

# A SIMULATION OF THE MACROECONOMIC EFFECTS OF INTRODUCING THE EURO IN SLOVENIA

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## Abstract

On 1 January 2007, Slovenia adopted the euro as the first of the ten new EU member states that entered the union in 2004 and as the first transition country. By means of simulations with SLOPOL6, a macroeconometric model of the Slovene economy, this paper examines which macroeconomic effects can be expected from this event. It is shown that the introduction of the euro brings about temporarily higher real GDP growth, a permanently higher GDP level, more employment, temporarily lower inflation and a permanently lower price level. On the other hand, both public finances and the current account deteriorate. Costs arise primarily from the loss of the monetary policy instrument (and the nominal exchange rate in particular). As long as the business cycle is only loosely correlated to those of the other Euro Area member countries, monetary policy can serve as a useful instrument for coping with idiosyncratic shocks hitting the economy. Benefits of joining the Euro Area are rooted in the supply-side productivity increases. The benefits stem in particular from transaction cost savings resulting from the elimination of the bilateral exchange rate with the 12 incumbent Euro Area members, trade expansion due to the removal of exchange rate uncertainty, and reductions in the country risk premium contained in the interest rates.

**Keywords: Euro Area, Macroeconometric model, Slovenia.**

## Presenting Author's biography

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## 1 INTRODUCTION

Slovenia was the first of the ten states that joined the European Union in May 2004 to join the Euro Area at the beginning of 2007. Before adopting the common currency euro, EU member states are required to fulfil the criteria set out in the Maastricht Treaty. In May 2006, both the European Commission and the European Central Bank decided that Slovenia had fulfilled all relevant criteria.

Introducing the euro as legal tender can be expected to exert non-negligible effects on the Slovene economy. Although most positive effects of economic integration, in particular regarding intensifying trade relations, have already materialized with the successive reductions of trade barriers during the EU accession negotiations and upon EU accession in 2004, the introduction of the common currency will have implications going beyond facilitating international trade.

The present paper aims at estimating the macroeconomic effects of the costs and benefits from Euro Area accession on the Slovene economy. To do so, simulations with SLOPOL6, a macroeconomic model of the Slovene economy, are performed. The macroeconomic costs of Euro Area accession are estimated by contrasting model simulations with flexible and fixed exchange rates. Benefits are evaluated by their impact on total factor productivity (TFP).

The plan of this paper is as follows. In the next section, the effects of introducing the euro in Slovenia are discussed from a theoretical point of view. In Section 3, the SLOPOL6 model used for the simulations is briefly described. In Section 4, quantitative macroeconomic effects of joining the Euro Area are derived by means of simulations of the SLOPOL6 model. Finally, the main findings are summarized and conclusions are drawn in Section 5.

## 2 EFFECTS OF EMU ACCESSION

Introducing the euro in Slovenia will bring about benefits, but also costs have to be considered. Here, potential costs and benefits arising from joining the Euro Area are discussed. Costs stem from abandoning an independent monetary policy and thus foregoing one policy instrument. In the Euro System, monetary policy is conducted by the European System of Central Banks and the European Central Bank (ECB) in particular. Therefore, monetary policy and thus the exchange rate can no longer be used for internal stabilization purposes in the member countries. These costs of joining the Euro Area are related to the optimum currency area (OCA) theory, which can be traced back to the seminal contribution by Mundell [1]. According to the OCA theory, countries benefit from a common currency if factor mobility between

the countries is high and if the exposure to asymmetric shocks is low. In the case of Slovenia, these criteria are only partially fulfilled. While almost all barriers to international trade and factor movements were removed upon EU accession, business cycles have not been totally synchronized. If the country is, to a large extent, exposed to idiosyncratic shocks, the loss of an independent monetary policy may result in increasing output variability.

However, more recent contributions point to the endogeneity of the OCA criteria [2]. This view was also shared by the European Commission [3]. Accordingly, deeper trade integration in a currency union leads to increasing business cycle synchronization. Thus, if countries form a currency union, the likelihood of fulfilling the OCA criteria increases. This argument rests upon the assumption that trade among European countries is typically intra-industry trade, based on economies of scale and imperfect competition. As a result, forming a currency union does not result in increasing specialization of the countries; a high degree of sector specific specialization renders a country vulnerable to asymmetric, sector-specific shocks. Moreover, Slovenia (like most other new EU members from 2004) has largely adjusted its economic policy to prepare for membership of the Euro Area [4, 5].

The existing literature for transition countries [e.g. 6, 7] does not come to a clear conclusion in terms of their fulfilling the OCA criteria. Usually, for Slovenia as well as for Hungary, the Czech Republic and Estonia, the studies find that structural convergence towards the incumbent Euro Area member countries has reached a mature stage. Thus, in these countries the likelihood of idiosyncratic shocks is limited, and therefore the costs of losing an independent monetary policy might well be smaller than the benefits from trade intensification and the expected further synchronization of the business cycle.

There are numerous benefits from Euro Area accession to be expected. They stem in particular from transaction cost savings resulting from the elimination of the bilateral exchange rate with the 12 incumbent Euro Area members, trade expansion due to the removal of exchange rate uncertainty, and reductions in the country risk premium contained in the interest rates.

Numerous further aspects of Euro Area accession deserve attention. Most of the founding Euro Area countries, especially the "core" countries, have a long tradition of aversion to inflation and thus monetary discipline [8]. Therefore, Slovenia will benefit from importing low inflation from these countries. Furthermore, higher price transparency can be expected to boost competition [9]. This is particularly relevant for a small open economy like Slovenia, which is also small in geographical terms. Moreover, Slovenia, like most of the countries that joined the EU

in May 2004, has only underdeveloped capital markets. The intensifying capital market integration brought about by joining the Euro Area will consequently entail efficiency gains [10]. By removing the transaction costs incurred by international investors, a currency union affects asset pricing and thus improves capital allocation. In addition, the adoption of the euro removes the risk of a currency crisis (even though the probability of a currency crisis already was low in Slovenia), inducing more foreign direct investment (FDI) and portfolio capital inflows.

In order to arrive at estimates of the macroeconomic consequences of introducing the euro in Slovenia by means of model simulations, these effects have to be quantified and translated into model inputs. Comparing the results of a model simulation with flexible exchange rates with the results obtained with fixed exchange rates can serve to simulate the costs associated with abandoning an independent monetary policy.

On the other hand, the benefits of joining the Euro Area are evaluated in terms of their impact on the economy's long-run growth potential. Effects on the production possibility frontier can, in particular, be expected from transaction cost savings, from the reduction in the country risk premium in the interest rates, and from productivity effects brought about by increasing international trade and FDI.

Obviously, when the euro is adopted in Slovenia, it follows that the bilateral exchange rate vis-à-vis the incumbent Euro Area countries disappears. Eliminating exchange rates saves transaction costs incurred by the private sector. These costs can be divided into two groups: the first group comprises costs paid by private households and enterprises when exchanging domestic into foreign currency and vice versa as well as costs for hedging against exchange rate risks. Exchange rate risks occur when the exchange rate changes in the time span between the conclusion and the settlement of a contract involving payments in a foreign currency. The second group of transaction costs associated with the existence of bilateral exchange rates consists of the resources used by companies for handling foreign exchange operations, additional accounting activities, and lengthier money transfers involving different currencies. In terms of the neoclassical growth model, savings on these transaction costs shift the production function upwards. Total factor productivity (TFP) increases because the elimination of transaction costs raises the efficiency with which the production factors are used in the economy. With a constant savings rate, the resulting rise in income raises the amount of savings. These are used to finance additional capital formation, thereby further increasing the growth rate. In sum, the one-off productivity increase brought about by the transaction cost savings leads to dynamic

productivity gains initiated by increasing fixed capital formation [11].

Another important effect of the introduction of the euro in Slovenia refers to interest rates: the exchange rate risk premium in the interest rate can be expected to decline. In a small open economy like Slovenia, domestic prices are, to a large extent, determined by prices on the world market. This not only pertains to prices for goods and services traded on international markets, but also to imported raw materials and intermediate goods. Therefore, the exchange rate is an important determinant of prices in the local currency. Eliminating exchange rate uncertainty thus reduces price uncertainty. If future output prices become less volatile, future revenues from investment projects also become more certain. If investors are risk averse, diminishing price uncertainty can consequently be expected to boost investment. If the uncertainty regarding future revenues from investment projects in a certain country is higher than in a benchmark country or region, this is reflected in a higher long-term interest rate. Thus, the risk premium can be defined as the difference between the long-term interest rates in Slovenia and the Euro Area. In 2005, the average interest rate of 10-year government bonds in Slovenia was 3.81 percent, compared to 3.42 percent in the Euro Area (among the 12 incumbent Euro Area countries, the long-term interest rate ranged between 3.33 percent in Ireland and 3.59 percent in Greece). Euro Area accession should reduce the long-term interest rate in Slovenia, entailing a positive effect on fixed capital formation. In addition, with the elimination of exchange rate uncertainty, a constraint to foreign direct investment is abolished. Gross fixed capital formation is an important source of the long-run growth potential. Eliminating the currency risk premium embedded in the long-term interest rate is thus a second channel through which Euro Area accession will boost potential output and total factor productivity in Slovenia.

As a third TFP enhancing channel of the euro adoption, we expect an increase in foreign trade and FDI. Exchange rate uncertainty arising from possible movements of the exchange rate between the conclusion and the settlement of a trade contract renders profits from international trade uncertain. Assuming that utility is a positive function of expected profits and a negative function of profit volatility, risk-averse firms will reduce their engagement in foreign trade. Removing exchange rate uncertainty should therefore be beneficial for international trade. In addition, a currency union goes beyond fixing the exchange rate between two currencies. Thus, trade among Euro Area members not only benefits from the elimination of exchange rate uncertainty, but also from sharing a common currency. Empirical studies [12, 13] confirm these theoretical considerations.

However, the effects of currency unions are not limited to trade creation among the member states.

Instead, trade diversion may also play a role. Some trade that took place between Slovenia and countries outside the Euro Area might be diverted to the Euro Area member states. To this end, there is no newly created trade. Because it is total international trade that is relevant for growth, only newly created trade matters.

As has been made clear by the new trade theory, the growth effects of international trade are not limited to effects from international specialization due to comparative advantages and economies of scale. In addition, and possibly more importantly, foreign trade is likely to induce knowledge spillovers from technologically more advanced economies. Such spillovers are an engine for total factor productivity growth [14, 15].

In order to investigate these possible causal chains empirically, their impacts on TFP have to be quantified. The problem of quantifying the benefits from a currency union has led some economists to question the possibility of measuring these gains in general. For the simulations in this paper, it is assumed that Euro Area accession raises total factor productivity in Slovenia by 1.5 percent. Previous estimations for the Euro Area conclude that reductions in the mark-up of prices over marginal costs due to structural reforms on the goods and factor markets have raised TFP in the Euro Area as a whole by 0.57 percent. At the level of member states, the maximum effect amounts to 0.75 percent [16]. The effects of introducing the euro in Slovenia can be compared to effects from reforms on the goods and factor markets. As Slovenia still lags behind the "old" Euro Area countries in terms of capital stock, there is potential for higher productivity gains. Thus, at 1.5 percent, a slightly higher TFP impact was assumed.

### 3 THE MACROECONOMETRIC MODEL SLOPOL6

SLOPOL6 (SLOvene economic POLicy model, version 6.1) is a medium-sized macroeconomic model of the small open economy of Slovenia. In its current version, it consists of 57 equations, of which 21 are behavioural equations and 36 are identities. The former were estimated by ordinary least squares (OLS), using quarterly data for the period from 1995:1 to 2005:4. Data for Slovenia were provided by the Statistical Office of the Republic of Slovenia, by the Institute of Macroeconomic Analyses and Development (IMAD) and by the Bank of Slovenia. Euro Area data were taken from the EUROSTAT database, except for the short-term interest rate in the Euro Area, which was extracted from the database of the German Bundesbank.

The model combines Keynesian and neoclassical elements. The former determine the short and medium-run solutions in the sense that the model is demand driven and persistent disequilibria in the

goods and labour markets are possible. The supply side incorporates neoclassical features. Almost all behavioural equations are specified in error correction form, exceptions being the equations determining the exchange rate, the interest rates, and changes in inventories. In this section, the behavioural equations are sketched very briefly. A more detailed description of the model can be found in [17]; for a slightly earlier version, see [18].

Consumption of private households depends on disposable income and on the real long-term interest rate, the latter reflecting wealth effects. Investment is derived from profit maximization of firms. Real gross fixed capital formation is thus influenced by total final demand and by the user cost of capital (the real long-term interest rate plus the depreciation rate of the capital stock). Real exports of goods and services are a function of the real exchange rate and of foreign demand for Slovene goods and services. As the aggregate of the 12 other Euro Area countries is Slovenia's largest trading partner by far (the Euro Area accounts for about 60 percent of Slovene foreign trade), the Euro Area approximates the rest of the world. Therefore, foreign demand is measured by Euro Area real GDP, and only the exchange rate between the Slovene tolar and the euro is considered (in the baseline simulation). Slovene real imports of goods and services depend on final domestic demand. A significant influence of the real exchange rate on imports was not supported by the data.

Money demand depends on real GDP and on the short-term interest rate. The long-term interest rate is linked to the short-term rate in a term structure equation. In addition, the long-term interest rate in Slovenia depends on its Euro Area counterpart, reflecting Slovenia's integration in the European capital market. The exchange rate equation combines factors derived from the uncovered interest parity and the purchasing power parity theories. Thus, the nominal exchange rate between the Slovene tolar and the euro depends on the interest differential between Slovenia and the Euro Area and on the ratio of the price levels of both countries/regions.

Labour demand (actual employment) is influenced by real GDP and by unit labour costs, where the latter are defined as the ratio of the nominal gross wage and labour productivity. Labour productivity is defined as real GDP per employee. Labour supply by private households depends on the real net wage. The wage rate is determined by the price level, by the unemployment rate, by labour productivity, and by the tax wedge on labour income, where the latter is defined as the sum of income taxes and employees' social security contributions. The negative influence of the unemployment rate on wages incorporates Phillips curve elements. Consumer prices depend on unit labour costs and the capacity utilization rate. In addition, due to the high degree of openness of the

Slovene economy, inflation in the rest of the Euro Area is assumed to influence inflation in Slovenia.

Potential output, which is determined by a Cobb-Douglas production function with constant returns to scale, depends on trend employment, the capital stock, and autonomous technical progress. Trend employment is defined as the labour force minus natural unemployment. The NAIRU (or the inflation-stable unemployment rate) is modelled by first applying a band-pass filter to the actual unemployment rate in order to extract the trend. In the simulations, the NAIRU is then modelled as an AR(8)-process. The production function has the following form:

$$\log(YPOT) = -0.839 + 0.648 \log(TREND\_EMP) + (1 - 0.648) \log(CAPR) + 0.0044 TIME.$$

In this equation, *YPOT* denotes potential output, *TREND\_EMP* trend employment, and *CAPR* the capital stock at constant prices. The linear time trend variable *TIME* approximates technical progress, i.e. total factor productivity. From this equation, it can be derived that technical progress or TFP growth is 0.44 percent per quarter or 1.8 percent per year. This rather low value might at least partly be due to measurement problems. Technical progress that is embedded in the production factors labour and capital is not accounted for by this TFP measure. In particular, human capital as a carrier of TFP is not adequately represented, but this would be rather difficult to implement in an aggregate macroeconomic model like SLOPOL6.

Positive macroeconomic effects from Euro Area accession are simulated by exogenously raising technical progress, approximating a TFP shift. In particular, it is assumed that the level of total factor productivity is permanently raised by 1.5 percent. In the model simulation, this productivity shift is implemented by increasing the constant accordingly.

Government expenditures and revenues are linked to economic policy instruments and to the economic situation in Slovenia. Revenues from personal income taxes and from employees' social security contributions are determined by multiplying the tax rate and the social security contribution rate, respectively, by the number of employees and by the average gross wage per employee. In a behavioural equation, corporate income taxes are explained by GDP. Interest payments on public debt are influenced by the debt level and by the long-term interest rate. The difference between the remaining government revenues and expenditures is determined by the past development of the debt level. This specification approximates a fiscal rule: if the government runs a deficit, i.e. if the debt level is rising, in the following period this is partly offset by increasing net revenues. Government consumption and investment as well as transfers to private households are regarded as policy instruments. Thus, they are exogenous in the simulations. The budget deficit is given by the

difference between total government expenditures and revenues.

Upon adoption of the euro, the exchange rate between the Slovene tolar and the euro ceases to exist. In terms of the model specification, this is equivalent to irrevocably fixing the exchange rate. In order to explore the macroeconomic implications of this, one model version with flexible exchange rates and another version with fixed exchange rates have been constructed.

In the flexible exchange rate model version, the short-term rate of interest is available as an active monetary policy instrument for internal stabilization purposes. In this case, the short-term interest rate is determined in a Taylor-rule type equation, i.e. it depends on inflation and on the difference between actual and potential GDP growth. In the other regime, the interest rate has to be adjusted to stabilize the exchange rate and therefore monetary policy cannot be used as an active policy instrument. In the model version with a fixed exchange rate, the short-term interest rate is therefore entirely determined by the three-month interest rate in the Euro Area and by the devaluation rate of the Slovene tolar. Thus, from the year in which the tolar exchange rate is fixed onwards (or, for the purpose of the simulations, equivalently: from the introduction of the euro in Slovenia onwards), the short-term interest rate in Slovenia gradually adjusts to that in the Euro Area.

#### 4 SIMULATION RESULTS

In this section, possible effects of the introduction of the euro on the Slovene economy are quantified. The effects were estimated by simulations with the SLOPOL6 model. The simulations were performed for the period 2006 to 2010.

First, consider the most important *exogenous variables* for the simulations. For the starting year 2006, the historical values were taken. It is assumed that real GDP in the Euro Area grows at a rate of 2.6 percent in 2007, after 2.7 percent in 2006. From 2008 onwards, a real growth rate of 2.5 percent is assumed. Consumer price inflation in the Euro Area is set at 1.9 percent p.a. from 2007 on. In 2006, it amounted to 2.2 percent. The three-month EURIBOR is assumed to rise gradually from its 2005 average value of 2.2 percent to 4 percent in 2010. Accordingly, the yield of 10-year government bonds rises from 3.4 percent in 2005 to 4.5 percent in 2010. As regards the fiscal policy instruments, which are also exogenous in the model simulations, it is assumed that both government consumption and transfers to private households, both at current prices, are increased by 7 percent p.a. Due to the fact that Slovenia still lags behind the EU-15 countries in its infrastructure capital stock, public investment is raised by the somewhat higher rate of 10 percent p.a. over the simulation horizon.

Tables 1 to 4 show the numerical simulation results. First, a baseline simulation without Euro Area accession was performed (Tab. 1). Tab. 1 also contains actual figures for 2005, showing the initial position of the Slovene economy. Tab. 2 displays the isolated effects of replacing an independent monetary policy in Slovenia with the common monetary policy conducted by the ECB, i.e. the costs of foregoing an independent monetary policy. The isolated effects arising from higher total factor productivity, but with flexible exchange rates as in the baseline simulation, are summarized in Tab. 3. They give an estimate of the supply-side benefits of introducing the common currency. Finally, the combined effects arising from Euro Area accession can be found in Tab. 4.

The *baseline simulation* provides a fairly optimistic picture (Tab. 1): real GDP growth reaches 4.8 percent on average. From 2007 to 2009 GDP growth slows down slightly before rising again in the final year. The consumer price index rises by 2.4 percent on average, with inflation falling slightly below its 2005 value. Over the five-year period, the unemployment rate is almost halved. Net employment creation amounts to 63,000 employees until 2010. In 2006 and 2007, the government runs a marginal budget surplus. From 2008 on, the government budget exhibits a widening deficit, rising from 0.1 percent to (still modest) 1.0 percent of GDP in 2010. In 2006 and 2007, the current account exhibits a declining deficit. From 2008 on, a small surplus of the current account is achieved.

Tab. 1. Baseline simulation

	2005	2006	2007	2008	2009	2010
GDP at constant prices (bn. SIT)	3516.2	3697.2	3907.0	4087.5	4264.8	4452.2
Real GDP growth rate	3.9	5.2	5.7	4.6	4.3	4.4
CPI inflation rate	2.5	2.5	2.7	2.3	2.3	2.4
Unemployment rate	10.2	9.1	8.1	7.4	6.8	6.4
Employment (1,000 persons)	813.1	825.9	838.5	851.0	863.8	876.1
Budget balance (% of GDP)	0.4	1.2	0.5	-0.1	-0.5	-1.0
Debt level (% of GDP)	25.5	22.7	20.4	19.1	18.4	18.2
Current account (% of GDP)	-0.3	-1.9	-0.6	0.7	1.6	2.2

2005: actual figures

Source: authors' own calculations

Abandoning the independent monetary policy conducted by the Bank of Slovenia and *adopting the*

*common ECB monetary policy* exerts adverse effects on the Slovene economy (Tab. 2). Although the short-term and the long-term interest rates converge to the Euro Area levels to a large extent, the loss of the monetary policy instrument and of the exchange rate as a buffer against idiosyncratic shocks more than offsets these effects. In 2010, real GDP falls below the baseline level by 1.7 percent. Real GDP growth amounts to 4.5 percent on average, compared to 4.8 percent in the baseline simulation. Employment is higher by 54,800 employees. In the last two years, inflation is lower than in the *status quo* simulation, showing the disinflationary influence of the ECB monetary policy on Euro Area members. In contrast to this favourable effect, public finances and the current account are negatively affected. The slight deterioration in public finances can be explained by the fact that the public balance improves with rising nominal GDP, and in this simulation, both inflation and nominal GDP are lower than in the baseline run. The worsening of the current account is caused by various forces. Firstly, in the baseline simulation the Slovene tolar depreciates by 12 percent in nominal terms. Due to the higher inflation compared with the Euro Area, it remains almost constant in real terms. In the simulation without an independent monetary policy, from 2007 onwards the exchange rate is fixed in nominal terms. Although inflation is lower than in the baseline, it is still higher than in the Euro Area average, thus in spite of the complete fixing of the nominal exchange rate, Slovenia's (non-existent) currency appreciates in real terms. This real appreciation promotes imports and impedes exports.

Tab. 2. Isolated effects of common monetary policy\*

	2006	2007	2008	2009	2010
GDP at constant prices	0.0	-0.3	-0.6	-1.3	-1.7
Real GDP growth rate	0.0	-0.2	-0.4	-0.7	-0.5
CPI inflation rate	0.0	0.0	0.0	-0.3	-0.8
Unemployment rate	0.0	0.1	0.2	0.5	0.7
Employment (1,000 persons)	0.0	-0.7	-2.5	-5.5	-8.2
Budget balance (% of GDP)	0.0	0.0	-0.1	-0.2	-0.4
Debt level (% of GDP)	0.0	0.1	0.2	0.6	1.2
Current account (% of GDP)	0.0	-0.1	-1.2	-1.2	-1.6

\* Deviations from baseline in percentage points (GDP: percent, employment: 1,000 employees)

Source: authors' own calculations

The isolated effects from *higher total factor productivity* (Tab. 3) are weaker than those of abandoning the policy instrument but much more favourable. From 2007 onwards, the year in which the

euro is introduced in Slovenia, positive macroeconomic effects can be observed. The real GDP growth rate increases, rising by 0.2 percentage point p.a. on average over the baseline run in the five-year period under consideration. In 2010, the level of real GDP exceeds that of the baseline run by 0.8 percent. Due to the outward shift of the production possibility frontier, capacity utilization declines. This, together with higher aggregate demand, reduces inflation by 0.4 percent on average. Additional employment creation amounts to 69,300 employees over the 2005 level or 6,300 over the baseline simulation run in 2010. Consequently, the unemployment rate is lower (by about half a percentage point in 2010) than in the baseline run. In contrast to what might be expected, there is a small adverse effect on public finances. This can be explained by the fact that the decline in inflation exceeds the increase in *real* GDP and thus *nominal* GDP is lower than in the baseline run. Again, the current account deteriorates. Due to higher real GDP, imports rise but exports are almost unaffected. They are only influenced by the marginal variation in the real exchange rate.

Tab. 3. Isolated effects of higher TFP\*

	2006	2007	2008	2009	2010
GDP at constant prices	0.0	0.0	0.3	0.6	0.8
Real GDP growth rate	0.0	0.1	0.3	0.3	0.2
CPI inflation rate	0.0	0.0	-0.9	-0.8	-0.5
Unemployment rate	0.0	0.0	0.0	-0.3	-0.6
Employment (1,000 persons)	0.0	0.1	1.0	3.5	6.3
Budget balance (% of GDP)	0.0	0.0	-0.1	-0.1	-0.1
Debt level (% of GDP)	0.0	0.0	0.2	0.5	0.6
Current account (% of GDP)	0.0	-0.1	-0.6	-0.7	-0.7

\* Deviations from baseline in percentage points (GDP: percent, employment: 1,000 employees)  
Source: authors' own calculations

The *combined effects* of abandoning an independent monetary policy and the assumed TFP shift can be found in Tab. 4. Positive growth effects arise in 2009 and 2010 in particular. In the final year of the time horizon considered here, real GDP exceeds the baseline level by nearly 1 percent, and CPI inflation is significantly lower from 2008 on. From 2009 on, the unemployment rate negatively deviates from the baseline trajectory. This development is due to more dynamic employment creation. By 2010, the number of employees exceeds the level reached without Euro Area accession by 6,400 people. The overall effect on public finances is slightly negative. This can be

explained by the fact that some expenditure and revenue items depend on *nominal* GDP, which, due to lower inflation, falls short of the baseline level. As in the case of the isolated TFP shock, the current account deteriorates. Higher domestic demand results in increasing imports, while real exports are almost identical to the baseline run.

Tab. 4. Overall macroeconomic effects of EMU integration\*

	2006	2007	2008	2009	2010
GDP at constant prices	0.0	-0.3	-0.2	0.1	0.9
Real GDP growth rate	0.0	-0.2	0.1	0.4	0.8
CPI inflation rate	0.0	0.0	-1.0	-1.2	-0.9
Unemployment rate	0.0	0.1	0.2	-0.1	-0.6
Employment (1,000 persons)	0.0	-0.7	-1.4	0.6	6.4
Budget balance (% of GDP)	0.0	0.0	-0.1	-0.3	-0.2
Debt level (% of GDP)	0.0	0.1	0.4	0.9	1.1
Current account (% of GDP)	0.0	-0.1	-1.2	-0.6	-0.6

\* Deviations from baseline in percentage points (GDP: percent, employment: 1,000 employees)  
Source: authors' own calculations

Summing up, the introduction of the euro in Slovenia brings about temporarily higher real GDP *growth*, a permanently higher GDP *level*, more employment, temporarily lower inflation and a permanently lower price level. On the other hand, both public finances and the current account deteriorate. Costs arise primarily from the loss of the monetary policy instrument (and the nominal exchange rate in particular), while benefits are rooted in the supply-side productivity increases.

## 5 CONCLUSIONS

On 1 January 2007, Slovenia was the first of the ten states that joined the European Union in May 2004 (and the first formerly Communist country) to become a member of the Euro Area. The adoption of the euro can be expected to exert non-negligible effects on the Slovene economy. By means of simulations with SLOPOL6, a macroeconomic model of the Slovene economy, this paper aims to quantify macroeconomic effects from Slovenia's accession to the Euro Area.

The introduction of the common currency brings about benefits, but also costs have to be considered. The costs of replacing the domestic currency with the euro are associated with abandoning an independent monetary policy. In particular during the transition process with rapidly growing productivity and real appreciation of the domestic currency, nominal

exchange rate flexibility may be important. Furthermore, as long as the business cycle is only loosely correlated to those of the other Euro Area member countries, monetary policy can serve as a useful instrument for coping with idiosyncratic shocks hitting the economy. On the other hand, positive effects on the production possibility frontier can, in particular, be expected from transaction cost savings, from the reduction in the country risk premium in the interest rates as well as from productivity effects brought about by increasing international trade and foreign direct investment.

To sum up the simulation results, the adoption of the euro brings about temporarily higher real GDP growth, a permanently higher GDP level, more employment, temporarily lower inflation and a permanently lower price level. Both public finances and the current account deteriorate.

Finally, it should be added that factors like structural imbalances between labour supply and demand, which may be very important determinants of unemployment, cannot be captured with an aggregated model like SLOPOL6. Moreover, the Lucas critique, which represents a fundamental objection against the use of structural macroeconomic models without rational expectations, may apply. Incorporating changes in the public's expectations with recognition of a new policy regime into the model will certainly be a major improvement, although the short time series available for consistent Slovene data makes an attempt at executing it still more difficult than for countries with a longer history without structural breaks.

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