2.5	2.1	0.5	0.7	−0.2	0.7	0.9	0.6	73.4	4.2	22.2
2005	2.9	1.9	0.3	0.6	−0.3	0.7	0.8	0.4	74.0	4.4	22.3
2006	3.4	1.7	0.1	0.5	−0.4	0.7	0.8	0.3	74.5	4.6	22.5
2007	3.1	1.6	0.0	0.5	−0.4	0.8	0.8	0.3	75.0	4.8	23.2
2008	1.8	1.5	0.1	0.4	−0.4	0.8	0.7	0.4	75.3	5.0	23.2
2009	−4.0	1.0	−0.2	0.1	−0.3	0.4	0.7	0.4	75.5	5.4	20.4
2010	−0.1	1.1	0.0	0.1	−0.1	0.4	0.7	0.5	75.5	5.8	20.2
2011	×	1.4	0.2	0.1	0.1	0.5	0.7	0.4	75.5	6.0	20.8
2012	×	1.8	0.5	0.4	0.1	0.5	0.8	0.7	75.5	6.1	21.1
2013	×	1.8	0.4	0.3	0.1	0.6	0.8	0.5	75.6	6.2	21.5
Period average											
1981–1985	1.5	1.9	−0.3	0.0	−0.3	0.9	1.3	1.1	70.9	2.2	21.4
1986–1990	2.9	2.4	0.1	0.3	−0.2	1.0	1.4	0.3	70.3	3.0	22.5
1991–1995	2.1	2.4	−0.3	0.4	−0.6	1.1	1.5	0.6	71.2	3.5	24.2
1996–2000	3.0	2.5	0.2	0.3	−0.2	1.0	1.3	0.3	71.9	3.8	24.2
2001–2005	1.7	2.2	0.5	0.6	−0.1	0.7	0.9	0.6	73.1	4.1	22.5
2006–2010	0.8	1.4	0.0	0.3	−0.3	0.6	0.7	0.4	75.2	5.1	21.9
2011–2013	×	1.7	0.4	0.3	0.1	0.5	0.8	0.5	75.5	6.1	21.1

Source: European Commission (http://circa.europa.eu/Public/irc/ecfin/outgaps/library?l=/spring_2009_forecast/spring_2009_results&vm=detailed&sb=Title).