



# AUSTRIA

## SELECTED ISSUES

February 2017

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# AUSTRIA

## SELECTED ISSUES

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Approved By  
European Department

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# STRUCTURAL AND FISCAL MEASURES TO INCREASE POTENTIAL OUTPUT IN AUSTRIA<sup>1</sup>

*This chapter discusses structural and fiscal reforms in Austria that could increase potential output. Regarding structural measures, a policy package that includes further liberalization of professional services, lowering costs for start-ups, and FDI promotion is proposed to increase productivity. Regarding fiscal measures, a shift in the tax and expenditure structure to less distortionary taxes and pro-growth spending on public investment in a budget-neutral manner can boost long-run output and private consumption.*

## A. Introduction

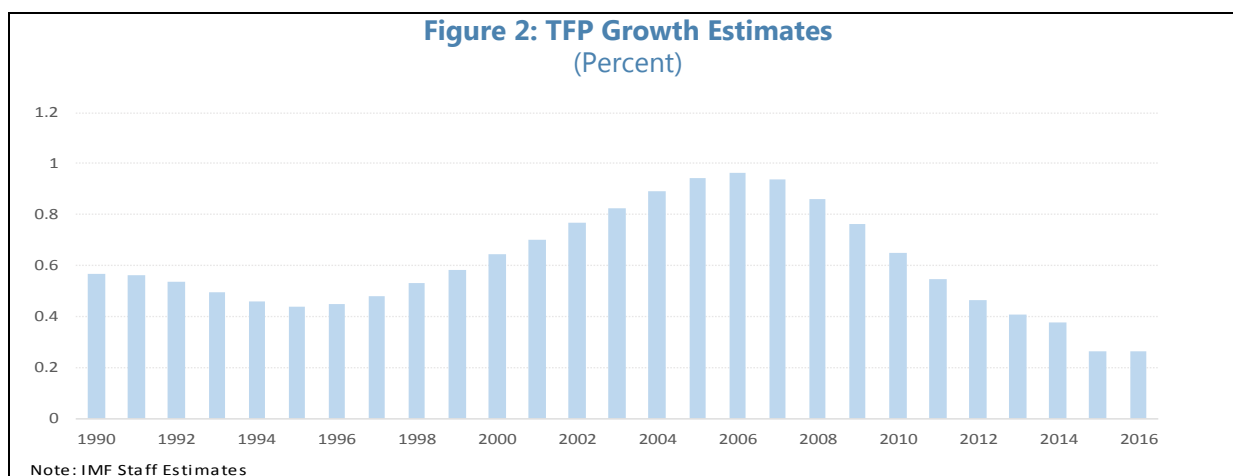
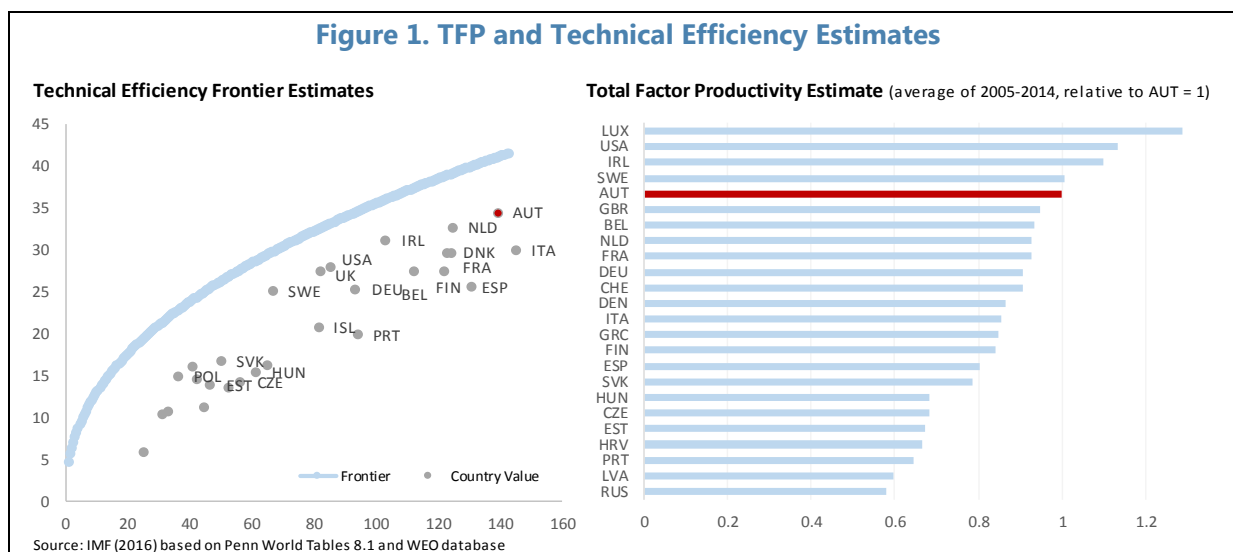
**1. Austria is a rich, advanced country with very productive uses of its resources and high living standards.** Among their peers, Austria ranks high in terms of per-capita wealth, total factor productivity, and efficient use of available resources. Austria also scores well in most indicators of structural development and quality of life. Austria's well-being goes beyond GDP, with low income inequality, low risk of poverty and social exclusion, and very high subjectively-reported life satisfaction, supported by high productivity and output, see Röhn and others (2016).

**2. Despite the high level of productivity and efficient use of resources, there is room for further improvements in both areas.** The analysis in this paper proposes fiscal and structural measures that aim to increase households' welfare. Both suggested fiscal and structural measures increase private consumption and output, without compromising fiscal sustainability or goods-and-services' quality standards and consumer protection.

**3. Estimates of total factor productivity (TFP) and the distance from the efficiency frontier rank Austria among the top countries in the world.** IMF estimates based on internationally-comparable Penn World Tables data suggest that Austria is above the EU average for TFP, and that capital stock per capita is above the average as well. Recent estimates of the stochastic production frontier model in the IMF (2016) also show that technical efficiency in Austria lies close to the efficiency frontier. Yet, TFP has been declining for a number of years. Thus, a package of well-designed structural reforms can raise total factor productivity and improve the allocation of resources, so that output and consumption rise even further.

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<sup>1</sup> Prepared by Michal Andrlé.



**4. We use OECD Structural Policy Indicators to assess Austria's position among their peers and to identify opportunities for reforms.** The OECD Structural Policy Indicators (OECD 2016) constitute a comprehensive set of indicators designed to allow comparison of economic policies among the member and some non-member countries. The indicators are compiled using a consistent and publicly-available methodology. Using an alternative set of indicators, for instance World Economic Forum's indicators or the ones from the World Bank or the Global Entrepreneurship and Development Institute, would not alter the identification of room for reforms in a significant way. The OECD indicators offer a comprehensive and well-established resource for international comparison, with available empirical estimates using these indicators that can be used to help assess the macroeconomic impact of structural measures.

**5. Lowering labor taxation, increasing public investment, and product market reforms were identified as policies that could increase potential output.** While Austria scores well among peers in many structural indicators, there are areas where further measures can be adopted. Labor income taxation is above the OECD advanced country average, even after the tax reform put in place in 2016, and public investment as a share of output is lagging behind peers. An increase in

productive public investment would raise productivity in the private sector and have a positive effect on output both in the short and the long run. Regarding product market reforms, inspection at the detailed level suggests that a comprehensive reform package, focusing on easing entry conditions for startups and professional services, and reducing barriers to investment and trade could improve the technical and allocative efficiency of the economy.

**6. The proposed structural measures aim at reducing the restrictiveness of product market regulations (PMR) and liberalization of professional services.** The proposed measures are inspired by the structure of the OECD economy-wide PMR index. The measures include further liberalization of professional services, lower administrative burdens on startups, and other reductions in barriers to trade and investment as described later in the text. All proposed measures are designed to increase output in the long term and have a positive impact on Austria's total factor productivity.

**7. The proposed fiscal measures consist of revenue-neutral rebalancing in the tax structure and expenditure-neutral changes in public spending composition.** On the revenue side, income taxes are lowered by 1 percent of GDP and consumption and other less distortionary taxes (e.g., on real estate) are increased to keep the expected total revenues unchanged. On the expenditure side, an increase in public investment of  $\frac{1}{2}$  percent of GDP is financed by an offsetting decline in government consumption expenditures.

**8. The effects of structural and fiscal measures are evaluated using the IMF's Global Integrated Monetary and Fiscal model (GIMF).** GIMF is a dynamic general equilibrium (DGE) model with a full set of stock-flow-consistent national accounting and budget constraints of households, firms, and the government. Tax rates and spending adjustments are simulated directly in the calibrated model for Austria. The estimated effects of proposed structural measures are first mapped into changes in the total factor productivity. The macroeconomic, general-equilibrium impact of this change is then estimated using the model.<sup>2</sup> The details on all three scenarios are described below and a brief summary of the model, with references, can be found in the Appendix.

**9. The combined effects of the proposed measures result in 3 percent increase in output over the medium term (5-10 years), without any negative impact on public finance sustainability.** We estimate that the proposed structural measures would raise potential output by about 1.5 percent in the medium term. Proposed revenue measures contribute to output increase by 0.5 percentage points, while proposed increase of public investment financed by government consumption contributes about 1 percentage point. The scale of the reform is mostly illustrative and scaling up or down the proposed measures would appropriately change the overall impact.

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<sup>2</sup> Positive long-run effects of lower income tax in Austria are also reported in a recent paper by Attinasi and others (2016), who consider financing by lump-sum transfers.

## B. Structural Measures

### Structural Indicators Review and Proposed Measures

**10. In this section, we discuss a package of structural measures with the potential to increase the productivity of the economy.** Structural measures are identified based on the OECD structural policy indicators. Overall, Austria scores very high in most structural measures at the aggregate level. The exceptions are the regulation of professional services, which is significantly above the OECD average, and the barriers to foreign direct investment (FDI). The policy recommendations thus focus mostly on startups, professional services (legal, accounting, architecture, and engineering professions), competition in network industries, and barriers to FDI and investment. Additional measures may also be directed at employment protection legislation (EPL).

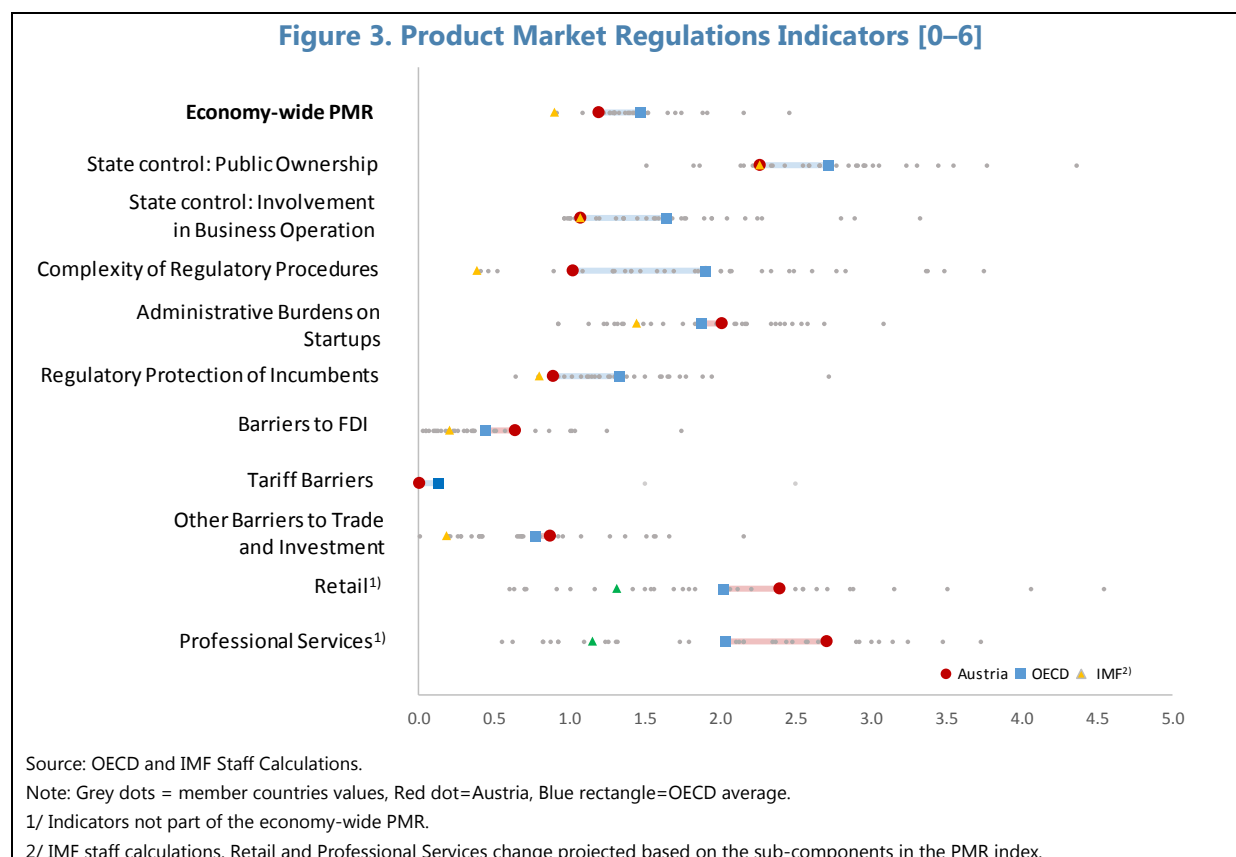
**11. We adopt a two-step approach to assess the possible impact of structural measures.** In the first step, we use the OECD PMR database with 800 questions on structural policies to identify areas for possible improvement based on distance to the frontier and to peers and construct the aggregate value of the economy-wide PMR index. We then impute selected improvement measures (see below) into the underlying questionnaire and the aggregate PMR index with its sub-components is recomputed in a bottom-up manner. In the second step, we map the PMR index changes into total factor productivity. We then estimate the macroeconomic impact of this change in productivity using the GIMF model.

**12. The OECD PMR index is composed of three broad areas, with seven key sub-indexes.** Each of the seven sub-indexes is composed of two to four sub-indexes that are directly mapped into the survey questions (see Figure 4 for the PMR indicator structure). In designing the reform package the categories “Barriers to Entrepreneurship” (including startups and professional services) and “Barriers to Trade and Investment” are considered for improvement, while the category “State Control” is left unchanged. The sub-indexes are inter-dependent; for instance, the issue of professional services permeates multiple sub-categories, apart from Barriers in Service Sector category, and the scoring of several areas is conditional on the scoring of other areas. The methodology used for constructing the index is described in Koske and others (2015) and references therein.<sup>3</sup>

**13. The proposed measures imply a change in the economy-wide PMR index of 22 percent.** The measures span many areas of the economy. Our proposed further product market liberalization maintains due regard to the quality of provided goods and services and consumer protection. The quality of products and services should not be compromised and certain types and degree of regulation are vital for the market economy to thrive, especially in areas with asymmetrical information (for instance law, medicine, and others). The proposed shift in regulation is towards the

<sup>3</sup> The underlying data to re-construct the indicators and to compute the effects of policy measures can be found at [https://www.oecd.org/eco/reform/Database\\_PMR.xlsx](https://www.oecd.org/eco/reform/Database_PMR.xlsx)

level and type of regulation comparable with advanced countries—often European—like Germany, the Netherlands, Denmark, or Sweden if applicable.



**14. Important changes can be implemented in the administrative burdens on startups, the complexity of regulatory process, and regulation in retail and professional services.** There is scope for further simplification of starting up businesses in terms of the number of bodies to be contacted to provide information or get a license. According to the World Bank’s “Doing Business” indicators, Austria ranks 106<sup>th</sup> in “Starting a Business” ranking.<sup>4</sup> Creating or improving one-stop shops and simplifying registration processes is in line with the best practice as identified by the World Bank, for instance.

**15. Further liberalization in professional services may be implemented without adverse consequences to quality of service provided.** While acknowledging the importance of educational requirements in professional services (legal, accounting, architecture, and engineering in this case), the required length of compulsory practice before admission as a full member of the profession could be shortened towards the level observed in other developed countries, if it is to be required at all. Quality control is still retained by the requirement to pass one or more professional examinations to become a full member of the profession. Further, professional organizations in Austria seem to have exclusive or shared exclusive rights to a much larger number of tasks than in other advanced

<sup>4</sup> <http://www.doingbusiness.org/data/exploretopics/starting-a-business>



countries and there is scope for changes towards a more competitive environment in several professions. Compulsory membership in professional organizations can also be reconsidered, with voluntary membership creating incentives for the professional organization to make the membership more attractive.

**16. While barriers to trade and investment in Austria are generally low, they can be reduced further without compromising the quality of standard of the business conduct.**

Continued encouragement for adoption of international standards, removal of any remaining restrictions on foreigners in professional services, or enhancing support for redress of foreigners, when business practices are perceived to restrict competition, would be steps in the right direction. With regard to vertical separation in network sectors, a few measures to consider are going beyond accounting separation towards legal separation in railroad infrastructure and railway services and similarly in the electricity sector segments. In the retail sector, the strictness of the licensing requirements can be eased based on other countries experience.

**17. Barriers to foreign direct investment (FDI) could be reduced.** Barriers to FDI in Austria, measured by the scaled version of the OECD's FDI restrictiveness index<sup>5</sup>, are just slightly below the OECD average. Many advanced countries rank as more open to FDI, examples being Germany, France, Sweden, and the United Kingdom. The FDI restrictiveness index measures four key areas: (i) foreign equity transactions, (ii) screening and prior approval requirements, (iii) rules for key personnel, and (iv) other restrictions on operation of foreign enterprises in 22 sectors of the economy, see Kalinova, Palerm, and Thomsen (2010).

**18. The sectoral breakdown of the FDI restrictiveness index in Austria also singles out network sectors and professional services.** Comparing detailed sectoral data for the index with other countries' values, Austria seems to be more restrictive towards FDI in electricity distribution and generation. There are more restrictions also in legal, accounting and audit, architectural, and engineering professions, as well as real-estate investment. Proposed measures should aim to reduce restrictiveness toward or below the average level of EU regulation.

**19. There is no scope for improvement related to trade barriers.** As a member of the EU, Austria is a member of the customs union, bound by the multilateral rules of the EU, and tariff barriers are minimal, promoting free trade.

### Quantitative Assessment of Structural Measures

**20. The structural measures discussed above are mapped into the GIMF scenario to complement the assessment of the fiscal measures.** The mapping is based on the estimated impact of the proposed structural reform measures on total factor productivity as implied by the OECD's empirical models. The resulting estimated increase in the total factor productivity is then fed into GIMF, which provides the estimate of general-equilibrium impacts of the proposed structural

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<sup>5</sup> The measure is the OECD FDI Restrictiveness index multiplied by a factor of 6, to map it to [0-6] of the PMR index.

measures. The estimates are subject to uncertainty; hence the results should be viewed as guidelines about the magnitude of the effects rather than as precise “predictions”.

**21. The mapping from the aggregate PMR indicator to TFP makes use of empirical analysis by the OECD and the process used in the IMF’s G20MAP process.** Based on the methodology in Bourlès and others (2010) and Bouis and Duval (2011), the changes in the regulatory index can be mapped into changes in total factor productivity. The effects depend not only on the change in the regulatory index but also on the distance to the frontier, or best practice. For Austria, proximity to the frontier is a relevant consideration and the effects on the TFP are lower, in line with the OECD results for countries the G20-MAP on a similar level of development, see IMF (2014).

**22. The effects of the structural reforms are positive, boosting output in the medium term by about 1.5 percent.** The gradual increase in productivity supports higher real wages, consumption, and higher investment activity in the economy. As the productivity rises economy-wide (both in the tradable and non-tradable sectors), the real effective exchange rate depreciates to raise both foreign and domestic demand for Austrian goods. In many aspects, the scenario is similar to the scenario where public investment increases. However, the phase-in of structural reforms is assumed to be gradual (over several years) with households and firms believing that measures implemented in the current year as permanent but not expecting any further changes.

### Alternative Assessment of Structural Measures

**23. A change of the PMR index of 20 percent in a ten-year horizon is consistent with historical experience.** In the past, in a ten-year horizon OECD countries were able to implement structural reforms that improved their implied PMR indicator on average by 20 percent. Austria itself reduced its implied measure of restrictiveness of product market regulations by 13.5 percent between 2008-13. A baseline of 20 percent change in PMR was also assumed for the analysis in G20-MAP, IMF (2014), based on the trend historical improvements. Reaching the levels of the frontier country for the aggregate PMR indicator at present, the Netherlands, would be consistent with a reduction of the index by roughly 23 percent. However, a move of 20 percent over a ten-year horizon does not necessarily imply reaching the frontier, as the frontier itself would move up over this period.

**24. An alternative strategy for improvements in the aggregate PMR index is to consider the distance to the frontier in each category.** Such approach is less detailed and may not result into a coherent set of policies to be jointly implemented. To move to an idealized country that is composed of the best country in each out of seven sub-indexes would require more than 50 percent change in the PMR index. To move to an idealized country formed by the average of the three least-regulated countries for each sub-component would still require about 40 percent change. This shows that our estimated 20 percent improvement in the overall PMR index is within the realm of feasibility.

**25. Other ways of quantitative assessment are possible.** For instance, the European Commission (2016, Box 3.5.1) presents an analysis of an ambitious increase of competition in professional services in Austria, corroborating the fact that professional services liberalization is an important issue for the country in order to boost productivity and output. Using empirical analysis from Canton and others (2014) and Thum-Thysen and Canton (2015), assumptions are made to map changes in profits and sectoral churn into the European Commission's QUEST model, resulting in about 0.7 percent increase output in medium term (ten years). This is broadly consistent with our analysis - scaling our quantitative exercise to exclude the proposed improvements in professional services in several indicators and adding the results of the European Commission to bring the professional services on board again, results in qualitatively similar effects.

## C. Fiscal Measures

### Revenue-Neutral Tax Rebalancing

**26. The scenario consists of changing the tax structure in a revenue-neutral manner.** An ex-ante revenue-neutral cut of income taxes by 1 percent of output is offset by an increase of consumption and lump-sum taxes. It is assumed that seventy percent of the income tax decline is covered by the consumption taxes, the rest is financed by lump-sum taxes approximating the effects of inheritance or property taxes.<sup>6</sup> The scenario is designed as revenue neutral, based on the ex-ante output share of labor income tax and consumption tax revenues for ease of implementation. The revenue neutrality holds on average over a few years even after taking into account the endogenous response of macroeconomic variables, however. The deficit-to-GDP target is kept unchanged and small deviations from this target (due to the endogenous response of the economy to the tax changes) offset each other over a few years with debt-to-GDP ratio kept unchanged.

**27. Shifting the tax burden towards less distortionary taxation increases long-run output by 0.5 percent.** Indeed, consistent with economic theory, lower taxation on labor leads to a permanent increase in private consumption, aggregate labor, and real output by roughly 0.5 percent in the long run. The results of the simulation are presented in Figure 2 and Figure 3.

**28. The positive effects of the change in labor tax structure are reached gradually, being largest in the medium and long term.** It takes time for firms and households to adjust to the new tax measures and it takes time to accumulate a new target level of the capital stock. Households provide more labor effort, cumulate larger stock of productive capital, and reap the benefits of permanently higher consumption and output in the long run.

**29. The equilibrium of the economy permanently changes.** Due to the increase of consumption taxes and drop of the income taxes, households' marginal propensity to consume out

<sup>6</sup> Consumption taxes are understood in a broad sense here, including excise taxes, other environmental taxes passed on to the consumer, and increases in the reduced VAT rate on certain goods. To the extent the net effect of the tax rebalancing affects low-income consumers adversely, the latter should be supported through the social assistance system. In the GIMF, all households, including the liquidity-constrained households, pay both consumption and labor taxes. The need for compensation would be more relevant for households who do not pay income taxes.

of their newly increased wealth is permanently lower. All components of household wealth improve, both the human wealth (permanent labor income) and the financial wealth. The increase in domestic production is supported by exports, with the real effective exchange rate depreciation inducing foreign demand and discouraging imports. In the medium run, as the private consumption rises on par with output, imports recover and the positive trade balance unwinds. In the long run, the economy moves to an equilibrium with higher labor input, higher level of the capital stock, and higher net foreign assets position. The change in the tax structure induces households to work and save more.

## Increasing Productive Public Investment

**30. The scenario consists of expenditure-neutral rebalancing from government consumption to government investment.** Productive public investment is increased by  $\frac{1}{2}$  percent of GDP, financed by an offsetting drop in government consumption spending by  $\frac{1}{2}$  percent of GDP. The assumption in the model is that public investment accumulates into the public stock of capital, which then raises the private sector productivity (better infrastructure, for instance). Switching from government consumption to more productive public spending boosts potential output in the long run.

**31. The benefits of the public expenditure switch for the economy are realized immediately, although the long-term effects are more pronounced.** By switching from public consumption to public investment, the government does not deprive the economy of public demand even in the short run. Rather, the government's productive investment augments the productivity of the private sector. The increased current and expected future productivity crowds in initially more labor effort and an increase in investment activity gradually over time. Permanently higher human and financial wealth of households stimulate private consumption—households' savings rate drops and the current account goes into deficit, with households correctly anticipating their future higher incomes. In the long run, the level of hours worked in the economy falls slightly, as the wealth effect prevails over the substitution effect for households.

**32. The increase in public investment of  $\frac{1}{2}$  percent of GDP financed by lower public consumption increases potential output by 1 percent in ten years.** In the long run, the full effect can rise up to two percent. The benefits of the switch take time to materialize fully, while the public capital stock is being accumulated and the private sector adjusts to the higher level of productivity. The framework also assumes that the public capital stock effect on private productivity is gradual.

**33. Although there may be uncertainty about the precise quantitative effects of public investment, there should be less uncertainty whether the overall effects are positive for the advanced economies.** The literature debates the quantitative effects of public investments and the empirical estimates of output elasticity to public investment has large variance both for the short-term and long-term effects. A recent analysis by Blom and Ligthart (2014) documents the dispersion of the estimates and suggests that the average elasticity of output to public capital is around 0.1. Other estimates, as the IMF's WEO (2014, Chapter 3) find even larger effects of public investment for advanced countries. The model calibration sticks with the baseline value of 0.1.

**34. The effects of implemented fiscal measures are also supported by accommodative monetary policy stance.** Even without considering the accommodative monetary policy in the euro area, Austria—being a small-open economy—does not affect dramatically the area-wide inflation or output gap and thus does not trigger a strong policy response from the ECB.

**35. The strength of the fiscal measures is also influenced by the belief that the proposed measures will not be reversed.** An important transmission channel of both fiscal changes, especially in the near term, are expectations of households and firms about the long-run benefit of the government policy. Households and firms adjust their spending and investment plans that rely on the expected higher productivity spillovers or permanently lower income taxes. If the permanency of the measures were initially doubted, the impact of public policy changes would be smaller, until firms and households were convinced the policies would not be unwound.

## D. Conclusions

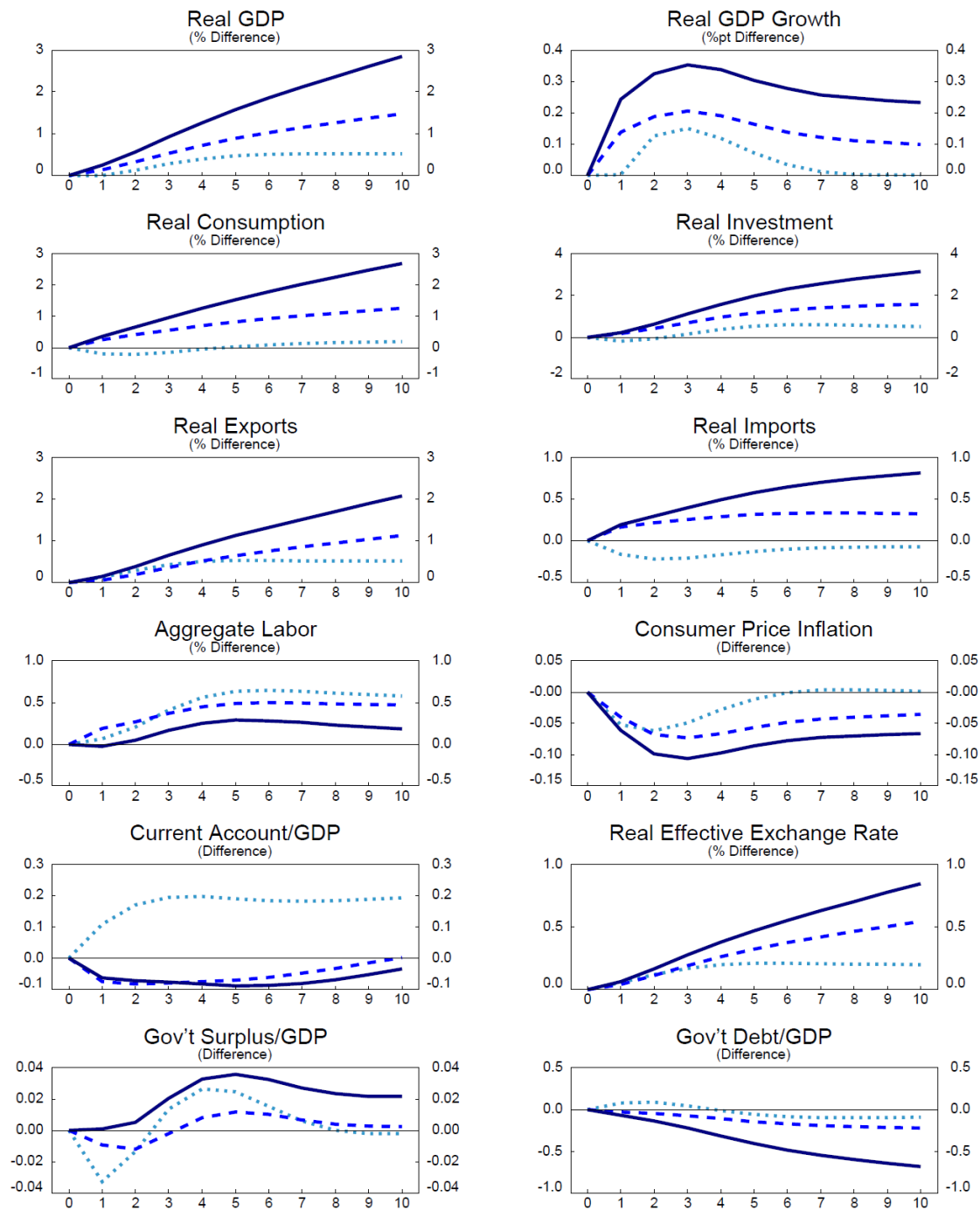
**36. The analysis in this paper suggests that a comprehensive package of structural and fiscal measures can permanently increase potential output in Austria.** The proposed measures increase output and private consumption by roughly 3 percent in the medium term, while safeguarding the public finance sustainability. Ultimately, the size of the output effect depends on the scale of the implemented reforms and can be scaled up in response to policy preferences. The proposed measures include a set of structural measures aimed at increasing total factor productivity, as well as lowering the labor income taxation and increase in public investment spending.

**37. Structural measures focused on further liberalization of professional services and lowering of the barriers to trade and investment would increase potential output.** Although Austria is among the countries with least restrictive business environment, there is a room for further improvement. The policy recommendations focus mostly on startups, professional services (legal, accounting, architecture, and engineering professions), competition in network industries, and barriers to FDI and investment, resulting in an estimated impact of roughly 1.5 percent of GDP in the medium term.

**38. Budget-neutral fiscal measures concentrated on more pro-growth tax structure and higher productive public investment increase the potential output.** The proposed decrease of labor tax revenues by 1 percent of GDP financed by an offsetting increase in consumption tax rate can increase the potential output by 0.5 percent. Further, increasing public investment by  $\frac{1}{2}$  percent of GDP financed by a commensurate drop in government consumption expenditures results in an additional increase in potential output of roughly 1 percent in the medium run. A bolder implementation of these policies would lead to correspondingly larger impact on output and consumption.

**Figure 4. Simulations – Summary**  
**Austria: Fiscal and Structural Measures (cumulative)**

... is Revenue rebalancing    - - - + Expenditure rebalancing    — + Structural measures



**Figure 4. GIMF Simulations– Fiscal Sector (concluded)**  
**Austria: Fiscal and Structural Measures (cumulative)**

... is Revenue rebalancing      - - - + Expenditure rebalancing      \_\_\_ + Structural measures

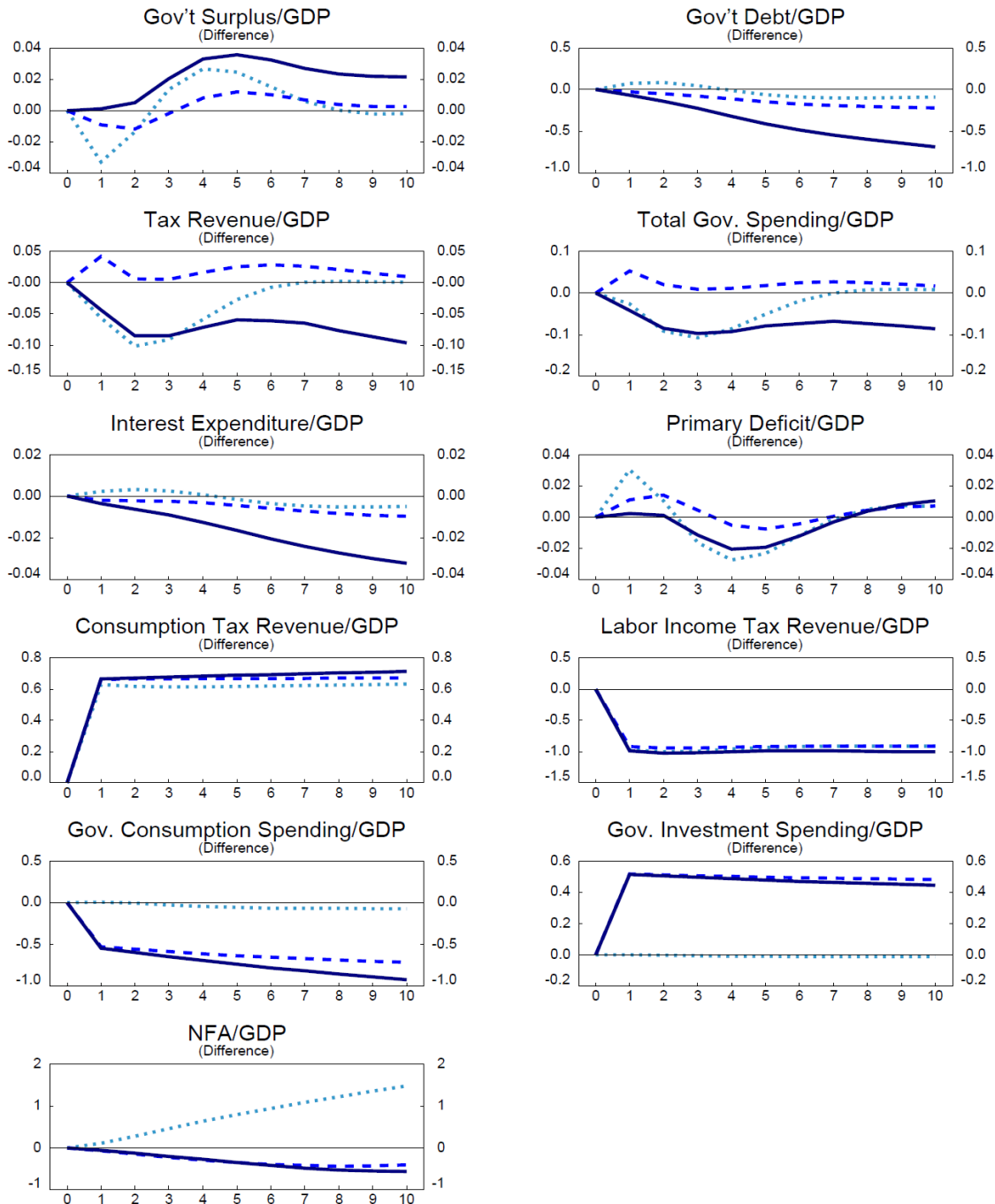


Figure 5. Economy-Wide PMR Index

## OECD PMR Indicator -- Proposed Measures

	ORIGINAL	REFORM	% Chg.
<b>ECONOMY-WIDE PMR</b>	<b>1.2</b>	<b>0.9</b>	<b>-22.6</b>
<b>BARRIERS TO ENTREPRENEURSHIP</b>	<b>1.3</b>	<b>0.9</b>	
<b>1 Administrative Burden on Startups</b>	<b>2.0</b>	<b>1.4</b>	
Admin burden for corporations			
Admin burden for sole owners			
Barriers in service sectors			
<b>2 Complexity of regulatory procedures</b>	<b>1.0</b>	<b>0.4</b>	
Licenses and permits systems			
Communication and simplification of rules			
<b>3 Regulatory Protection of Incumbents</b>	<b>0.9</b>	<b>0.8</b>	
Legal Barriers to Entry			
Antitrust Exemptions			
Barriers in network sectors			
<b>STATE CONTROL</b>	<b>1.7</b>	<b>1.7</b>	
<b>4 Public Ownership</b>	<b>2.3</b>	<b>2.3</b>	
Scope of SOEs			
Gov't involvement in network sectors			
Direct control over enterprises			
Governance of SOEs			
<b>5 Involvement in business operations</b>	<b>1.1</b>	<b>1.1</b>	
Price controls			
Command and control regulation			
<b>BARRIERS TO TRADE AND INVESTMENT</b>	<b>0.6</b>	<b>0.2</b>	
<b>6 Explicit barriers to trade and investment</b>	<b>0.3</b>	<b>0.2</b>	
Barriers to FDI			
Tariff barriers			
<b>7 Other barriers to trade and investment</b>	<b>0.9</b>	<b>0.2</b>	
Differential treatment of foreign suppliers			
Barriers to trade facilitation			

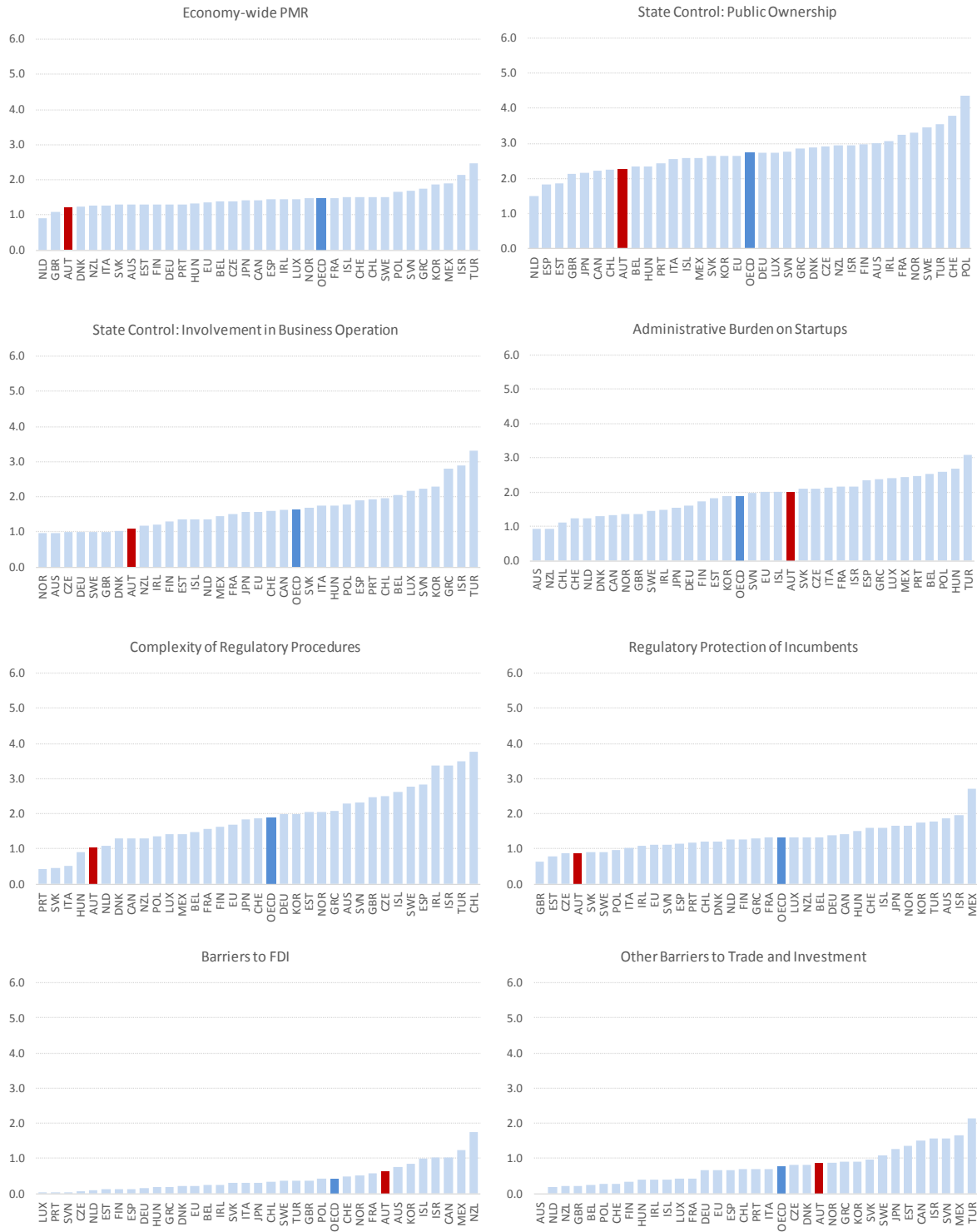
NOTE: IMF Staff calculations using the OECD PMR database.

Includes effects of replication discrepancies and rounding errors.



Figure 6. OECD Product Market Regulations Index

OECD PMR Indicator and Sub-Components



Source: OECD

Notes: Regulatory indices on a scale from 0-6, zero being the least restrictive. Austria in red, OECD average in dark blue.

## Annex I. The GIMF Model

The model used to quantify the impacts of fiscal and structural reforms in this paper is the IMF's Global Integrated Monetary and Fiscal model (GIMF), see Kumhof and others (2010) and Anderson and others (2013) for more detailed documentation and key properties of the model.

GIMF is a multi-country structural dynamic general equilibrium model. The model used in this paper features Austria, the rest of the euro area, and the rest of the world.

GIMF links the behavior of households, firms, and government sector within and among countries. The model has a consistent system of national accounting and stock-flow budget constraints for all sectors, including the government. The model belongs to the exogenous-growth family of models, meaning that the long-term (potential) growth of output is exogenous. Hence, fiscal or structural measures may change the structure of the economy, possibly increasing permanently the level of real output per capita, but not the potential output growth rate.

Household sector consists of forward-looking optimizing households, as well as of liquidity-constrained households who spend all their available income. The forward-looking households are modeled as overlapping generations (OLG) with finite lives, following the Blanchard-Weil-Yaari approach. The presence of OLG households breaks the Ricardian equivalence in GIMF and is important for realistic results of fiscal policy in the long run. Households have utility from consumption and disutility from labor effort, they consume traded and non-traded services, receive labor income, transfers from the government, dividends from corporations, and pay taxes—income, consumption, and lump-sum taxes.

Firms produce intermediate and final goods using the labor and capital inputs, cumulate capital, and import or export their production. Firms pay taxes from corporate income.

Monetary policy in the euro area and rest of the world regions follows an inflation-forecast targeting rule and set policy interest rates. Austria is a member of the euro area.

Government collects tax revenues and spends them on government consumption, investment, and transfers. Government target a specific debt-to-GDP (and thus deficit-to-GDP) target and uses a mix of its instruments to achieve it. The government's commitment to sustainable public finance is credible for firms and households, who hold the stock of government bonds.

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## CREDIT GROWTH AND ECONOMIC RECOVERY IN EUROPE: THE CASE OF AUSTRIA<sup>1</sup>

*Economic activity in Europe remains in general subdued nearly eight years after the global financial crisis (GFC) against the background of a slow expansion of bank credit despite historically low lending interest rates. Trying to identify the key factors underpinning such developments, this study, through a panel analysis, uncovers that: (i) indeed, Europe's and Austria's post-GFC recovery is slower than what one can expect after a crisis; (ii) regulatory capital, customer deposits, bank equity price index, loan quality, as well as the macroeconomic environment are key factors influencing bank credit developments; and (iii) bank credit to the private sector has a positive, but modest impact on economic activity in European countries, working mainly through the investment channel. Drawing on these findings, the study examines the behaviors of these bank-level and macroeconomic factors in the specific context of Austria.*

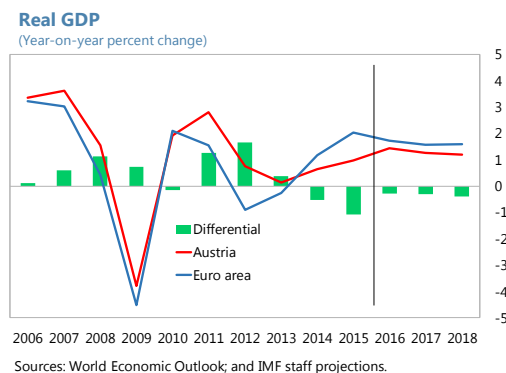
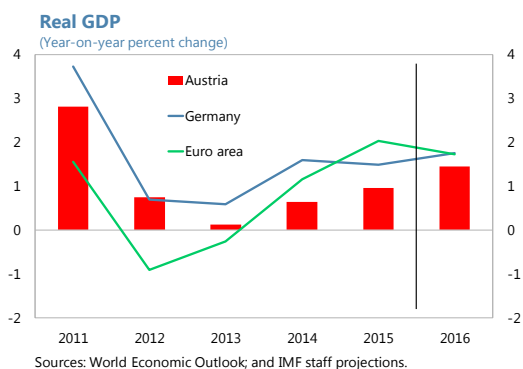
### A. Background

**1. Compared to other post-recession recoveries, economic activity in Europe and in Austria remains subdued years after the global financial crisis (GFC).** With a few notable exceptions, GDP growth rates remain lower than in other post-recession recoveries, and unemployment remains elevated. Estimates of potential growth have dropped notably relative to the early 2000s—a trend that, in some cases, started already in the pre-crisis period—largely on account of much lower investment and total factor productivity (TFP) growth.

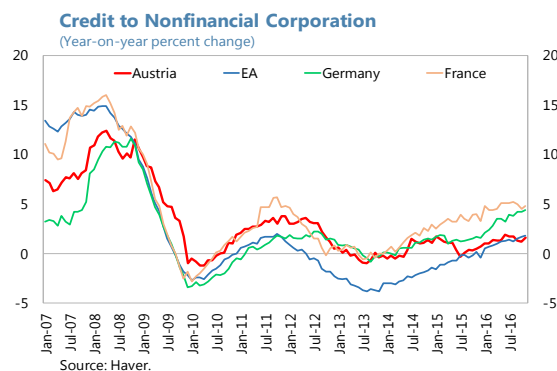
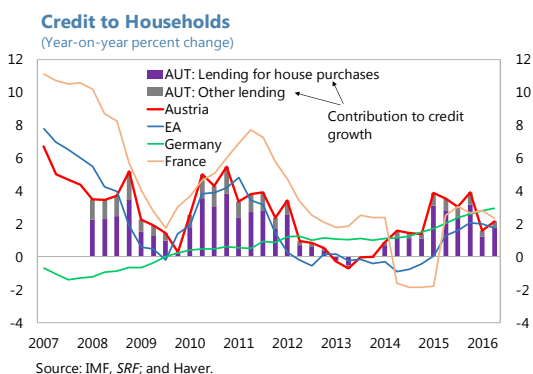
**2. GDP growth in Austria has been weak and lagging behind euro area growth.** Similar to other advanced European economies, Austrian economy's post-GFC recovery has been lackluster with GDP growth lower than the pre-crisis level. Nonetheless with the exception of 2010, GDP growth in Austria outperformed the euro area over the period 2006-2013. However, since 2014, economic growth has been lagging behind the euro area average. Austria's recovery has somewhat strengthened lately, with growth reaching 1.4 percent (y/y) in Q1–Q3 2016, but remains below that of peers.

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<sup>1</sup> Prepared by Etienne Yehoue. The paper draws on an ongoing cross-country analysis of credit growth and economic recovery in Europe after the global financial crisis performed by an EUR team including Sergei Antoshin, Marco Arena, Tonny Lybek, John Ralyea, and Etienne Yehoue under the supervision of Nikolay Gueorguiev.



**3. These developments have been accompanied by subdued credit expansion.** Credit growth to the private sector had recovered from post-crisis lows but decelerated again since 2012 and reached -2 percent in 2014. Although it is showing some signs of resumption, standing at 1.8 percent in 2015 and 2.0 percent y-o-y as of October 2016, it remains weak. The recent credit pick-up reflects strengthening lending to households (largely mortgages) against a background of rising house prices; business credit remains subdued.



**4. In light of these observations, this paper draws on a cross-country and bank-level analysis and addresses the following issues:**<sup>2</sup> (i) Is the weak recovery in Austria as expected given the scale and severity of the GFC and the credit boom that preceded it or is economic activity even weaker than expected? (ii) What are the main determinants of credit dynamics in Austria? (iii) How strong is the link between credit and economic activity? Has it changed post-GFC? The paper tackles these issues through a cross-country European and Austria-specific data analysis.

**5. The findings of the analysis can be summarized as follows.** The post-GFC recovery in Austria significantly lags typical post-recession recoveries for both normal and financial-crisis-driven recessions. Credit dynamics have also been much more subdued. In line with the cross country study' findings, bank-specific factors—loan quality, customer deposits, capital—are the key determinants of bank lending. Bank credit to the private sector has a positive, but modest impact on economic activity, working mainly through the investment channel. A more granular analysis for

<sup>2</sup> Credit Growth and Economic Recovery in Europe (forthcoming, European Department, International Monetary Fund).

Austria reveals, perhaps not surprisingly, that: (i) during the 2009 recession, when credit was scarce, sectors less dependent on outside (to the firms) financing survived the recession more easily, exhibiting a lower decline in value added compared to sectors more dependent on outside financing; (ii) similarly, during the creditless recovery of 2011–14, sectors less dependent on outside financing adjusted better and had higher value added growth compared to the other sectors; (iii) for investment, sectors less dependent on outside finance exhibited a lower decline in their investment rate than sectors more dependent on outside finance during the 2009 recession; and (iv) however, the same sectors (less dependent on outside finance) had a lower growth rate of investment than the other group of sectors during the 2011–14 creditless recovery.

## B. The Post GFC-Recovery in Austria: Is It Different?<sup>3</sup>

**6. The post GFC in Europe and Austria is assessed by first deriving a projection path for Europe’s recovery post GFC.** Drawing from Jorda et al (2013), the local projection (LP) method is used to develop projections of recession and recovery paths. It follows the specification below:

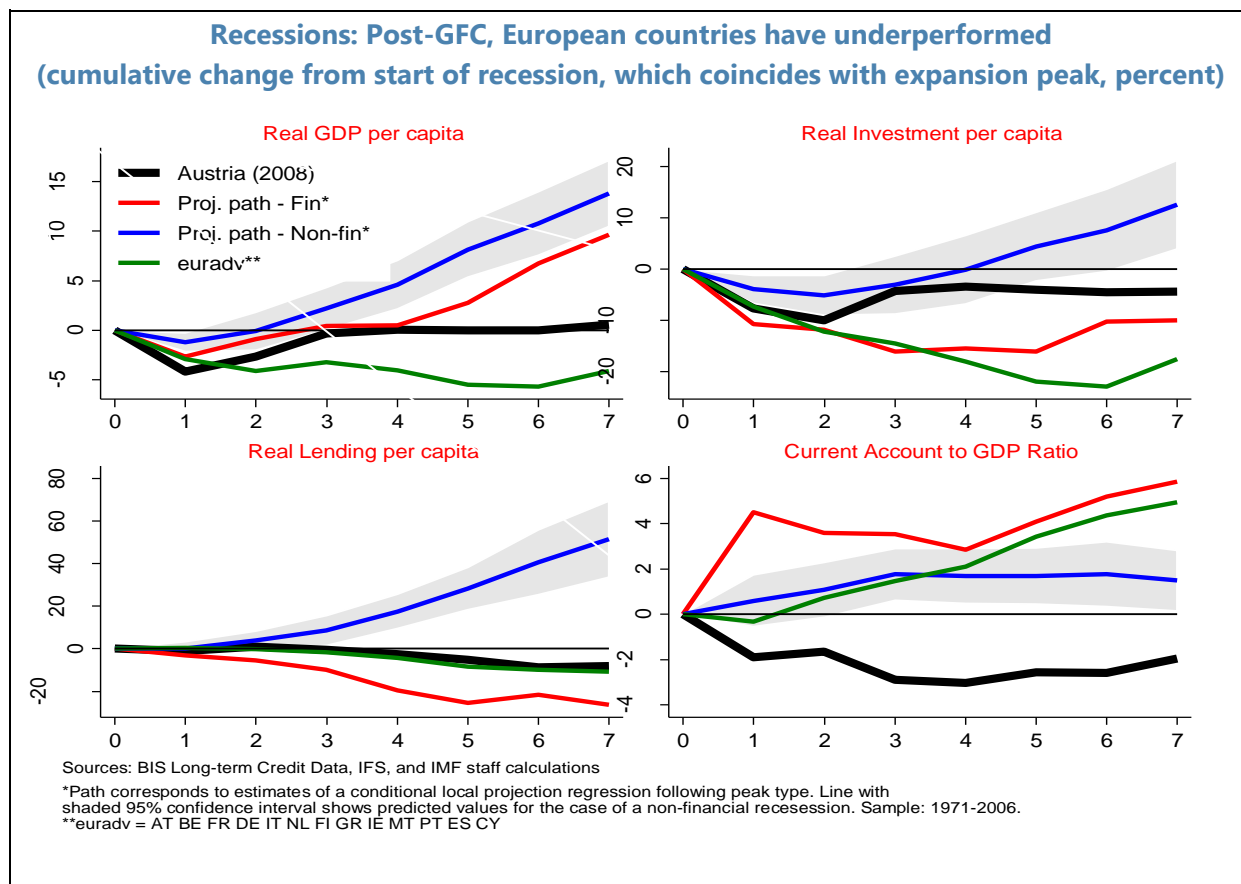
$$\Delta_h y_{i(r)+h}^k = \alpha_i^k + \phi_h N_{it(r)} + \gamma_h F_{it(r)} + \sum_{j=0}^p \beta_j^k Y_{it(r)-j} + e_{it(r)}^k$$

The dependent variable ( $y$ ) is the cumulative change in key macroeconomic variables (GDP growth, investment, credit, and the current account balance) in the aftermath of expansion peaks;  $N$  and  $F$  are dummy variables indicating whether the peak is followed by a normal (non-financial-crisis) recession, or financial crisis-driven one;  $\alpha$  represents the fixed effect for  $i$ th country; and  $e$  is the error term.  $Y$  is a vector of control variables. The coefficients  $\phi$  and  $\gamma$  on non-financial and financial peak dummies are of interest. Intuitively,  $\phi$  and  $\gamma$  are similar to the average cumulative response of dependent variable at each horizon (projection) period.

**7. The analysis reveals, as shown in the Figure below, that Europe and Austria have underperformed post-GFC.** European countries’ recovery has been weaker than the average recovery following past recessions. The same holds for Austria. However, Austria fares better than the advanced euro area as a bloc. Cumulative growth and investment in the Euro area only reached the lowest point six years after GFC, with the sovereign debt crisis in 2011–12 likely contributing to the “double-dip” visible in the charts. For Austria, the lowest point was reached only a year after the GFC for growth and only two years for investment, but the subsequent recovery was feeble and fizzled quickly. On lending dynamics, while Austria and the advanced Euro area have underperformed compared to the average recovery path after previous normal recessions, they fare better compared to the expected recovery path after financial recessions. The currency swap arrangements and quantitative easing mechanism put in place in the years after the GFC may explain the better performance relative to past financial recessions. With regard to the current account, while advanced Euro area broadly behaved as expected, Austria’s current account has consistently underperformed (starting from a large surplus), indicating that savings declined more

<sup>3</sup> In the cross-country paper, this analysis is performed by John Ralyea (EUR).

than investment as households and firms tried to smooth consumption in view of falling income and finance investment out of retained earnings.



## C. Determinants of Credit Growth<sup>4</sup>

**8. Bank-level cross country panel and Austria specific analyses point to both bank fundamentals as well as macro factors as influencing bank credit dynamics.<sup>5</sup>** In light of the low expansion of bank credit growth despite historically low lending interest rates, a bank-level panel analysis, covering 37 European countries (including Austria) and nearly 8000 banks, point to both bank specific and demand factors (Table 1).<sup>6</sup> The bank specific factors include bank capital, customer deposits, loan quality, and profitability. The demand factors include GDP growth and inflation.

<sup>4</sup> In the cross-country paper, this analysis is performed by Etienne Yehoue.

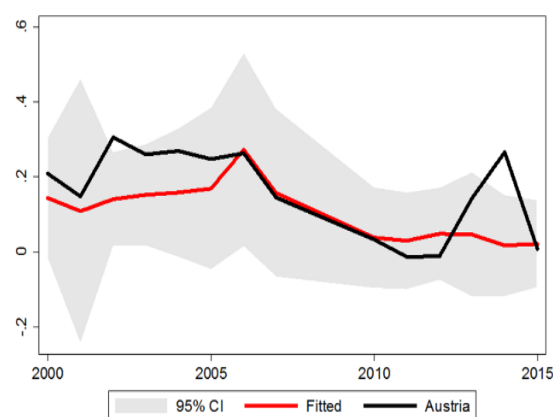
<sup>5</sup> The analysis uses annual data over 1999-2015 from *Fitch-Connect* for the bank specific data and from the *World Economic Outlook* (WEO) for the macroeconomic data. The credit growth variable is defined as growth of gross loans extended by individual banks to borrowers of a specific country.

<sup>6</sup> The analysis relies on system generalized method of moments (GMM) estimations, which appropriately lag the variables and instrument the right hand variables. This has helped to correct for potential correlation between right hand variables—through lags of different orders for a set of variables and other instruments for the rest—as well as dealing with potential endogeneity issues. The J-test of over-identifying restrictions or the Sargan validity test for instruments embedded in system GMM ensures the goodness fit of the specifications.

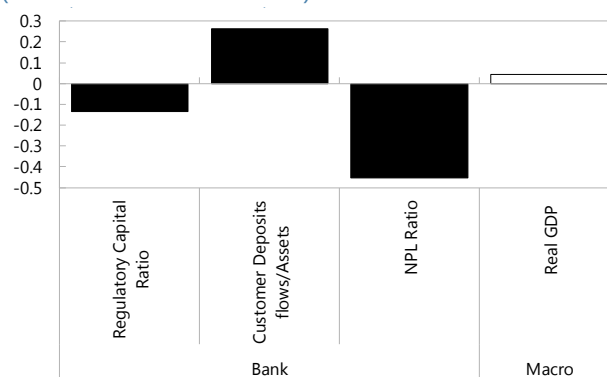


**9. The results for Austria are broadly in line with this finding (Table 2, and Text Figure below).** The fitted values in Austrian credit growth regression broadly co-move with the fitted values from the panel regression. Each of the factors affecting credit dynamics is examined in the Austrian context.

**Credit Growth: Austria vs. Fitted**



**Austria: Determinants of Credit Growth (Standardized coefficients)**



Source: IMF staff estimations.

### **Bank capital**

**10. Bank regulatory capital as percent of total assets is found significant in the cross country analysis with a negative sign, especially during recessions, indicating that raising regulatory capital tend to be associated with less credit expansion.<sup>7</sup>** Raising regulatory capital, owing to changes in regulatory standards or market requirements, either leads to less loanable funds or triggers deleveraging. It also suggests a dominance of the banks that did need to raise capital during recessions in the analyzed sample, as banks which did not need to raise capital would not have restrained lending.

**11. Although the fitted values in Austrian credit growth broadly co-move with the fitted values in the cross-country analysis, in the Austria specific regressions,<sup>8</sup> the bank regulatory capital result is somewhat weak.** In fact, Austria's banking system is sound with a capital adequacy ratio of 16.8 percent as of June 2016, although large banks are still lagging behind their peers in Europe. In the process of raising their capital, banks have used a number of tools, including mainly retained earnings and sales of non-core assets in Austria and abroad. Eidenberger, Schmitz, and Steiner (2014) have found that in Austria, about 27 percent of the raise in banks' regulatory capital ratio can be attributed to a reduction of total assets.

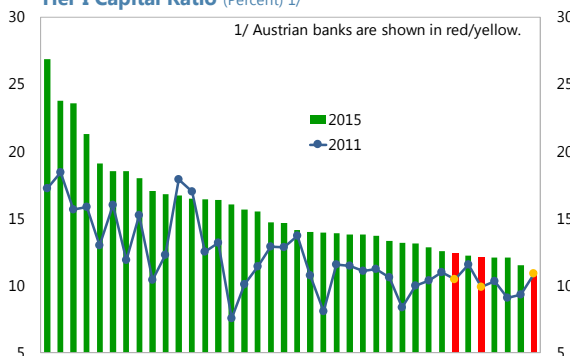
<sup>7</sup> The regulatory capital result is stronger during recessions in the cross-country analysis. Regulatory capital refers to the total bank capital as measured for regulatory purposes. It does not refer to the minimum capital required by the regulator.

<sup>8</sup> The cross-country results appear more robust than the Austria specific ones as the latter rely on just 78 observations compared to nearly 14,000 for the cross-country analysis.

**Figure 1. Selected Economic Indicators of the Banking System**

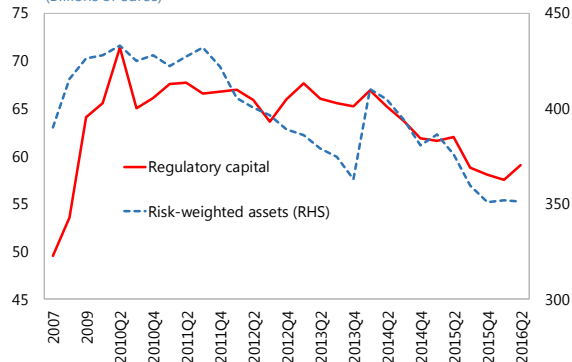
**Selected Large European Banks:**

**Tier I Capital Ratio (Percent) 1/**

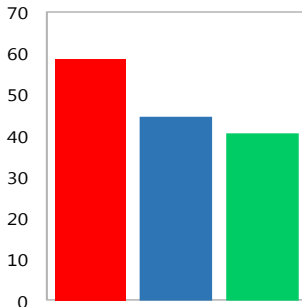


**Austrian Banks: Capital and Risk-Weighted Assets**

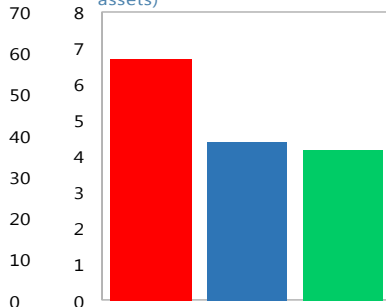
(Billions of euros)



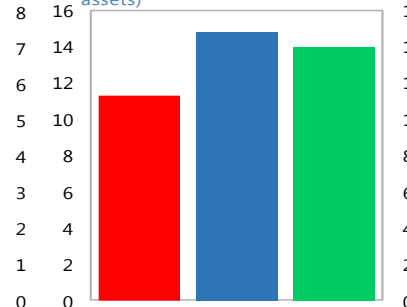
**Loans to Customers**  
(Percent of total assets)



**Leverage**  
(Tier-1 capital in percent of total assets)



**Tier-1 ratio**  
(Tier-1 capital in percent of risk-weighted assets)

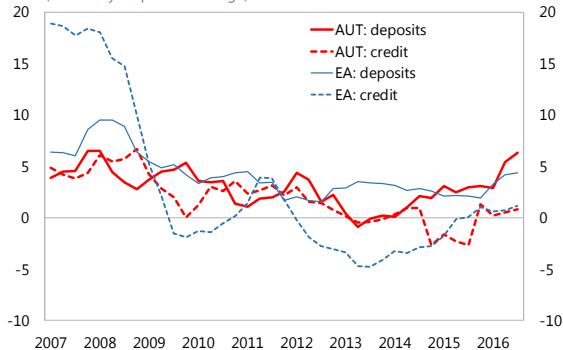


**■ AUT banking groups (top 3) ■ EU banking peer groups ■ EU banking groups with CESEE focus**

Source: OeNB: *Fact on Austria and Its Banks*, October 2016.

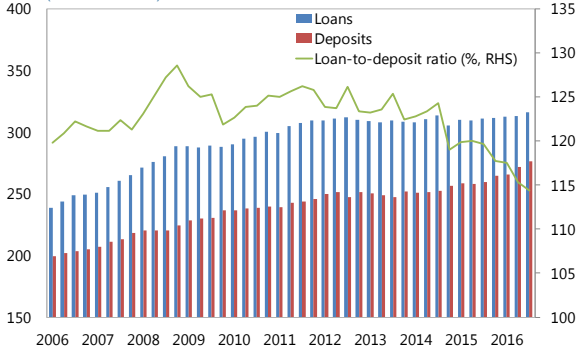
**Customer Deposits and Private Sector Credit**

(Year-on-year percent change)



**Austria: Funding**

(Billions of euros)



Sources: Haver; FSIs; OeNB, *Fact on Austria and Its Banks*, Oct. 2016; and IMF staff calculations.

### Customer Deposits

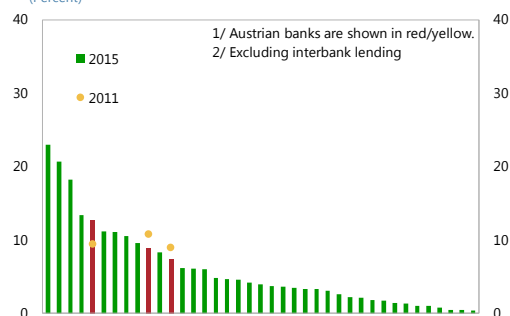
**12. The customer deposit variable is significant with a positive sign in the bank-level cross country analysis and appears to be supported by Austrian data.** This suggests that strong saving mobilization facilitates credit expansion. In Austria, customer deposit growth trended down over 2007-2011, showed some signs of recovery in 2012 before plummeting in 2013. Its growth stood at about zero percent in 2014Q1 and has been trending up since then. These deposit developments seem broadly in line with the credit dynamics highlighted above given the positive correlation between deposits and credits uncovered in the cross-country analysis but also supported in Austria specific regressions (Tables 1 and 2).

### Non-Performing Loans

**13. The NPL ratio variable is significant with a negative sign in the cross-country analysis.**

High NPL ratio indicates trouble in the economy or in the bank's loan selection process and hence triggers a more conservative approach to credit expansion. Even if the NPLs are fully provisioned, they still have costs in terms of credit expansion since the resources used for provisioning could have been used to extend further credits. In Austria, even though the NPL ratio for the banking system as a whole is relatively low (3.2 percent in 2016:Q2 when interbank lending is included in gross loans and 5.6 percent when interbank lending is excluded), some large banks exhibit an NPL ratio around 10 percent (text figure), which is relatively high compared to peers. Given the significant market share of these banks, this high ratio could be a drag on credit expansion for the banking industry.

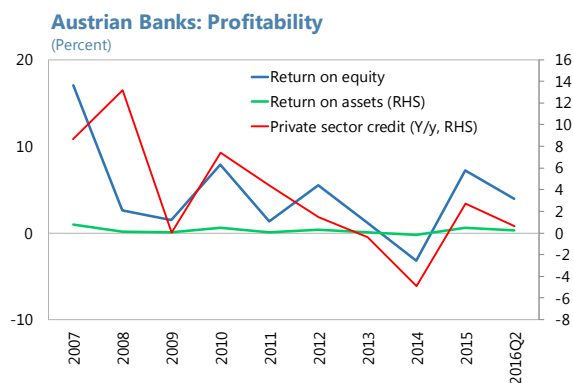
Selected Large European Banks: Nonperforming Loans Ratio 1/2/ (Percent)



### Profitability

**14. In Austria, bank profitability proxied by the return on equity (ROE) appears as a factor affecting bank lending dynamics.** Although bank profitability is not significant in the cross country analysis (whether proxied by the return on assets or on equity), it is significant with a positive sign in the empirical analysis focusing on Austria. Bank return on equity displays a fair correlation with credit growth (text figure), which is further confirmed by the regression analysis. The search for yield is a key driving factor of investors' behaviors and banks are no different. This underlines the significant exposures of Austrian banks to CESEE countries.

For example, the return to profits by Austrian banks in 2015 with ROA at 0.5 percent



Sources: Financial Soundness Indicators; and Haver.

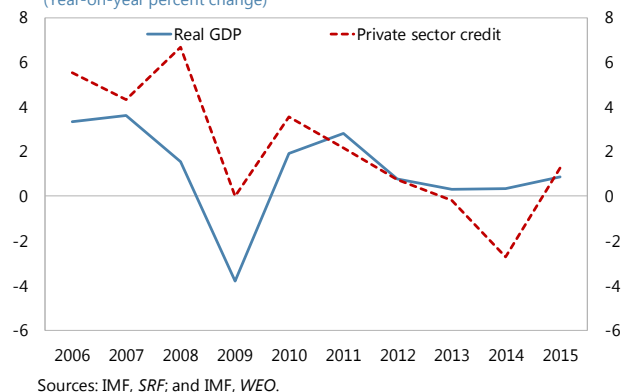
(against -0.2 percent in 2014) and ROE at 7.2 percent (against -3.2 percent in 2014) is to a large extent attributable to increased profits by the CESEE subsidiaries (OeNB, 2016).

### Macroeconomic Conditions: GDP Growth and Inflation

#### 15. Macroeconomic conditions captured by GDP growth and inflation matter for credit growth.

Higher real GDP growth is associated with stronger lending activity in the cross country analysis in line with the strong correlation displayed between real GDP growth and private credit growth. This finding is somewhat confirmed in the Austria-specific empirical analysis (Table 2), but just in one regression. The weak demand factor for Austria could be explained as Austrian corporations hold high cash positions and report very low demand for loans according to the Austrian Institute of Economic Research

**Real GDP and Private Sector Credit**  
(Year-on-year percent change)



(WIFO)'s survey as well as the joint European Commission-European Central Bank Survey on the access to finance of enterprises (SAFE) and the bank lending survey (BLS). The deceleration observed in credit growth by Austrian banks since 2012 is to some extent driven by weak credit demand. The most robust loan segment was in the mortgage sector, mirroring strong housing demand and price developments in some major Austrian cities. Real estate loans represent about 65 percent of total loans to households as of September 2016. High inflation hampers credit growth as evidenced by the cross-country analysis, especially for the Western European countries, although this finding is driven by the pre-crisis inflation rates. Overall, declining domestic economic activity and high inflation are found to reduce demand for credit as well as banks' willingness to lend.

#### D. GDP Growth and Credit Growth in Europe and Austria<sup>9</sup>

**16. In Europe, private sector's bank credit growth has been subdued during the recovery and in some countries there is no clear relationship between GDP growth and credit growth after the GFC, echoing a creditless recovery.** This makes the reexamination of the impact of credit growth on GDP growth crucial. This is relevant given the reliance on bank credit funding in the majority of European economies. The aim of this section is then to re-assess to what extent bank credit growth influences GDP growth.

**17. The analysis reveals that the impact of credit growth on GDP growth is somewhat weak in advanced Europe and Austria.** Country-level panel analysis using a dynamic GMM estimator (Blundell and Bond, 1998) for 22 Advanced European (AE) countries suggests an estimated coefficient of about 0.03–0.04, i.e., a 10 percentage points increase in credit growth would raise GDP growth by 0.3–0.4 percent. We would expect this result to hold to Austria as well, as the fitted values

<sup>9</sup> In the cross-country paper, this analysis is performed by Marco Arena.

of this regression for Austrian banks fall within the confidence interval of the panel regression. A further analysis of the Austrian data reveals that while recovery period for economic activity started in 2010 in Austria, credit growth was negative between 2011 and 2014, suggesting an episode of creditless recovery between 2011 and 2014.

**18. To gain a better understanding of the impact of credit on economic growth in Austria a more granular analysis is conducted.** It uses manufacturing subsectors and assesses their impacts in terms of value added to economic activities and on investment.

#### ***Sectoral Analysis based on Value Added***

**19. Based on 22 manufacturing subsectors (Appendix 1), the growth rate of value added is analyzed across sectors according to the degree of dependence on external financing developed by Rajan and Zingales, 1998 and Kroszner et al., 2007.<sup>10</sup>** The analysis reveals that during the 2009 recession when credit was scarce, sectors less dependent on outside (to the firms) financing survived the recession more easily, showing a lower decline in value added compared to sectors more dependent on outside financing, but the results are less clear for advanced European countries (AE). In the creditless recovery of 2011–14, sectors less dependent on outside financing adjusted better and had higher value added growth compared to the other sectors. The heterogeneity among countries could explain the less clear picture that emerges for AE countries (Text table below).<sup>11</sup>

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<sup>10</sup> The 2007 updated figures by Kroszner et al. are used in this paper.

<sup>11</sup> It is noteworthy mentioning that in Austria, manufacturing sectors only make up about  $\frac{1}{4}$  of the Austrian economy (by revenue and gross value added); therefore, the impact of this finding on the whole economy may not be that significant.

<b>Growth Rate of Value Added</b> (in percent)				
	<b>Austria</b>		<b>Advanced Europe</b>	
	<b>median</b>	<b>mean</b>	<b>median</b>	<b>mean</b>
<b>Recession</b>	-12.3	-14.9	-7.8	-10.3
Recession, less dependent sectors (external index<median)	-10.2	-10.8	-7.0	-9.7
Recession, less dependent sectors (external index<25th percentile)	-6.9	-11.8	-7.4	-10.0
Recession, more dependent sectors (external index>median)	-16.9	-18.7	-8.4	-10.8
Recession, more dependent sectors (external index>75th percentile)	-16.9	-12.3	-9.2	-11.1
<b>Recovery</b>	1.0	1.3	0.7	1.2
Recovery, less dependent sectors (external index<median)	1.1	0.6	-0.3	-0.1
Recovery, less dependent sectors (external index<25th percentile)	1.2	0.7	-1.7	-1.5
Recovery, more dependent sectors (external index>median)	0.9	1.9	1.6	2.2
Recovery, more dependent sectors (external index>75th percentile)	0.7	1.4	0.7	1.2
<b>Recovery (creditless recoveries)</b>	0.3	-0.7	0.3	0.6
Recovery, less dependent sectors (external index<median)	0.5	-0.6	-0.8	-0.9
Recovery, less dependent sectors (external index<25th percentile)	0.3	-0.4	-1.1	-2.1
Recovery, more dependent sectors (external index>median)	0.1	-0.7	1.0	1.9
Recovery, more dependent sectors (external index>75th percentile)	-0.2	-1.4	-0.2	0.5

### ***Sectoral Analysis based on Investment***

**20. The same analysis is conducted with investment.** It reveals that during the latest recession, sectors less dependent on outside finance exhibited a lower decline in their investment rate than sectors more dependent on outside finance during the 2009 recession. However, in the 2011–14 creditless recovery, the same sectors (less dependent on outside finance) had a smaller growth rate of investment than the other group of sectors in both Austria and AE countries (Text table below).

Change in Investment Rate (percentage points)				
	Austria		AE	
	median	mean	median	mean
<b>Recession</b>	-1.0	-1.6	-0.7	-0.9
Recession, less dependent sectors (external index<median)	-0.4	-1.2	-0.6	-0.6
Recession, less dependent sectors (external index<25th percentile)	-0.5	-0.8	-0.5	-0.9
Recession, more dependent sectors (external index>median)	-2.6	-2.0	-0.9	-1.2
Recession, more dependent sectors (external index>75th percentile)	-2.3	-2.1	-0.9	-1.2
<b>Recovery</b>	0.0	-0.1	0.1	-0.2
Recovery, less dependent sectors (external index<median)	-0.1	-0.3	-0.2	-0.8
Recovery, less dependent sectors (external index<25th percentile)	-0.4	-0.4	-0.1	-0.2
Recovery, more dependent sectors (external index>median)	0.2	0.1	0.0	-0.2
Recovery, more dependent sectors (external index>75th percentile)	-0.3	-0.2	-0.1	-0.3
<b>Recovery (creditless recoveries)</b>	0.2	0.2	0.1	-0.2
Recovery, less dependent sectors (external index<median)	0.1	-0.1	0.1	-0.5
Recovery, less dependent sectors (external index<25th percentile)	-0.4	-0.4	-0.3	-0.1
Recovery, more dependent sectors (external index>median)	0.8	0.5	0.1	0.1
Recovery, more dependent sectors (external index>75th percentile)	0.3	0.3	0.0	0.2

## E. Concluding Remarks

**21. This paper examines the relationship between credit growth and economic activity in Austria, especially in the post-GFC recovery.** It investigates whether the weak recovery in Austria is as expected given the scale and severity of the GFC and assesses the role of credit in the process. In particular, it examines the main determinants of credit dynamics in Austria, as well as the link between credit and economic activity and how it has evolved before and after the GFC.

**22. It emerges from the analysis that the post-GFC recovery in Austria significantly lags typical post-recession recoveries for both normal and financial-crisis-driven recessions.** It is shown that credit dynamics following the 2009 recession have also been much more subdued. Bank-specific factors such as loan quality, customer deposits, and capital are the key determinants of bank lending. Bank credit to the private sector influences economic activity, but the impact is modest, working mainly through the investment channel.

**23. A more granular analysis using manufacturing subsectors is also conducted for Austria.** The dynamics of these subsectors differ in terms of value added to economic activity or

investment depending on their dependence on external financing. In general, less credit dependent sectors are less hit during recessions and recover faster during creditless recovery. For example, during the 2009 recession, sectors less dependent on outside financing exhibited a lower decline in value added compared to sectors more dependent on outside financing. In the subsequent creditless recovery, less external finance-dependent sectors have higher value added growth compared to the external finance-dependent sectors.

**24. Some policy recommendations can be drawn from the findings.** The first relates to asset quality. The results show that non-performing loans can be a major drag on credit growth. Austria banks in general have performed well on NPLs, however, improvements are needed with regard to their subsidiaries in CESEE countries where NPL ratios are over 17 percent in some countries (in Croatia and Hungary for example). As such, proactive actions by banks to dispose impaired loans, combined with improvements in legal framework and tax system that provide the right incentives for the disposal and resolution of problem loans are vital to facilitate credit expansion and economic growth. The second relates to funding to finance lending activities. The GFC has highlighted the consequences of sudden stop of external funding and the importance of averting them. At the same time this paper highlights the crucial role of customer deposits in supporting credit expansion. In this regard, banks need to improve the management of their funding operations and diversifying their funding structure with more emphasis of customer deposits, which are more stable, to reduce vulnerability to sudden stops.



**Table 1. Cross-Country Analysis of Determinants of Credit Growth: Regression Results**

VARIABLES	Europe				Advanced Europe				CESEE		
	(1) Real Credit Growth	(2) Real Credit Growth	(3) Real Credit Growth	(4) Real Credit Growth	(5) Real Credit Growth	(6) Real Credit Growth	(7) Real Credit Growth	(8) Real Credit Growth	(9) Real Credit Growth	(10) Real Credit Growth	(11) Real Credit Growth
Real credit growth (-1)	0.0137 (0.0271)	0.0108 (0.0273)	0.00742 (0.00795)	-0.0187 (0.0178)	-0.0321 (0.0442)	0.0134 (0.0194)	0.00915 (0.00906)	0.00941 (0.00828)	0.0479 (0.0359)	0.0415 (0.0389)	0.0574 (0.0445)
Regulatory capital ratio	-0.0243 (0.0173)	-0.00116 (0.0169)	0.0101 (0.0198)	-0.0146 (0.0206)	-0.0302* (0.0167)	-0.00476 (0.0120)	-0.00781 (0.0222)	0.000590 (0.0233)	0.0992 (0.133)	0.375 (0.533)	0.178 (0.112)
Customer deposit flows/Assets	0.629*** (0.0868)	0.386*** (0.106)	0.444*** (0.0958)	0.572*** (0.0906)	0.564*** (0.0874)	0.279*** (0.108)	0.507*** (0.138)	0.698*** (0.131)	0.639*** (0.103)	0.939*** (0.320)	0.667*** (0.130)
ROAA	-0.102 (0.432)	1.735 (1.759)	0.759 (1.002)	0.330 (0.807)	-0.132 (0.853)	2.743 (1.758)	3.975 (3.504)	0.120 (0.827)	-0.0538 (0.551)	0.423 (3.551)	
Liquid assets/Total assets	-0.0427 (0.0371)	-0.0169 (0.0262)			-0.00289 (0.0224)	0.00254 (0.0249)			-0.0711 (0.0680)	-0.0214 (0.0695)	
NPL ratio	-0.284 (0.283)	-0.959* (0.569)	-1.321*** (0.419)	-1.199** (0.579)	-0.377 (0.342)	-0.882* (0.459)	-0.851 (0.786)	-0.654 (0.610)	-0.440** (0.176)	-1.070* (0.627)	-1.612*** (0.473)
Bank equity price index	-0.0208 (0.0183)	-0.00254 (0.00838)	-0.000868 (0.00790)	0.0281*** (0.00956)	-0.00504 (0.00727)	-0.0133 (0.0108)	0.00103 (0.00920)	0.0106 (0.0157)	0.0155 (0.0107)	-0.000868 (0.0168)	
Real GDP growth	2.440*** (0.374)	1.842*** (0.413)	1.870*** (0.531)	1.708*** (0.416)	2.092*** (0.563)	1.804*** (0.494)	2.653*** (1.018)	2.918*** (0.677)	1.147*** (0.414)	1.184* (0.657)	1.322*** (0.319)
Inflation	0.439 (0.457)	0.0705 (0.711)	0.606 (0.576)	0.278 (0.810)	-0.354 (0.250)	-0.521* (0.278)	0.361 (0.591)	0.616 (0.660)	-0.162 (0.247)	-0.0886 (0.310)	
Recession dummy	-0.00582 (0.0661)	0.00848 (0.100)	-0.0580 (0.0766)	0.328*** (0.127)	0.0280 (0.0360)	0.0550 (0.0599)	0.159 (0.124)	0.145* (0.0747)	-0.0237 (0.0436)	-0.251 (0.236)	
Recovery dummy	-0.0956 (0.0682)	-0.185*** (0.0584)	-0.163*** (0.0500)	-0.0717 (0.0672)	-0.0348* (0.0179)	-0.147*** (0.0536)	0.00572 (0.127)	0.0227 (0.0392)	-0.0665** (0.0303)	-0.231** (0.115)	
Regulatory capital*Recession dummy		-0.149*** (0.0561)	-0.135** (0.0559)	-0.163*** (0.0446)		-0.143** (0.0557)	-0.153** (0.0600)	-0.181*** (0.0474)		-0.113 (0.524)	
Deposit flows*Recession dummy		0.0924 (0.187)				0.155 (0.194)				-0.642* (0.363)	-0.332* (0.197)
NPL*Recession dummy		0.447 (0.677)	0.808* (0.486)	0.636 (0.644)		0.202 (0.621)				0.944 (0.618)	1.301*** (0.429)
Bank equity Index*Recession dummy		0.0251 (0.0496)	0.0497 (0.0536)	-0.123** (0.0624)		0.00320 (0.0322)				0.102 (0.124)	
Regulatory capital*Recovery dummy		-0.0530 (0.0515)	-0.0734 (0.0476)			-0.0607 (0.0563)	-0.00853 (0.0467)			-0.287 (0.586)	
Deposit flows*Recovery dummy		0.0920 (0.174)	0.0211 (0.141)	-0.284* (0.146)		0.179 (0.146)				-0.458 (0.386)	
ROAA*Recession dummy		-1.853 (2.115)				-3.868 (2.603)	-4.478 (5.029)			-0.00628 (3.589)	
ROAA*Recovery dummy		1.210 (2.142)	0.168 (1.651)	1.686 (1.625)		-0.265 (2.074)	-3.405 (5.190)			1.244 (3.725)	
NPL*Recovery dummy		0.848 (0.639)	1.117** (0.468)	1.159* (0.602)		0.768 (0.520)				0.840 (0.657)	1.049** (0.443)
Bank equity Index*Recovery dummy		0.0581** (0.0226)	0.0505** (0.0213)	0.00994 (0.0290)		0.0385** (0.0188)	0.0167 (0.0283)			0.0855 (0.0548)	
Constant	0.153* (0.0925)	0.0967** (0.0414)	0.101*** (0.0312)	0.00576 (0.0444)	0.101*** (0.0341)	0.130*** (0.0387)	0.0220 (0.0556)	0.000705 (0.0528)	0.102** (0.0445)	0.109** (0.0516)	0.115*** (0.0327)
Observations	11,973	11,973	13,925	13,925	10,794	10,794	12,540	12,540	1,179	1,179	1,385
Number of fid	3,119	3,119	3,261	3,261	2,890	2,890	3,014	3,014	229	229	247

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 2. Determinants of Credit Growth: Austria

VARIABLES	(1) Real Credit Growth	(2) Real Credit Growth	(3) Real Credit Growth	(4) Real Credit Growth	(5) Real Credit Growth
Real credit growth (-1)	0.0531 (0.157)	-0.0440 (0.168)	-0.0336 (0.218)	-0.321 (0.878)	-0.181 (0.381)
Regulatory capital ratio	-0.102* (0.0597)	-0.0657 (0.0468)	-0.224 (2.894)	3.210 (8.808)	-0.0425 (0.0916)
Customer deposit flows/Assets	0.457*** (0.126)	0.411** (0.176)	0.661 (0.831)	1.742*** (0.670)	0.959 (1.309)
ROAE	0.0295 (0.0320)	0.000437 (0.0283)	-0.00227 (0.0503)	0.121* (0.0716)	0.0105 (0.0809)
Liquid assets/Total assets	0.0720 (0.387)	-0.300 (0.458)	-0.117 (0.324)		
NPL ratio	-1.638* (0.973)	-1.038 (0.892)	-1.896* (1.041)	14.61 (16.87)	-3.396 (11.34)
Bank equity price index	0.00179 (0.0695)	0.00103 (0.0648)	-0.0515 (0.0833)	0.111 (0.113)	-0.0112 (0.159)
Real GDP growth	0.524 (1.469)	3.749 (2.386)	6.915** (3.181)	2.820 (4.181)	2.174 (2.369)
Inflation	-1.094 (2.596)	0.249 (3.913)	0.492 (1.979)	-0.00192 (2.493)	-0.333 (3.428)
Recession dummy	-0.0585 (0.248)		-0.766 (21.24)	-2.955 (4.506)	0.980 (2.211)
Recovery dummy	0.0570 (0.235)	-0.152 (0.170)	-0.433 (0.431)	1.124 (0.998)	-0.174 (0.993)
NPL*Recession dummy		93.35 (63.80)	13.06 (266.5)	-26.01 (58.94)	2.857 (17.18)
Deposit flows*Recession dummy		-43.90 (37.80)	0.908 (7.213)		
Regulatory capital*Recovery dummy			0.129 (2.893)	-3.210 (8.664)	
Deposit flows*Recovery dummy			-0.427 (0.967)	-1.441* (0.871)	-0.636 (1.497)
ROAA*Recession dummy		8.216 (5.594)	0.229 (18.97)		
ROAA*Recovery dummy			0.181 (0.241)	-0.626 (1.182)	0.0816 (0.422)
Bank equity Index*Recovery dummy			0.200 (0.161)	-0.0762 (0.153)	-0.0113 (0.171)
Regulatory capital*Recession dummy		-61.51 (41.32)		35.25 (30.06)	-9.241 (19.21)
NPL*Recovery dummy				-14.58 (14.19)	2.547 (11.90)
Constant	0.0941 (0.400)	0.258 (0.340)	0.256 (0.326)	-1.205 (1.255)	0.252 (0.977)
Observations	78	78	78	78	78
Number of fid	20	20	20	20	20

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

## Appendix 1. Manufacturing Sectors and Index of External Dependence

Number	ISIC-3	Rajan and Zingales (1998)	Krozner et al (2007)
1	Food	0.14	-0.15
2	Beverages	0.08	0.03
3	<b>Tobacco</b>	-0.45	-1.14
4	Textiles	0.40	0.01
5	Apparel	0.03	-0.21
6	Leather	-0.14	-0.95
7	Footwear	-0.08	-0.74
8	Wood products	0.28	0.05
9	Paper	0.18	-0.35
10	Printing	0.20	-0.42
11	<b>Petroleum refined products</b>	0.04	-0.02
12	Chemicals products	0.25	-0.25
13	<b>Basic chemicals</b>	0.25	-0.19
14	Rubber products	0.23	-0.02
15	Plastic	1.14	-0.02
16	Non-metal products	0.06	-0.29
17	Glass products	0.53	0.03
18	<b>Iron and steel</b>	0.09	0.05
19	Non-ferrous metals	0.01	-0.12
20	Metal products	0.24	-0.25
21	Electrical equipment	0.77	0.24
22	Motor vehicles	0.39	0.06
23	Other transport equipment	0.31	-0.08
24	Furniture	0.24	-0.38
25	Machinery	0.45	-0.04

\*Sectors in red were not included in the analysis due to data constraints.

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