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Quantifying the economic benefits with a DSGE model

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Abstract

Austria's EU accession 25 years ago, alongside Finland and Sweden, was preceded by an extended period of convergence toward the EU: via the free trade agreement concluded with the EC in 1973, and the participation in the European Economic Area (EEA) in 1994. Although the Corona crisis in 2020 seems to overshadow the overall positive balance of 25 years EU membership, on average the real GDP growth dividend amounted to 0.8 percentage points (pp) per year since 1995. To check the robustness of this result, obtained with an integration macro model, a DSGE model for Austria is used here. Usually other methods are applied to estimate integration effects: trade gravity models, CGE models, macro models. Following in't Veld's (2019) approach with a DSGE model for the EU, we adapt an earlier version of the two-country DSGE model for Austria and the Euro area (Breuss and Rabitsch, 2009) to evaluate the benefits of Austria's EU membership. It turns out that grosso modo the macro results can be confirmed with the DSGE model.

Keywords: European Integration; Model simulations; country studies
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Contents

1. Introduction

The year 2020 – paraphrasing Queen Elizabeth II - will be remembered as an "annus horibilis". The world has been infected by the Coronavirus and as a reaction most governments locked down all activities of the economy. This resulted in the worst recession since the Great Depression in the thirties. Many celebrations are overshadowed by the Corona crisis: The 75th anniversary of the end of World War II, the 70th anniversary of the foundation of the EU (Schuman Declaration – "Europe day", 9 May 1950) and the memory of 25 years of EU membership of Austria, Finland and Sweden. This must be kept in mind when in the following the experience with the EU is evaluated. Nevertheless, the unique Corona crisis year 2020 should not make forgotten the achievements during 25 years of EU membership.

Austria, together with Finland and Sweden, joined an EU with twelve Member States 25 years ago, which grew to 28 Member States by 2013. With the Brexit, it shrank to 27 countries. As a member of EFTA, Austria had already closely approached the EU's trade policy through the Free Trade Agreement with the EC in 1973 (in the following FTA-EC-EFTA) and the participation in the European Economic Area (EEA) in 1994. With its accession to the EU in 1995, Austria participated in all subsequent deepening steps of EU integration (EMU with the euro; Schengen Agreement) and in the EU enlargement process. Austria's membership in the EU has made it politically more European, more modern and more open, and it has also benefited economically from all levels of integration.

This article describes firstly Austria's approach towards the EU. Then it applies a DSGE model for Austria to evaluate the benefits of Austria's EU membership since 1995. Additionally, these results are confronted with those won from an integration macro model. A comparison of the economic performance of Austria with Finland and Sweden und estimates of their benefits from EU membership concludes this analysis.

2. Austria's step by step approach towards the EU

Austria had been a member of EFTA since 1960, participated then one year (2014) in the European Economic Area (EEA) and, together with Finland and Sweden, joined the EU 25 years ago (For a short history, see Table 1). An intensive political discussion in Austria preceded EU accession; above all, there were initially concerns about the compatibility of Austria's status of permanent neutrality with a full EU membership (Breuss, 1996; Gehler, 2002; Griller et al., 2015). Happily, the collapse of communism in 1989 and the resolution of the Soviet Union in 1991, also removed the fear of a Soviet veto against Austria's EU accession. After a hot political debate, the then ruling grand coalition (SPÖ and ÖVP) reached a consensus that Austria should join the EU. Therefore, on July 1989 the Austrian federal government decided to apply for EU membership.

After joining the EU, Austria participated in all steps of deepening the Union: a must for every new member is the entry into the internal (or single) market. It grants the four freedoms for goods, services, capital and labour. Austria was also among the first eleven countries that founded the EMU in 1999 and introduced the euro as legal tender in 2002. In the meantime, 19 EU member states are euro area countries. Austria also joined the Schengen Agreement on April 28, 1995, which led to the end of border controls on April 1, 1998. This means that Austria (unlike Sweden, which has not yet introduced the euro) has advanced formally to become a role model EU member state. However, the lack of implementation of EU law shows that this is not quite the case in practice (Wolfmayr, 2019; European Commission, 2018).

Table 1: A short history of Austria's approach towards the EU

17 July 1989:	Austria (as a then EFTA member) applies officially to join the EC ("letter to Brussels").
1 February 1993:	Start of the accession negotiations
1 January 1994:	The European Economic Area (EEA) enters into force: EC plus Austria, Finland, Iceland, Norway, Sweden and Liechtenstein
30 March 1994:	End of accession negotiations: Accession Treaty
12 June 1994:	In a referendum in Austria 66.6% of the population voted for an accession to the EU.
24-25 June 1994:	European Council meeting in Corfu, Greece: Austrian representatives sign the Accession Treaty EU-Austria.
1 January 1995:	Austria (together with Finland and Sweden) becomes the 15th member of the EU. Austria leaves the EFTA.
28 April 1995:	Austria accedes to the Schengen Agreement.
1 January 1999:	Austria becomes one of the 11 founding members of the Economic and Monetary Union (EMU).
1 January 2002:	The Euro is becoming the legal tender in the Euro area.
1 May 2004:	The EU-15 is enlarged by 10 new member states: EU-25
1 January 2007:	Bulgaria and Romania become members of the EU-27.
1 July 2013:	Croatia becomes a member of the EU-28.
1 February 2020:	The United Kingdom leaves the EU: the EU shrinks to EU-27.

The dual nature of European integration in the 1960s (European Economic Community, EEC (since 1967 European Communities, EC) versus EFTA was overcome by the FTA-EC-EFTA in 1973. By the middle of 1977, these created a large free trade area in Europe (at least for industrial and commercial goods). The next step towards Austria's rapprochement with the EU came with the participation in the EEA in 1994, which already implemented two-thirds of the law concerning EU's internal market. The full liberalization then took place on January 1, 1995 by participating in the four freedoms of the EU internal market (Breuss, 2020a).

Before the start of each integration step, several studies were carried out in the EU[1] and also in Austria (especially by the Austrian Institute of Economic Research, Wifo) in order to estimate ex ante the possible integration effects[2]. Austria had already earned a big part of the economic fruits through the intensification of foreign trade relations with the EU via the FTA-EC-EFTA of 1973 and the membership in EEA in 1994. So, the expectations about an additional welfare gain through a full membership in the EU were subdued but realistically positive. Most Austria's EU accession studies predicted an annual increase in real GDP by around ½ percentage points.

The constant deepening of EU integration has also increased its complexity and caused an ever bigger challenge for estimating the possible integration effects. The EEC Customs Union established in 1968 could still be evaluated with the simple theoretical effects developed by Viner (1950) - trade creation and trade diversion. With the advancement of EU

[1] Cecchini Report (1988) evaluating the impact of the Single Market; European Commission (1990) studied the implication of EMU and the single currency in Europe. A summary of studies about the quantitative effects of European Post-War Economic integration can be found in Badinger and Breuss (2011).
[2] An overview of such Austrian studies can be found in Breuss (2012) and Beer et al. (2017).

integration - internal market (with the four freedoms) as well as the EMU and the introduction of the euro - other macroeconomic effects had to be considered in addition to pure trade effects.

3. Participating in an ever closer union

Connected with the accession to the EU there was a restriction of national autonomy and the transfer of competences to the EU in favour of an increased participation in the European community[3]. Participation in the supranational organization European Union (it is a hermaphrodite between the confederation and the federal state, namely a confederation of states) resulted in significant changes to the Austrian constitution (Öhlinger, 2015). The attempt to gradually create the "United States of Europe" - an old dream - by means of the "Treaty establishing a Constitution for Europe" (TCE or Constitutional Treaty) failed after the negative referenda in France and the Netherlands in 2005. Ultimately, however, essential elements have taken up in the currently valid Treaty of Lisbon - in force since December 1, 2009 - adopted in the form of two partial contracts (The Treaty on European Union, TEU and The Treaty on the Functioning of the European Union, TFEU). In the preamble to the Treaty on European Union (TEU), the finality of the EU is addressed relative vaguely but decisively by the target ".. *creating an ever closer union among the peoples of Europe, in which decisions are taken as closely as possible to the citizen in accordance with the principle of subsidiarity.*" For the British people, this goal was one step too much. In the Brexit referendum in 2016, the Brits obviously assessed the benefits of this ever-increasing shift in competences to Brussels less than the recovery of their state autonomy ("taking back control").

Since the entry into force of the Lisbon Treaty, competences between the EU and the Member States have been divided into three categories (Articles 3–6 TFEU):

• *Exclusive competence of the EU*: Customs Union (Common Customs Tariff, CCT), common trade policy (CTP).

• *Shared competence between the Union and the Member States:* internal market, social policy, regional policy, common agricultural policy (CAP), environment, energy, consumer protection, transport, trans-European networks (TEN), area of freedom, security and justice, research programs, development cooperation.

• The Union shall have competence to carry out actions to support, *coordinate or supplement the actions of the Member States*: human health, industry, culture, tourism, education, youth and sport, civil protection, administrative cooperation. In addition, the Member States coordinate their economic policies within the Union (Art. 5 TFEU). The council adopts measures for broad guidelines for these policies, e.g. employment and social policies.

• Special rules apply to the *Member States whose currency is the euro*. Due to the asymmetrical construction of the EMU (central monetary and decentralized fiscal policy), there is a whole arsenal of procedures – extended after the Great Recession in 2009 - (including the European Semester) and instruments (Reform of the Stability and Growth Pact, Fiscal Pact with a debt brake obligation, etc.) to coordinate the different fiscal policies of the EU and Euro member states. This necessary coordination works relatively well in "good weather periods", but hardly in times of crises, like in the 2009 recession and the following euro crisis.

[3] For an analysis of the impact of EU law on the national legal system in Austria, see Griller et al. (2015).

Overall, Austria and its governments, which have been changing since 1995, have dealt very well with the changed political framework as an EU member and have given the Union many important impulses. Finally, Austria has shown solidarity by the "Vienna Initiative" with the new EU member states of Eastern Europe that were in need due to the financial crisis (Selmayr, 2019). Occasional outliers (referendum on leaving the EU in 2015; the memory of H.-C. Strache's "Öxit" debate after the Brexit referendum) have disappeared from the political debate since the struggle for Brexit and are also largely rejected by the population (Schmidt, 2019).

4. Model description

For our analysis we use a two-country dynamic stochastic general equilibrium (DSGE) model in the style of New Keynesian/New Open Economy Macroeconomics of the Austrian economy within the EU's Economic and Monetary Union (EMU). DSGE models can be used to estimate and forecast (not always successful in times of crises; see Breuss, 2018b) time series, using Bayesian methods. It has rigorous microeconomic foundations derived from utility and profit optimisation and includes frictions in goods, labour, and financial markets.

Our model to evaluate the possible economic integration effects of Austria's 25 years of EU membership has its basis in the two-country DSGE model (Austria and Euro area) developed by Breuss and Rabitsch (2008, 2009). In order to estimate integration effects we adjust the model in several ways: (1) we endogenize total factor productivity (TFP); this allows to incorporate stimuli for TFP via R&D investments and the productivity generating effects of the increasing engagement in globalisation via exports and foreign direct investments.

We present here an overview of the central equations of the DSGE model in log-linearized form. The equations refer to those for Austria, those for the Euro area are equivalent, but are not reported here[4]. Through-out, the variables with a hat denotes log-linearized variables, i.e. $\hat{Y}_t = \frac{dY_t}{Y}$.

The *consumption Euler equation* is given by:

$$\hat{C}_t = \frac{h}{1+h}\hat{C}_{t-1} + \frac{h}{1+h}E_t\hat{C}_{t+1} - \frac{1-h}{\sigma_c(1+h)}\left(\beta\left(\widehat{1+\iota_t}\right) - E_t\pi_{t+1} + E_t\hat{\varepsilon}^C_{t+1} - \hat{\varepsilon}^C_t\right) \quad (1)$$

The inclusion of habit persistence makes current consumption dependent on a weighted average of past and expected future consumption which reduces the impact of the real interest rate on consumption. The equation includes a consumer preference shock, $\hat{\varepsilon}^C_t$.

The *investment equation* is given by:

$$0 = \left(\hat{Q}_t + \hat{\varepsilon}^X_t\right) - \varphi_K(1)(\hat{X}_t - \hat{X}_{t-1}) + \beta\varphi_K(\hat{X}_{t+1} - \hat{X}_t) \quad (2)$$

The presence of the capital adjustment cost (φ_K) helps in capturing the hump-shaped behaviour of investment in response to various shocks, including monetary policy shocks. The investment shock is $\hat{\varepsilon}^X_t$

[4] For a more detailed description of the model, see Breuss and Rabitsch (2008).

The *capital Euler equation* is given by:

$$\left(\hat{Q}_t + \hat{p}_t^X\right) = -i_t + \hat{\pi}_{H,t+1} + \beta(1-\delta)\left(\hat{Q}_{t+1} + \hat{p}_{t+1}^X\right) + (1-\beta(1-\delta))\hat{R}_{t+1}^k \tag{3}$$

The log-linear form of the *capital law of motion* reads:

$$\widehat{K}_t = (1-\delta)\widehat{K}_{t-1} + \delta\hat{\varepsilon}_t^X + + \delta\widehat{X}_t \tag{4}$$

The *inflation equation* is specified as a New-Keynesian Phillips curve:

$$\hat{\pi}_{H,t} = \left[\frac{(1-\xi_P)(1-\beta\xi_P)}{\xi_P}\left(\widehat{MC}_t - \hat{p}_{H,t} + u_t^{\mu_P}\right) + \beta E_t\hat{\pi}_{H,t+1} - \beta\xi_P\gamma_P\hat{\pi}_{H,t} + \gamma_P\hat{\pi}_{H,t-1}\right] \tag{5}$$

In this more general specification of the New-Keynesian Phillips curve, current inflation depends not only on future expected inflation but also on past inflation, in additional of (current) real marginal costs. When $\gamma_P = 0$, equation (5) reduces to the more standard, purely forward-looking Phillips curve. The elasticity of inflation with respect ot changes in marginal costs depends mainly on the degree of price stickiness, ξ_P. The price mark-up shock, $u_t^{\mu_P}$ is used in the integration simulations with a value of 15.

In a similar manner, the *wage Phillips curve*, including partial wage indexation (à la Calvo), is given by:

$$\widehat{W}_t(1+\beta) = \begin{bmatrix} \left\{\frac{(1-\beta\xi_\omega)(1-\xi_\omega)}{((1+\lambda_\omega\sigma_L)\xi_\omega)}\right\}\left(\sigma_L\hat{L}_t + \hat{\varepsilon}_t^L + \frac{\sigma}{1-h}(\hat{C}_t - h\hat{C}_{t-1}) - \widehat{W}_t + u_t^{\mu_\omega}\right) + \\ \beta E_t\widehat{\pi}_{t+1} - \widehat{\pi}_t + \beta E_t\widehat{W}_{t+1} + \widehat{W}_{t-1} + \gamma_\omega\widehat{\pi}_{t-1} - \beta\xi_\omega\gamma_\omega\widehat{\pi}_t \end{bmatrix} \tag{6}$$

This equation includes a wage mark-up shock: $u_t^{\mu_\omega}$ and a labour supply shock, $\hat{\varepsilon}_t^L$.

Die log-linear version of the *production function* á la Cobb-Douglas is given by:

$$\hat{Y}_t = \widehat{TFP}_t + \alpha\widehat{K}_{t-1} + (1-\alpha)\hat{L}_t \tag{7}$$

In the original DSGE model, TFP has been modelled as an autoregressive process, we endogenize *TFP* in equation (11).

The *optimal factor input ratio* is given by:

$$\widehat{W}_t + \hat{L}_t = \hat{R}_t^k + \widehat{K}_{t-1} \tag{8}$$

Real marginal costs are given by:

$$\widehat{MC}_t = \alpha\hat{R}_t^k + (1-\alpha)\widehat{W}_t - \widehat{TFP}_t \tag{9}$$

The Calvo mechanism for adjustments in employment leads to the following equation for *employment*:

$$\Delta\widehat{empl}_t = \frac{(1-\xi_E)(1-\beta\xi_E)}{\xi_E}\left(\hat{L}_t - \widehat{empl}_t\right) + \beta\Delta\widehat{empl}_{t+1} + el_E\hat{Y}_{t-1} \tag{10}$$

It is assumed that only a constant fraction, (ξ_E), of firms can adjust employment to its desired total labour input. Employment, hence, responds more slowly to macroeconomic

shocks than total hours worked. For the purpose of simulating EU integration effects, we added to the employment equation a term which captures the reaction of employment to the lagged development of GDP with an elasticity, $el_E = 0.01$.

In addition to the original DSGE model for Austria we *endogenize* the development of *total factor productivity (TFP),* exogenously formulated in equation (7). We follow the idea of the theory of endogenous growth, e.g. by Romer (1990) and postulate the following equation:

$$\widehat{TFP}_t = el_{RD}\widehat{R\&D}_t + el_{CA}\left(\widehat{EX}_t + \widehat{IM}_t\right) + el_{FDI}\left(\widehat{FDIx}_t + \widehat{FDIm}_t\right) + \hat{\varepsilon}_t^{tfp} \quad (11)$$

Besides R&D expenditures, the core of endogenous growth theory we also include the volume of trade ($\widehat{EX}_t + \widehat{IM}_t$) and those of FDIs ($\widehat{FDIx}_t + \widehat{FDIm}_t$)as determinants which positively influence TFP. These effects are particularly important for small open economies like Austria. It is forced to be more productive the more it is engaged in globalization via foreign trade and investing abroad. A similar approach is applied in an integration macro model developed by Breuss (2020b). The trade and productivity nexus are the core of the new-new trade theory of Melitz (2003). The TFP shock is $\hat{\varepsilon}_t^{tfp}$.

R&D expenditures are dependent on GDP and lagged R&D in the following equation

$$\widehat{R\&D}_t = el_Y\hat{Y}_t + el_R\widehat{R\&D}_{t-1} + \hat{\varepsilon}_t^{RD} \quad (12)$$

The R&D shock, $\hat{\varepsilon}_t^{RD}$ is used in R&D integration simulations with a value of -0.5.

The *FDI exports* (outward stocks) are dependent on the development of foreign GDP and negatively influenced by trade barriers (NTBs), given by the following equation for *exports of FDI*:

$$\widehat{FDIx}_t = el_{Ys}\widehat{Ys}_t - \hat{\varepsilon}_t^{NTB} + \hat{\varepsilon}_t^{FDx} \quad (13)$$

The shock, $\hat{\varepsilon}_t^{NTB}$ is used in the NTB integration simulations with a value of 20. In the FDI equations (13) and (14), as well in the trade equations (23) to (26) we consider the NTB shock as a quantity shock and not as a price shock like in in't Veld (2019) because NTBs are non-price effects. Additionally, in the above equation, there is an outward FDI shock, $\hat{\varepsilon}_t^{FDx}$.

The *FDI imports* (inward stocks) are modelled analogously. They depend on domestic GDP and NTB trade barriers, in the following equation of *imports of FDI*:

$$\widehat{FDIm}_t = el_Y\hat{Y}_t - \hat{\varepsilon}_t^{NTB} + \hat{\varepsilon}_t^{FDm} \quad (14)$$

The shock, $\hat{\varepsilon}_t^{NTB}$ is used in the NTB integration simulations with a value of 20. There is also an inward FDI shock, $\hat{\varepsilon}_t^{FDm}$.

Instead of specifying a similar endogenization of the TFP for foreign (Euro area, EA) we consider the negative impact of NTBs on TFP in the EA by an autoregressive process with the same shock as in Austria, namely, $\hat{\varepsilon}_t^{NTB}$. This captures the negative impact of trade barriers in the Euro area.

In the EMU, the ECB is solely responsible for doing *monetary policy.* As a member of the Euro area, Austria's interest rate policy depends directly on ECB's policy actions. Hence, the short-term interest rates in Austria are the same as those set by the ECB. It is assumed that

the ECB's (standard) monetary policy is based on the Taylor rule. However, by EU law the primary goal of the ECB is to stabilize the inflation rate below but near 2%. We use the following general Taylor rule like follows:

$$\left(1+\widehat{\imath_t^{emu}}\right)=\rho_t^{emu}\left(1+\widehat{\imath_{t-1}^{emu}}\right)+(1-\rho_t^{emu})\begin{bmatrix}\rho_\pi^{emu}(\hat{\pi}_t^{emu}-\bar{\pi}^{emu})+\\ \rho_Y^{emu}\left(\hat{Y}_t^{emu}-\bar{\pi}^{emu}\right)\end{bmatrix}+u_t^{emu} \quad (15)$$

The monetary policy shock is u_t^{emu}.

The *real exchange rate* is derived from a risk sharing equation which links the real exchange rate to the ratio of marginal utilities (for more details, see Breuss and Rabitsch, 2008, pp. 24-25). In log-linear form, the real exchange rate equation looks like this:

$$\widehat{RER}_t=\left[\hat{\varepsilon}_t^{*C}-\hat{\varepsilon}_t^{C}-\frac{\sigma_c}{(1-h)}\left(\hat{C}_t^*-h\hat{C}_{t-1}^*\right)+\sigma_c\frac{\sigma_c}{(1-h)}\left(\hat{C}_t-h\hat{C}_{t-1}\right)\right] \quad (16)$$

Under a flexible exchange rate regime, the nominal exchange rate is given by the following equation for (nominal) *depreciation*:

$$\Delta_t=\widehat{RER}_t-\widehat{RER}_{t-1}+\hat{\pi}_t-\hat{\pi}_t^* \quad (17)$$

In the EMU regime, because exchange rates are fixed the above equation reduces to:

$$\widehat{RER}_t-\widehat{RER}_{t-1}=\hat{\pi}_t-\hat{\pi}_t^* \quad (18)$$

Fiscal policy is modelled in this model highly simplified. Government spending is assumed to be financed by lump-sum taxes. The government is not allowed to run budget deficits, and its budget constraint is given by:

$$P_tG_t+TR_t=TAX_t \quad (19)$$

This no-deficit rule is much stronger than those of EU's Stability and Growth Pact (SGP) which allows deficits of 3% of GDP and public debts of 60% of GDP.

Budget balance in log-linear form is given by

$$\widehat{BUD}_t=\frac{G}{Y}\left(\widehat{TAX}_t-\hat{G}_t\right) \quad (20)$$

The *goods markets clearing* in the domestic economy (*Austria*) is given by:

$$\hat{Y}_t=\frac{G}{Y}\left(\hat{G}_t-\widehat{TAX}_t\right)+p_H^{-\epsilon}\gamma_c\frac{C}{Y}\left(\hat{C}_t-\epsilon\hat{p}_{H,t}\right)+ \quad \text{consumption (domestic plus foreign)} \quad (21)$$

$$+\left(\frac{p_H}{p_X}\right)^{-\epsilon}\gamma_x\frac{C}{Y}\left(\hat{X}_t+\epsilon\hat{p}_{X,t}-\epsilon\hat{p}_{H,t}\right)+ \quad \text{investment (domestic plus foreign)}$$

$$+\frac{1-n}{n}p_H^{*-\epsilon}\gamma_c^*\frac{Y^*}{Y}\frac{C^*}{Y^*}\left(\hat{C}_t^*-\epsilon\hat{p}_{H,t}^*\right)+ \quad \text{export consumption}$$

$$+\frac{1-n}{n}\left(\frac{p_H^*}{p_X^*}\right)^{-\epsilon}\gamma_x^*\frac{Y^*}{Y}\frac{X^*}{Y^*}\left(\hat{X}_t^*+\epsilon\hat{p}_{X,t}^*-\epsilon\hat{p}_{H,t}^*\right) \quad \text{export investment}$$

Where *n* is the size of Austria relative to the Euro area (0.03).

The *goods markets clearing* in the foreign economy (*Euro area*) is given by:

$$\hat{Y}_t^* = \frac{G^*}{Y^*}\left(\hat{G}_t^* - \widehat{TAX}_t^*\right) + + \frac{n}{1-n} p_F^{-\epsilon}(1-\gamma_c)\frac{C}{Y}\frac{Y}{Y^*}\left(\hat{C}_t - \epsilon\hat{p}_{F,t}\right) + \quad \text{consumption} \quad (22)$$

$$+ \frac{n}{1-n}\left(\frac{p_F}{p_X}\right)^{-\epsilon}(1-\gamma_{x)}\frac{X}{Y}\frac{Y}{Y^*}\left(\hat{X}_t + \epsilon\hat{p}_{X,t} - \epsilon\hat{p}_{F,t}\right) + \quad \text{investment}$$

$$+ p_F^{*-\epsilon}(1-\gamma_c^*)\frac{C^*}{Y^*}\left(\hat{C}_t^* - \epsilon\hat{p}_{F,t}^*\right) + \quad \text{export consumption}$$

$$+ \left(\frac{p_F^*}{p_X^*}\right)^{-\epsilon}(1-\gamma_x^*)\frac{X^*}{Y^*}\left(\hat{X}_t^* + \epsilon\hat{p}_{X,t}^* - \epsilon\hat{p}_{F,t}^*\right) \quad \text{export investment}$$

The *Austrian exports* are given by:

$$\widehat{EX}_t = \frac{1-n}{n} p_H^{*-\epsilon}\gamma_c^*\frac{Y^*}{Y}\frac{C^*}{Y^*}\left(\hat{C}_t^* - \epsilon\hat{p}_{H,t}^*\right) + \frac{1-n}{n}\left(\frac{p_H^*}{p_X^*}\right)^{-\epsilon}\gamma_x^*\frac{Y^*}{Y}\frac{X^*}{Y^*}\left(\hat{X}_t^* + \epsilon\hat{p}_{X,t}^* - \epsilon\hat{p}_{H,t}^*\right) - \hat{\varepsilon}_t^{NTB} \quad (23)$$

The export NTB shock, $\hat{\varepsilon}_t^{NTB}$ is used in NTB integration simulations with a value of 20.

The *Austrian imports* are equivalent the foreign exports:

$$\widehat{IM}_t = p_F^{*-\epsilon}(1-\gamma_c^*)\frac{C^*}{Y^*}\left(\hat{C}_t^* - \epsilon\hat{p}_{F,t}^*\right) + \left(\frac{p_F^*}{p_X^*}\right)^{-\epsilon}(1-\gamma_x^*)\frac{X^*}{Y^*}\left(\hat{X}_t^* + \epsilon\hat{p}_{X,t}^* - \epsilon\hat{p}_{F,t}^*\right) - \hat{\varepsilon}_t^{NTB} \quad (24)$$

The import NTB shock, $\hat{\varepsilon}_t^{NTB}$ is used in NTB integration simulations with a value of 20.

Foreign (*Euro area) exports* are given by:

$$\widehat{EX}_t^* = p_F^{*-\epsilon}(1-\gamma_c^*)\frac{C^*}{Y^*}\left(\hat{C}_t^* - \epsilon\hat{p}_{F,t}^*\right) + \left(\frac{p_F^*}{p_X^*}\right)^{-\epsilon}(1-\gamma_x^*)\frac{X^*}{Y^*}\left(\hat{X}_t^* + \epsilon\hat{p}_{X,t}^* - \epsilon\hat{p}_{F,t}^*\right) - \hat{\varepsilon}_t^{NTB} \quad (25)$$

The export NTB shock in foreign is the same as in domestic, $\hat{\varepsilon}_t^{NTB}$ and is used in NTB integration simulations with a value of 20.

Foreign (*Euro area) imports* are equivalent to Austrian exports:

$$\widehat{IM}_t^* = \frac{1-n}{n} p_H^{*-\epsilon}\gamma_c^*\frac{Y^*}{Y}\frac{C^*}{Y^*}\left(\hat{C}_t^* - \epsilon\hat{p}_{H,t}^*\right) + \frac{1-n}{n}\left(\frac{p_H^*}{p_X^*}\right)^{-\epsilon}\gamma_x^*\frac{Y^*}{Y}\frac{X^*}{Y^*}\left(\hat{X}_t^* + \epsilon\hat{p}_{X,t}^* - \epsilon\hat{p}_{H,t}^*\right) - \hat{\varepsilon}_t^{NTB} \quad (26)$$

The import NTB shock in foreign is the same as in domestic, $\hat{\varepsilon}_t^{NTB}$ and is used in NTB integration simulations with a value of 20.

The result of the symmetric definition of exports and imports in domestic and foreign is also a symmetric current account position of domestic and foreign.

The *current account* in *Austria* is given by:

$$\widehat{CA}_t = \widehat{EX}_t - \widehat{IM}_t \quad (27)$$

The *current account* in *foreign* is a mirror image of those of domestic:

$$\widehat{CA}_t^* = \widehat{EX}_t^* - \widehat{IM}_t^* \quad (28)$$

5. Macroeconomic effects of Austria's EU membership

The difficult thing in evaluating EU integration effects ex post is that joining the EU is not a one-off event because joining an institution like the EU means a permanent change. It is similar to the mathematical task of shooting at a moving target. Since the nineties, the EU has changed its character by deepening (Single Market in 1993, EMU in 1999, Euro in 2002) and since 2004 enlarging enormously from 12 to 28 member states. Austria, after joining the EU has participated in all these steps of European integration.

When Austria joined the EU, it had already eliminated practically all tariff barriers vis a vis the EU through the FTA-EC-EFTA in 1973 and the participation in the European Economic Area (EEA) in 1994. What remained to do was to eliminate the remaining non-tariff barriers (NTBs).

In a recent evaluation of Austria's EU membership with an integration macro model the complexity of EU membership has been grouped into three phases (Breuss, 2020b):

(1) *EU's Single Market:* five subcategories determine its integration effects:
   - 1a) NTBs in trade of goods and services[5] and in foreign direct investments (FDIs)
   - 1b) More competition (reduction of price mark-ups), supported by an efficient competition policy.
   - 1c) More R&D investment by participating in EU's several research programmes stimulate TFP growth.
   - 1d) Austria is a net contributor into the EU budget of around 1/4% of GNI per year
   - 1e) EU accession stimulated slightly the immigration to Austria.

(2) *EMU* and *Euro:* two subcategories capture its special effects:
   - 2a) The Euro also led to a dismantling of NTBs in trade (by reducing and/or eliminating the risk of exchange rate changes in intra-Euro area trade) and FDI
   - 2b) The trend to an increasing appreciation against peripherical countries of the Euro area has been stopped and increase competitiveness.
   - 3b) Also the EMU participation gave further way to stimulate R&D.

(3) *EU enlargement* since 2004:
   - 3a) Elimination of NTBs vis a vis the new EU member states in Eastern Europe.
   - 3b) Immigration – although postponed through a seven years transitional arrangement – was imminent because of the huge income gap between the old (rich) and the new (poor) countries.

When applying the DSGE model to evaluate Austria's benefits of being a member of the EU since 1995 we are less ambitious to quantify the many possible integration effects. We simply reduce the complexity of EU integration by simulating counterfactuals for only three of the most important determinants of integrating into EU's Single Market[6]:

- Elimination of trade barriers: our NTB shock, $\hat{\varepsilon}_t^{NTB}$ captures the above effects of 1a), 2a), and 3a) in the trade and FDI equations.
- More competition: our mark-up shock, $u_t^{\mu_P}$ takes account of the above effect 1b).
- TFP stimulating R&D investments: our R&D shock, $\hat{\varepsilon}_t^{RD}$ considers the above effect 1c).

[5] The barriers in trade in services were only eliminated after the Services Directive came into force in 2009 (see Breuss et al., 2008).

[6] In't Veld (2019) evaluates the EU Single Market benefits with only two effects: trade barriers and competition.

The counterfactual simulations are executed in Dynare/Matlab with the deterministic simulation option. That means the integration shocks (NTB, markup, and R&D) are implemented in the first period. The simulation runs over 25 periods which are interpreted here as the period of Austria's EU membership from 1995 to 2020.

5.1 *Elimination of trade barriers*

Austria's entrance into EU's single market was only the last step of trade integration. Tariffs did no longer exist. Non-tariff barriers (NTBs), such as differences in regulatory regimes or product standards were the only impediment for new EU members. In contrast to tariffs, NTBs are not exactly recorded. Only estimates with different approaches are available. Therefore, their values vary from author to author and method to method. E.g., in't Veld (2019) assumes in his simulation exercise that the estimated NTBs between the EU and US (Berden et al, (2009, 2015); Egger et al. (2015)) apply also to EU's Single Market. These authors calculate tariff equivalents of NTBs which vary from 57% for the sector food, beverages, and tobacco to 4% in the services and in the construction sectors.

We assume in our simulations that EU membership over the last 25 years has implied a reduction of NTBs by 20% tariff equivalents. The NTB shock $\hat{\varepsilon}_t^{NTB}$ is implemented in the equations (13), (14), (23), (24), (25) and (26) as described in the previous chapter. The elimination of NTBs is stimulating trade of goods and services and outward and inward FDI.

Table 2 reports the simulation results of eliminating NTBs participating in EU's Single Market of our DSGE model for Austria and compares it with those of the integration macro model and with those estimated by in't Veld (2019). Interestingly, the macroeconomic impact is quite similar in the three models.

Table 2: Long and short run macroeconomic impact of the elimination of trade barriers (NTBs) by fully participating in EU's Single Market (Percentage changes)

	GDP	Con-sumption	Invest-ment	Exports	Imports	Current account	Capital	Employ-ment	Inflation
DSGE Austria	9.49	2.97	27.78	31.18	30.00	1.18	9.23	3.72	-0.84
p.a.*)	0.36	0.11	1.07	1.2	1.15	0.05	0.36	0.14	-0.03
DSGE EU1)	9.50	18.9	18.8	14.1	22.7	-	14.8	1.3	-
p.a.*)	0.38	0.76	0.75	0.56	0.91	-	0.59	0.05	-
Macro Austria2)	10.21	-	-	32.24	36.29	-0.76	5.24	4.83	0.74
p.a.*)	0.41	-	-	1.29	1.45	-0.03	0.15	0.15	0.03

GDP, consumption, investment, exports and imports in real terms.

*) p.a. is calculated as the long-run cumulative values divided by 25: annual percentage changes

1) in't Veld (2019)

2) Breuss (2020b)

As described above, the DSGE counterfactual simulations of the economic effects of EU's Single Market, those of in't Veld (2019) and ours are not so rich as those in the integration macro model of Breuss (2020b). We assume that the elimination of trade barriers through the participation in the Single Market is encompassed in a single NTB shock (in't Veld (2019) also adds an import tariff shock).

5.2 *Effects of tougher competition*

Greater trade openness has increased competition and lowered prices. This implies that firms had to reduce mark-ups of their prices over their marginal costs, which should have improved output. One study that examines the impact of the Single Market on mark-ups is Badinger (2007) for 10 EU Member States over the period 1981–99. The relative reduction in mark-ups reported in this paper in manufacturing is 26%. A similar study for Austria (Badinger and Breuss, 2005) resulted in much lower average reductions in mark-ups after 10 years membership of Austria.

As a compromise, we assume in our simulations that Austria's EU accession since 1995 has led to a reduction of price mark-ups in the overall economy by around 15%. This shock $u_t^{\mu_P}$ is implemented in the equation (5) of our DSGE model, as described in the previous chapter.

Table 3: Long and short run macroeconomic impact of more Single Market competition (Percentage changes)

	GDP	Con-sumption	Invest-ment	Exports	Imports	Current account	Capital	Employ-ment	Inflation
DSGE Austria	0.78	0.88	0.66	0.11	0.00	0.11	0.72	0.10	-0.20
p.a.*)	0.03	0.03	0.03	0.00	0.00	0.00	0.03	0.00	0.01
DSGE EU1)	2.30	2.40	5.00	3.80	3.60	-	3.40	0	-
p.a.*)	0.09	0.10	0.20	0.15	0.14	-	0.14	0.00	-
Macro Austria2)	-1.06	-	-	0	-1.82	1.06	-0.53	-0.13	-3.10
p.a.*)	-0.04	-	-	0	-0.07	0.04	-0.01	-0.01	-0.12

GDP, consumption, investment, exports and imports in real terms.

*) p.a. is calculated as the long-run cumulative values divided by 25: annual percentage changes

1) in't Veld (2019)

2) Breuss (2020b)

The results in Table 3 differ for several reasons. On the one hand we assume a smaller pro-competitive effect in the case of Austria than in't Veld (2019) did for the EU. As Austria was already before the EU entry closely related to the EU via free trade agreements and the EEA this seems not implausible. On the other hand, due to a different specification of prices and a lower mark-up shock (only 15% reduction) the overall impact is slightly negative on GDP. In the integration macro model, the mark-up shock has only strong price effects, however, a slight decrease in output.

5.3 *TFP stimulating R&D investments*

As an EU member, Austria could fully participate in all EU research programmes. This allowed Austria to faster catch-up to the high R&D to GDP quota of Finland and Sweden. Due to our endogenization of the development of TFP an impulse of R&D stimulates TFP and hence also GDP, as described in the previous chapter. The R&D catch-up effect is captured by a 0.5% shock of $\hat{\varepsilon}_t^{RD}$ in equation (12) of our DSGE model.

Table 4 contrasts the DSGE results with those of the integration macro model. In't Veld (2019) did not consider this effect in his DSGE model for all member states of the EU. The Austrian DSGE model delivers nearly twice as strong GDP results as the macro model. The latter considers the R&D shocks of both integration phases – Single Market and EMU.

Table 4: Long and short run macroeconomic impact of more R&D investment (Percentage changes)

	GDP	Con-sumption	Invest-ment	Exports	Imports	Current account	Capital	Employ-ment	Inflation
DSGE Austria	7.49	1.48	25.76	0.65	0.00	0.65	7.38	4.73	-0.53
p.a.*)	0.29	0.06	0.99	0.03	0.00	0.03	0.28	0.18	-0.02
DSGE EU[1)]		-	-	-	-		-	-	-
p.a.*)		-	-	-	-		-	-	-
Macro Austria[2)]	4.17	-	-	0	7.30	-3.89	2.23	1.99	0.39
p.a.*)	0.18	-	-	0	0.31	-0.16	0.07	0.07	0.02

GDP, consumption, investment, exports and imports in real terms.
*) p.a. is calculated as the long-run cumulative values divided by 25: annual percentage changes
1) in't Veld (2019)
2) Breuss (2020b)

5.4 *Total effects of 25 years EU membership*

In't Veld (2019) calls the results of the simulations of the two Single Market effects (reduction of trade barriers; mark-ups) the "non-Single Market effects". The first comparison with our DSGE model comprises only two shocks (NTB and mark-up). As shown in Table 5 the macroeconomic results (cumulative GDP increase by 11.8% in in't Veld versus 10.3% in the Austrian DSGE model) are quite similar. The lower benefits in the Austrian DSGE model is the result of a lower mark-up input than assumed by in't Veld (2019) (see Table 3).

Table 5: Long and short run macroeconomic impact of Austria's 25 years EU membership (Percentage changes)

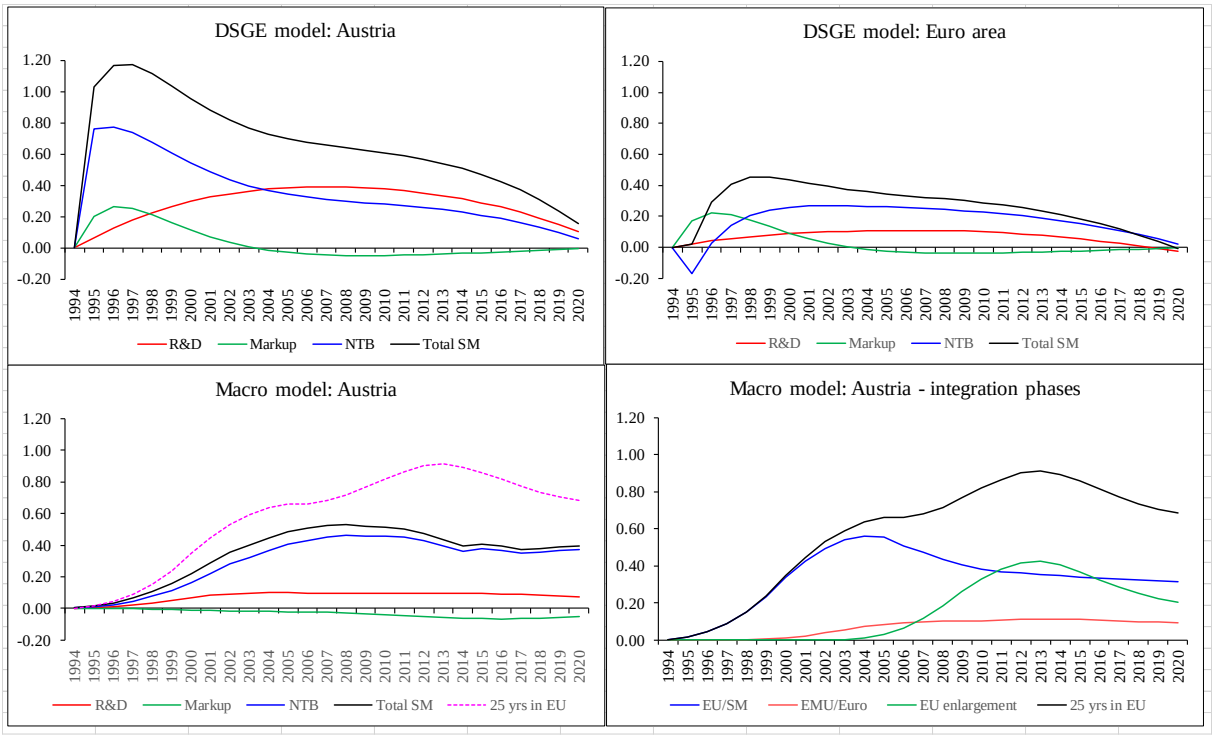
	GDP	Con-sumption	Invest-ment	Exports	Imports	Current account	Capital	Employ-ment	Inflation
DSGE Austria[1)]	10.27	3.85	28.43	31.29	30	1.29	9.95	3.82	-1.04
p.a.*)	0.39	0.15	1.09	1.2	1.15	0.05	0.38	0.15	-0.04
DSGE Austria[2)]	17.76	5.33	54.19	31.94	30.00	1.94	17.33	8.55	-1.56
p.a.*)	0.68	0.20	2.08	1.23	1.15	0.07	0.67	0.33	-0.06
DSGE EU[3)]	11.80	21.20	22.90	17.50	25.60	-	17.80	1.50	-
p.a.*)	0.47	0.85	0.92	0.70	1.02	-	0.71	0.06	-
Macro Austria[4)]	13.32	-	-	32.24	41.77	-3.59	6.94	6.69	-1.97
p.a.*)	0.55	-	-	1.29	1.69	-0.14	0.21	0.21	-0.07
Macro Austria[5)]	20.36	-	-	31.01	55.06	-7.02	10.23	10.09	-1.76
p.a.*)	0.81	-	-	1.24	2.2	-0.28	0.41	0.40	-0.07

GDP, consumption, investment, exports and imports in real terms.
*) p.a. is calculated as the long-run cumulative values divided by 25: annual percentage changes
1) Sum of NTB and mark-up.
2) Sum of NTB, mark-up, R&D
3) in't Veld (2019): Sum of NTB and mark-up.
4) Breuss (2020b): Sum of NTB, mark-up, R&D.
5) Breuss (2020b): Total integration effects (EU, EMU/Euro, EU enlargement) of the Austrian integration macro model.

Next, we compare the own DSGE model results of the simulations of the tree shocks (NTB, mark-up, R&D) with those simulated in the integration macro model. The DSGE model delivers a cumulative GDP increase of 17.8%, the macro model 13.3%. The difference can be explained by considering that our DSGE model obviously captures already a part of the total integration effects of the macro model. The 17.8% increase in GDP in our DSGE model is therefore closer to the results of the total integration effects of Austria's integration in the EU with the macro model (20.4%). Nevertheless, the per annum effects of real GDP gains are in the same ballpark – 0.7% versus 0.8%.

A comparison of the estimated integration effects of 25 years of Austria's EU membership with a DSGE model and an integration macro model (Breuss, 2020b) exhibits the following insights (see Figure 1):

Figure 1: Different timing of the impact of Austria's EU integration on real GDP (Percentage changes)



1) The cumulative and annual impact on real GDP is quite similar (see Table 5)
2) The timing of the integration effects differs significantly between the two approaches (see Figure 1). Whereas in the macro model the counterfactual integration effects are imputed in the model gradually. According to this philosophy, the integration effects only gradually take effect with increasing membership of the EU/EMU (see the below, left panel of Figure 1).
   In contrast, in the DSGE model, the deterministic simulation considers the integration effects (R&D, mark-up, NTB) as immediate shocks, which fade out over time (IRF philosophy; see left above, left panel of Figure 1).
3) In our two-country model the integration shocks deliver not only an impact in Austria but also in the Euro area. However, the overall effects on real GDP are less pronounced than those for Austria (see above, right panel of Figure 1). Also in the exercise of in't Veld

(2019) the overall Single Market effects on GDP for the EU (cumulative 8.7%) as a whole are lower than those for Austria (11.8%).

6. Comparison with Finland, and Sweden

6.1 *Economic performance since 1995*

Economies develop with and without EU membership. Before analysing how much of the general economic development can be attributed to EU membership, it is worth taking a comparative look at the economic development of the three Member States that joined the EU in 1995, Finland, Austria and Sweden (Table 6).

- Between 1995 and 2020, *real GDP* grew on average in Austria by 1.6%; this was lower than in Finland (2.0%) and Sweden (2.2%). In Austria (–1.4 percentage points) and Finland (–1.0 percentage points), economic growth was weaker in the 25 years after EU accession than in the previous 25 years. Only Sweden (+0.3 percentage points) grew faster. While the three countries that joined the EU in 1995 grew faster than Germany (Austria + 0.5%, Finland + 0.8%, Sweden + 1.1%), apart from Sweden, GDP development was weaker than in the USA.

  Austria, Finland, and Sweden are among the richest EU member states. In terms of GDP per capita, Austria was the second richest country in the EU-15 in 1995, with Finland in tenth place and Sweden in fifth. In 2020 Austria was third in the EU-27, Finland seventh and Sweden sixth.
- The *inflation* rate in Austria was 1.8% higher in the last quarter of a century than in Finland (1.4%) and Sweden (1.2%). In all three countries it fell compared to the previous 25 years - in Finland (–6.2%) and Sweden (–6.0%) more than in Austria (–2.1%).
- Austria has the best position in terms of *unemployment.* At 4.8%, the unemployment rate was on average much lower than in Finland (9.1%) and Sweden (7.6%).

Table 6: Macroeconomic indicators of selected countries: 1995-2020 (Annual averages)

Indicator	Unit	Austria	Finland	Sweden	EU-15	Germany	USA	Switzerland
GDP, real	%	1.60	1.95	2.23	1.20	1.11	2.14	1.57
GDP p.c., real	%	1.14	1.62	1.58	0.93	1.01	1.25	0.76
GDP, nominal 2020	Bn PPS	344	184	371	13073	3029	14054	404
GDP p.c., nominal[1] 2020	PPS	38602	33224	35804	31777	36380	42470	46485
Inflation[2]	%	1.78	1.37	1.16	1.74	1.39	2.14	0.54
Uneymployment rate	%	4.82	9.13	7.60	8.88	7.24	5.84	4.13
Net-lending	% of GDP	-2.51	0.05	-0.21	-2.98	-1.87	-5.86	-0.34
Public debt 2020	% of GDP	78.80	69.40	42.60	100.3	75.6	136.20	42.00
Intra-EU exports	%	5.99	3.87	4.05	4.34	4.97		
Intra-EU exports 2020	Share in %	70.80	58.80	57.90	61.1	58.4		
Current account	% of GDP	1.19	2.33	4.82	1.10	4.15	-3.16	9.61
Net-contribution to EU budget[3]	% of GNI[4]	-0.25	-0.14	-0.34		-0.38		

Sources: European Commission: European Economic Forecast, Spring 2020 (AMECO data base); IMF World Economic Outlook, April 2020.

1) PPS = Purchasing Power Standards.
2) National consumer price index.
3) European Commission: Operating budgetary balance, average 1995-2018.
4) GNI = Gross National Income.

- In terms of *fiscal policy*, Austria fell behind Finland and Sweden both in terms of the development of the budget balance and of government debt.
- Austria already benefited greatly from the opening-up of Eastern Europe in 1989 and was able to further increase its foreign trade after the EU enlargement in 2004. Overall, Austria has therefore expanded its *intra-EU trade* much more than Finland and Sweden. This is reflected in the average annual increase in intra-EU exports (Austria + 6.0%, Finland + 3.9%, Sweden + 4.1%). With an intra-EU export share of 70.8%, Austria is clearly ahead of Finland (58.8%) and Sweden (57.9%).
- Overall, the *current account* has improved in all three countries over the past quarter century, most notably in Sweden (a surplus of 4.8% of GDP), but also in Finland (2.3%) and Austria (1.2%).

Austria was able to raise its *R&D* (research and development) quota and reached the high level of that of Sweden (around 3½% of GDP), not least because of the increasing participation in EU research programs. Finland fell from 3.9% in 2009 to less than 3%. While Austria and Finland introduced the euro from 1999 onwards, Sweden was able to improve its international competitiveness by devaluing the Swedish krona (by 0.7% per year since 1995). However, especially in Austria, the introduction of the euro meant that the previously strong appreciation trend of the schilling was stopped.

Regarding the fight against *climate change*, the Scandinavian countries are considerably more advanced than Austria. From 1995 to 2017, CO_2 emissions (per capita) decreased by 27% in Finland, by 38% in Sweden and by only 0.4% in Austria. Finally, the early introduction of a CO_2 tax in Finland in 1990 and in Sweden in 1991 contributed to this better result.

6.2 *Which benefits of EU membership?*

Given the better overall economic performance since 1995 of Finland and Sweden compared to Austria (Table 6), it is surprising that almost all studies assessing the effects of EU membership in the three countries are less favourable for the Scandinavian countries than for Austria (Table 7). A main reason for this result may be the fact that most studies justify the EU effects solely with increased trade growth. Austria has an advantage in this regard because its intra-EU trade has been more dynamic than in the Scandinavian partners.

All studies compiled in Table 7 report positive GDP or welfare effects of EU membership. In't Veld (2019) finds the largest impact of the EU membership in the three countries with Austria (a long-term increase in real GDP of 11.8%) in the lead; Finland and Sweden benefit equal strongly with +7,7%. Mayer et al. (2019) with a structural gravity trade model, and Felbermayr et al. (2018) with the ifo trade model estimate the second highest welfare (income) effects in the long run: Austria (6.6%; 6.2%), Finland (3.5%, 3.8%) and Sweden (4.1%, 4.2%). The study by Mion and Ponatta (2019) result in effects of only half of those of Felbermayr et al. The highest positive GDP effects per annum are postulated by London Economics (2017). Accordingly, Austria should have profited from EU membership by an annual increase of real GDP of 2.6%, Finland by 1.7% and Sweden by 1.5%.

Studies by Austrian researchers show lower, but more realistic effects. Oberhofer (2019) with a structural Gravity cum Input-Output model finds that Austria's EU membership added 0.7 percentage points to the annual growth rate of real GDP. For Finland (+0.3%) and Sweden (+0.2%) this methodology results in only less than half the Austrian effects. Using the GTAP10 world trade model our simulation results in a cumulative GDP effect since 1995

of 7.9% in Austria, in Finland 3.8% and in Sweden 5.3%. A specifically constructed macroeconomic integration model (Breuss, 2020b) confirms the overall pattern of the other international studies if the integration model is reduced only to trade and FDI effects: Austria (+0.5% additional annual real GDP growth) has benefitted a little bit more from the EU membership than Finland (+0.4%) and Sweden (+0.4%).

Table 7: Estimates of Integration Effects: Austria, Finland and Sweden in comparison

Authors	Method	Scale	Period	Austria	Finlad	Sweden
London Economics (2017)	Econometric estimates with 5 indicators	SM: GDP p.c. %	1995-2015	2.58	1.71	1.50
Felbermayr et al. (2018)	ifo trade model	SM. Welfare cum. %	2000-2014	6.17	3.78	4.22
Mion-Ponattu (2019)	CGE model	SM: Welfare cum %	2010-2016	3.92	2.52	2.80
Mayer et al. (2018)	Gravity trade model	SM: Welfare cum %	2014	6.6-9.6	3.5-5.0	4.1-5.9
in 't Veld (2019)	QUEST DSGE model	SM: GDP, real cum. %	long-term	11.80	7.70	7.70
Oberhofer (2019)	Gravity cum IO model	GDP, real % p.a.	1995-2014	0.70	0.30	0.20
Breuss	Integration model	GDP, real % p.a.	1995-2020	0.46[1)] (0.81)[2)]	0.44[1)]	0.41[1)]
Breuss	CGE model GTAP10[3)]	Welfare cum (% GDP)	1995-2014	7.90	3.80	5.30

Source: Own representation.

1) Trade and FDI results of the integration macro model of Breuss (2020b).
2) Results of all integration effects of the integration macro model of Breuss (2020b).
3) Simulations with a 10x10 (10 countries and 10 sectors) CGE model with GTAP10 data of 2014; assumption: the EU accession reduces NTBs by 20%.

Remarks: SM = Single Market; cum = cumulative.

The integration macro model for Austria, Breuss (2020d) includes (as mentioned earlier) several effects which can be expected from the deep integration into the EU (Single Market, EMU/Euro) and its enlargement since 2004. Accordingly, the participation in EU's Single Market contributed 0.4 percentage points (pp) per year to the growth of real GDP. EMU plus Euro contributed a further 0.1 pp annual GDP increase[7]. EU enlargement added 0.3 pp to annual GDP growth[8].

Already the world-historic event in 1989 – the fall of the Iron Curtain and the following opening-up of Eastern Europe – was beneficial for Austria (Brait and Gehler, 2014). This historic event moved Austria politically and economically from the margins to the centre of Europe. Austria quickly took advantage of these new opportunities for trade and foreign direct investment. The memory of the old Austro-Hungarian monarchy was certainly helpful. The opening to the east led to an annual increase in real GDP of around 0.1%.

7. Concluding remarks

Austria's accession to the EU in 1995 was the final step of its steady effort to become European. After the EFTA membership since 1960, the FTA-EU-EFTA in 1973 and the one-year participation in the EEA in 1994, Austria was already strongly integrated in Europe.

[7] These results are below estimates using the synthetic control method (SKM) by Breuss (2019). Accordingly, the introduction of the euro led to an additional impulse to annual GDP growth by 0.3%. McKinsey Germany (2012) calculated significantly stronger effects of the euro for the first ten years after its introduction: in Austria cumulated +7.8% more real GDP (an annual growth of 0.8%), followed by Finland (6.7%) and Germany (6.4%) and the Netherlands (6.2%).

[8] Most EU enlargement studies find a 1:10 rule. This means that the welfare gains of the new EU member states are ten times higher than those of the old EU member states (Breuss, 2002; Levchenko and Zhang, 2012).

Favoured by the collapse of Communism in Eastern Europe and the dissolution of the Soviet Union, Austria were free to accede the EU.

International studies and our owns (with macro and DSGE models) prove that 25 years of EU integration was beneficial for Austria. Whereas for newcomers to the EU membership is welfare improving this must not be true for the incumbents of the EU. There is a so-called EU integration puzzle (Breuss, 2014) postulating that it is difficult to explain why the EU – in spite of a steady deepening of integration since World War II - could not achieve higher economic growth than the United States (see also, Breuss, 2017). This contradicts all predictions of the various integration theories. So, while the EU overall did apparently achieve no growth impulses (Andersen et al., 2019) or only small ones (Breuss, 2018a, 2020a), this does not – as shown in this study - apply to individual countries that joined the EU.

Despite the positive judgment over the past 25 years EU membership, one has, however, to assume that the best years of Austrian EU membership are already behind us. Even if one takes into account that a full exploitation of the internal market potential (Wolfmayr, 2019) could lift real income by around ½ percentage points, four developments give reason to assume that Austria's economy can hardly expect any significant new integration impulses in the near future:

Firstly, the breakdown of the economic dynamic in Eastern Europe: So far, the new EU member states in Central and Eastern Europe have always grown faster than the old ones. This was also necessary to catch-up to the rich western states. With the exception of Poland, which survived the Great Recession in 2009 without a slump in growth, all new EU member states experienced a much stronger decline in economic growth in 2009 (particularly dramatic in the Baltic states) than the old member states. However, recent forecasts indicate that the growth rates of the new EU member states are slowly adapting to those of the old ones. The dynamic of the East, which gave traditionally a strong boost to Austria's foreign trade, will slow down significantly, not at least after the Corona recession in 2020.

Secondly, one can hardly expect new impulses for foreign trade and economic growth if the euro area expands. Even if the euro were to be introduced in all EU member states ("the euro for all") in the near future (Breuss, 2019), the euro area would - with the exception of Poland - consist of only rather small countries (Bulgaria, Denmark, Croatia, Poland, the Czech Republic, Romania, Sweden and Hungary) and would therefore deliver no significant growth impulses to Austria.

Thirdly, the possible costs associated with the final Brexit - hard or soft - should not be underestimated. Even a soft Brexit with a comprehensive trade agreement with the EU - although minimal - will at least dampen economic development in the remaining 27 EU member states. In addition, this should result in restrictions in the EU budget. The gap left by the net contributor to the UK must either be compensated for by savings in the EU's Multiannual Financial Framework (MFF) 2021-2027. Especially if one considers the new EU Commission's ambitious Green Deal program (Von der Leyen, 2019), which provides EUR 1 trillion for the transformation (decarbonization) of the European economy by 2050.

Fourthly, the Corona crisis will not only cause the deepest recession since World War II in 2020, but it could also significantly slow down the European integration process in the years to come, despite the huge European Recovery programme implemented into the MFF.

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