



*Adopting the euro in Hungary:
expected costs, benefits and timing*

Edited by
Attila Csajbók – Ágnes Csermely



**ADOPTING THE EURO IN HUNGARY:
EXPECTED COSTS, BENEFITS AND TIMING**

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I. SUMMARY

Accession to the Economic and Monetary Union is one of the most important steps in Hungary's European integration, which will entail abandoning the national currency and adopting the euro as domestic legal tender. For Hungary as a new member state in the EU, introduction of the euro will not be an option but an obligation. Nevertheless, new EU members will have some leeway to set the date of adopting the euro¹. Therefore, it is useful to analyse the likely costs and benefits of joining the euro area for Hungary and to define the choice of medium-term economic policy strategy in the light of the results of this analysis. The National Bank of Hungary would like to contribute to the formulation of an economic policy strategy by issuing this volume, which contains a cost-benefit analysis of the likely effects of the country's joining the euro area. This analysis is confined strictly to the economic benefits and costs of introducing the euro and is not intended to examine its other possible impacts, including, for example, the implications for politics and national security. Adopting the euro will likely have a permanent impact on Hungarian economic growth. This impact will become evident through numerous channels. Bank staff have attempted to quantify and sum up the extent of this impact transmitted through the various channels. The findings of this analysis suggest that **the introduction of the euro will bring about significant net gains in growth**. However, welfare is influenced not only by the level and rate of GDP growth, but their stability as well. A widely fluctuating national income will produce lower welfare than a more stable one, even if on average the two income levels are identical. For this reason, it is important to examine whether joining the euro area will increase or mitigate the volatility of business cycles. In other words, the key question is whether Hungary and the euro area form an optimum currency area, that is whether the monetary policy of the euro area is capable of adequately substituting independent Hungarian monetary policy in smoothing out cyclical fluctuations. In the findings of this analysis, **the euro area seems to be in most respects at least as optimal a currency area for Hungary as for less developed euro area member countries**.

¹ One example of the current EU member states is Sweden, which even though committed to joining the euro, has been postponing it by staying outside the ERM II. By contrast, Great Britain and Denmark have an official opt-out. The new EU members did not request an opt-out, and probably they would not have received one.

Quantifying costs and benefits

In estimating the likely costs and benefits of monetary union, it is very important to clarify to which alternative path those costs and benefits are related. The alternative path used in our study reflects possible economic developments if Hungary enters the EU at a relatively early stage, but refrains from adopting the common currency for some reason, pursuing independent monetary and exchange rate policy strategies. This study assumes successful disinflation and continued income convergence towards the euro area even in the staying-out scenario. However, if Hungary stays out from currency union, disinflation will entail higher real economic sacrifices, due to the costs of accumulating and preserving central bank credibility. Disinflation undertaken with a well-defined purpose and time-horizon of joining the euro area would probably enjoy higher credibility and thus would be less costly. As this credibility gain arising from the presence of an early EMU-entry date cannot be quantified, it has not been accounted for in our cost-benefit analysis, but its significance will be stressed when determining the optimal timing of joining the euro area.

The methodology of estimating the costs and benefits is necessarily eclectic, but Bank staff have attempted to confirm the calculations from several aspects, taking account of recent theoretical and empirical findings in the international academic literature.

The analysis quantifies three key **benefits** arising from euro area membership, in the form of gains from **reduced transaction costs, expansion of foreign trade and a drop in real interest rates** (and the simultaneous easing of the current account constraint).

Maintaining a country's own currency can be viewed as an administrative restriction causing welfare losses to society, since part of the physical and human resources are tied up due to this very restriction. These losses appear in the form of transaction costs incurred by firms and households. One group of transaction costs is conversion costs, comprising fees and commissions charged by banks and other financial intermediaries for converting euros into forints (and vice versa) and of bid-ask spreads. The other group contains in-house costs incurred by firms engaged in foreign currency transactions, due to extra administration and risk management

tasks associated with these transactions. Giving up a national currency will reduce these transaction costs and the reallocation of resources released in this way may raise the level of GDP. Estimates of the magnitude of transaction costs are partly derived from data for Hungarian foreign exchange market turnover and from the size of commissions, and partly from international estimates. **Thus, Bank staff estimate that the gains from reduced transaction costs will cause a one-off rise in the level of GDP of 0.18-0.30 of a percentage point.**

The bulk of international empirical research suggests that maintaining an independent currency will also have an adverse effect on external trade. In contrast, currency union with major trading partners will boost a country's external trade, leading to higher growth via various externalities (such as technology and know-how transfer). In this analysis, we have used a methodology that has recently gained popularity to gauge such effects on external trade and growth. The approach is based on gravity models and large panel data to estimate the effect of a currency union. Accordingly, **the adoption of the euro may raise GDP growth by 0.55-0.76 of a percentage point over the long run, via the expansion of external trade.**

Domestic interest rates currently contain a risk premium component to compensate non-resident investors for the uncertainty about movements in the exchange rate. The switch to the euro will remove this premium from domestic nominal rates, causing real rates to be lower. A lower level of real interest rates will in turn encourage domestic investment. Furthermore, once in the euro area, investment can grow unhindered by current account deficits, as depreciation will cease to be a threat to non-resident investors. Thus, the adoption of a common currency will help the country maintain macroeconomic equilibrium even in the face of a higher current account deficit, thanks to the removal of a major restraint on investment growth. More buoyant investment will, over the longer term, boost economic growth and accelerate convergence towards the average income level within the EU. To quantify this additional growth, Bank staff have first estimated the size of the expected reduction in the risk premium following the euro changeover, using information inherent in the forint yield curve. Using as input the reduction in real rates obtained in this way, two different models were employed to estimate the effect on growth in numerical terms. The findings suggest that **the common**

currency will raise the *rate of GDP growth* by 0.08-0.13 of a percentage point over the longer term via lower real rates of interest.

A quantifiable cost of abandoning autonomous monetary policy arises from giving up part of the government's revenue from seigniorage. Once inside the monetary union, Hungary will also share the seigniorage revenues arising from the use of euro notes and coins. However, due to accounting rules, this share will likely be lower than if the National Bank had retained its right of issue. Estimates suggest that **lower seigniorage revenues will cause an annual loss in the range of 0.17–0.23 of a percentage point in the *level* of GDP.**

When summarising the benefits and costs, it creates some difficulty that the euro-induced increases/decreases in GDP are distributed across time in a way that is not identical or not known for each individual mechanism. Savings arising on lower transaction costs will presumably appear over the very short term, pushing up the level of GDP. The same applies to the losses caused by the lower seigniorage. Therefore, it seems plausible to treat the benefits and costs of entering monetary union associated with these two items as changes in the level of GDP.

The situation is different with regard to the benefits arising from the reduction in real rates, the subsequent pick-up in investment and the expansion of external trade. Here, GDP growth will unfold fully only over the longer term, justifying the expression of these benefits as changes in the growth rate of GDP. When quantifying these two effects, the assumption is that GDP will reach the higher level estimated for the long term (20 years) by growing at an even pace. The benefit obtained from joining the euro area is expressed in the form of average annual gain in growth calculated in this way.

It is important to distinguish between the short-term benefits and costs affecting the level of GDP and those affecting its rate of growth only in the longer run. Being approximately equal in size, **the quantifiable short-term benefits and costs** (i.e. the gains from reduced transaction costs and the loss due to lower seigniorage) effectively **cancel each other out**. The sum of the estimated long-term benefits reflects significant net gains, as **euro area membership may raise the growth rate of Hungarian GDP by 0.6 to 0.9 of a percentage point in terms of a long-term (20-year) average.**

Table I-1**Effect of short-term factors on (the level of)
GDP as a percentage of GDP**

Reduction in transaction costs (+)	0.18–0.30
Change in seigniorage revenue (–)	–0.17––0.23
Net effect	0.01–0.07

Table I-2**Effect of long-term factors on GDP growth
(percentage points)**

Reduction in real rates (+)	0.08–0.13
Expansion of external trade (+)	0.55–0.76
Net effect	0.63–0.89

Abandoning monetary autonomy and the effect on business cycles

The welfare cost of abandoning the national currency and autonomous monetary policy is determined by the extent to which business cycle volatility increases in the wake of joining the euro. This in turn greatly depends on the exposure of the Hungarian economy to asymmetric shocks, that is unexpected disturbances in the economic environment affecting Hungary and the euro area to differing degrees. This study claims that the incidence of asymmetric shocks is no more likely in Hungary than in current less-developed members of the euro area.

The first reason for this is that integration of Hungarian economy and trade towards the euro area appears to be on a par with that achieved by current members, in terms of both quantitative indicators (such as the size of trade with the euro area) and qualitative indicators (such as export/import structure, weight of intra-industry trade and penetration of high value added markets).

Secondly, the structure of the Hungarian economy, in terms of the contribution of individual sectors to GDP and employment, does not significantly differ from the euro area average. Thus, sector-specific shocks tend to have a similar effect in the euro area as in Hungary. Hence, common monetary policy responses to such

sectoral shocks at the euro area level also appear to be optimal in the case of Hungary. There exists a certain degree of asymmetry regarding a few specific industries within manufacturing, but this does not exceed the asymmetry experienced by the current smaller euro-area members.

The third reason is that since the middle of the past decade, the Hungarian business cycle has been increasingly in line with that in western Europe, at least as much as the business cycles of peripheral euro area members in respect of some indicators. Provided that this trend is permanent, the anti-cyclical monetary policy of the European Central Bank will be suitably timed, with a cyclical smoothing effect on the Hungarian economy.

Abandoning independent monetary policy will entail a smaller loss in welfare provided there exist effective market mechanisms and economic policy instruments capable of taking monetary policy's place in the management of the asymmetric shocks that may arise.

Comparative studies suggest that Hungary does not lag behind the west European average in respect of the flexibility of goods markets and probably outperforms the former in terms of labour market flexibility. Hence, price and wage adjustments by the market can be counted on in the management of asymmetric shocks at least as much as in the case of the current euro-area members.

Fiscal policy may be suitable for dampening asymmetric shocks at the aggregate level in a country. However, to be able to respond with the necessary speed it has to be sufficiently flexible and unplagued by high deficits or debts. This is to be ensured by the Maastricht criteria on the size of the budget deficit and public debt which countries wishing to join monetary union have to meet and, after accession to the EU, by the requirements laid down in the Stability and Growth Pact. Adjustment to the shocks can be implemented in two different ways, namely the operation of automatic stabilisers and active discretionary fiscal measures. As fiscal revenues and expenditures in today's Hungary are predominantly linked to wages and consumption, and as the expenditures are less variable relative to the cycle, automatic stabilisers do not have a very large effect. However, this should not be seen as exceptional, as automatic stabilisers play a similarly minor role in some (typically south European) EU countries. Consequently, discretionary measures, with special regard to those aimed at smoothing investment activity,

exposed more to cyclical fluctuations than consumption, are to play a more pronounced role. It should be noted that the EU prefers aggregate demand management via the automatic stabilisers to that via discretionary measures.

Even though monetary independence is a useful instrument in smoothing cyclical fluctuations, it may actually magnify the cycles under certain circumstances. For a small open economy, still classified within the 'emerging' market investment category, maintaining the national currency may by itself induce undesirable shocks, such as financial contagion and speculative attacks on the currency. A country sticking to its currency may have to face larger volatility in capital flows than that experienced by more developed countries and/or countries in a currency union with their major trading partners. This may also make a mark on the business cycle, triggering more erratic movements than in the more advanced economies or in countries that gave up their national currencies. It should be stressed that although surpassing the emerging market status may by itself mitigate higher capital flow volatility, it cannot completely eliminate it, as that can only be achieved by giving up the national currency. Thus, Hungary's entry into the EU and its prospective move away from the emerging market status in itself offers no complete remedy to this problem.

Adopting the euro is also expected to be conducive to financial integration. The end of exchange rate uncertainty will likely prompt Hungarian households to reallocate investment portfolios and transfer a large portion of their savings into euro area instruments. The ensuing higher diversification of portfolios will lead to a wider distribution of risk across Hungarian and euro-area households, a welcome development for both parties. Wider diversification of risks will in turn reduce exposure to asymmetric shocks, since income changes triggered by the shocks tend to be smaller if portfolios are more diversified. However, it is rather difficult to quantify the rise in utility through this channel, as that would require knowledge of both the size of the expected diversification and the risk aversion of Hungarian households.

Our cost-benefit analysis could be summarised as follows. The quantifiable benefits arising from joining the euro area considerably exceed the costs entailed, resulting in higher economic growth and faster real convergence towards western Europe. It is impossible to quantify the impact of the introduction of the euro area on

business cycle fluctuations and its welfare implications. Giving up the national currency will entail the loss of a device for keeping some of the asymmetric shocks at bay, while, at the same time, it eliminates one potential source of asymmetric shocks (i.e. emerging market financial contagion). The likelihood of other asymmetric shocks is not higher than in the less developed euro-area countries, thanks to the similarity of production structures, the advanced state of trade integration with the euro area and cyclical synchronicity. Furthermore, flexible price and wage adjustment mechanisms and discretionary fiscal policy instruments can tackle any disturbances that may still occur at least as effectively as in the euro-area member nations at a similar stage of development.

Timing of joining the euro area

Since the our cost-benefit analysis has produced convincing evidence in support of the existence of considerable gains in growth if the single currency is adopted, the question of optimal timing seems easy to answer: the sooner the better. The findings suggest that by postponing entry, Hungary will miss out on extra growth. Nevertheless, the situation is not as simple as that, since nominal convergence, a prerequisite of joining the euro area, may entail real economic costs, which are not unrelated to the speed of the accession process. Currently, the rapid fulfilment of the Maastricht criteria on inflation and the fiscal deficit may be problematic. There is the danger that rapid disinflation and fiscal adjustment (aimed at a changeover in 2007) may entail excessive sacrifice of growth. It should be noted however, that quite a few current euro area countries had to accomplish a similar degree of fiscal adjustment and disinflation during a similarly short period of time. Follow-up studies (see for instance, ECB (2002)) reveal that these countries have not incurred any significant costs in connection with this rapid adjustment.

Should the issue of postponing Hungary's adoption of the single currency arise, the following three implications should be considered. The first is the fiscal policy obligations emerging right after Hungary joins the EU. The second is the rise in exposure to speculative capital flows, especially during the period between the EU entry and joining the euro. The third factor is the effect on the credibility of the disinflation programme of postponing the participation in the euro area.

Fiscal adjustment must be accomplished not solely for the purpose of joining the euro area, since the Agreement requires member countries to reduce fiscal deficits below 3% as early as accession. Furthermore, the Stability and Growth Pact also requires that member nations seek to attain a balanced fiscal position at a prescribed pace and as laid down in their convergence programmes.

If non-resident investors are confident that Hungary will join the euro area in the near term, it may trigger speculative capital inflows and start off a 'convergence play' similar to the ones that had involved other countries earlier in preparation of Monetary Union. This threatens a rapid reversal of capital flows and drastic depreciation, should investor confidence drop unexpectedly (due perhaps to exogenous factors). It is easy to see that Hungary's accession to the EU will give continued momentum to speculative capital inflows, as the entry will give investors a clear signal that the country has passed a major milestone on the way towards adopting the single currency. The history of a few current euro area members in the 1990s well illustrates the proposition that EU membership by itself does not provide protection from a sudden reversal in capital flows, speculative attacks on the national currency and a potential currency crisis (see EMS crises in 1992 and 1995). Another argument in favour of the earliest possible participation in the euro area is that it would shorten the period marked by intensive exposure to speculative capital flows. Volatile investment flows could trigger extreme fluctuations in the exchange rate of the forint. Steady inflows of capital may cause the exchange rate to appreciate steadily at first, only to be replaced by rapid depreciation once there is a reversal in the direction of capital flows. A successful accession programme may also enhance stability of the exchange rate, since international experience suggests that as the date of entry gets nearer, exchange rate expectations tend to approach the expected conversion rate.

Commitment to joining the euro area at an early date is one of the key factors enhancing the credibility of the disinflation programme in the eyes of market participants. In turn, the credibility of the disinflation programme has a major impact on the magnitude of the real economic sacrifices involved in achieving it. The lower the level of inflation expectations in response to an announced disinflation path, the easier and faster it is to actually reduce inflation to the desired level, in other words, the smaller the real economic sacrifice of disinflation. Commitment to

joining the euro area as early as possible, especially if it is a consensus objective of the central bank and the government, signifies an 'end point' to market participants which lends credibility to the preceding disinflation process and is extremely favourable for inflation expectations, ultimately reducing the costs of disinflation. On the other hand, this also means that should the expected end point become uncertain for any reason (such as postponing the entry to some unspecified date), that may significantly push up the costs of disinflation.

II. HUNGARY'S MATURITY FOR EURO AREA

PARTICIPATION

This analysis starts with a discussion of what considerations should be used to decide whether it is worthwhile for Hungary to give up its autonomous monetary policy and join the euro area.

In the academic literature, the theory of Optimum Currency Areas (OCAs) deals with the conditions and the analytical framework that can be employed to assess when a country should fix its exchange rate, that is give up its monetary independence. The classic theory of OCAs was established in the 1960s as a result of research by Mundell (1961), McKinnon (1963) and Kenen (1969). These authors attempted to establish guidelines for the selection of the most suitable exchange rate system.

Mundell's line of reasoning, in fact the starting point of the theory, can be best presented within a two-country model. Let us assume that there is an increase in demand for the products of country (region) A at the cost of the products of country (region) B, implying a change in consumer preferences. If there are nominal rigidities in B (for instance, nominal wages are inelastic downwards), equilibrium (of the trade balance) may be restored via a depreciation of the currency of B. If there is a pegged exchange rate regime or currency union, mobility of labour is needed, or else B will suffer a rise in unemployment and a trade deficit vis-à-vis A. Thus, Mundell believes that the widest boundaries of an OCA are designated by labour mobility. Many authors have since pointed out the existence of other equalising mechanisms, such as fiscal transfers, which makes labour mobility no longer necessary for a currency union.

The theory has drawn attention to the conditions that must exist for asymmetric shocks to occur at all, that is disturbances affecting the economies of various regions to differing degrees, potentially requiring adjustment via relative prices once they occur. An adequately diversified sectoral structure may ensure that the effects of sectoral shocks are averaged out. Structural similarity between countries also rules out major incidence of shocks at the aggregate level. Sections III and IV examine whether it is worthwhile for Hungary to join monetary union, analysing several aspects of the OCA theory.

Mundell and his followers exclusively determined real criteria – nominal criteria were not among the conditions of a sustainable currency pegging. One of the conditions for participating in the European currency union is meeting the Maastricht convergence criteria, which establish numerical values for nominal variables (for more details, see Section V). It is perhaps less well known that the Maastricht criteria include real measures as well, although without numerical values. These indicators provide supplementary information about the extent to which nominal convergence is sustainable (e.g. trade and current account balances, unit labour costs, labour productivity, developments in real wages, etc.)². Nevertheless, the main reason for giving nominal criteria the primary role is that meeting solely the real economic criteria derived from the OCA theory does not automatically guarantee monetary stability in the region introducing the common currency. But the designers of EMU did not simply wish to create an ‘optimal’, or put more practically, well functioning currency area. Rather they wished to create an area of monetary stability.

It is important to note that neither the OCA theory nor the convergence criteria involve the economy’s ‘level of development’, as it is traditionally measured by per-capita GDP. The official standpoint of the ECB and the European Commission is included in the press release³ issued about the Helsinki seminar⁴. This states that real and nominal convergence should proceed simultaneously. During *real convergence*, the *economic structure* will become similar to that existing within the EU, while growth picks up speed via structural reforms, helping *living standards approach* the levels seen in the EU. Referring to historical examples, they stress that this progress should proceed *in parallel with nominal convergence*, by which they mean price stability and sound public finances. As *progress towards meeting the Maastricht criteria does not impede the implementation of structural reform*, they also suggest that monetary policy should be directed at achieving price

² It must have been an important factor in setting the Maastricht criteria that it was not possible to specify optimal levels for real-convergence indicators *in numerical terms*. The lack of numerical values would have hampered the objective selection of eligible participants. However, decision-makers were in agreement as to the need for basing participation in the currency union on objective and quantifiable criteria which leave only minimum space for discretion.

³ <http://www.ecb.int/press/pr991112.htm>

⁴ The Helsinki seminar was held in the capital of Finland in November 1999. High-ranking officials of the ECB and accession-country central banks met to discuss strategic issues relating to EMU participation. This was the first meeting of its kind aimed at establishing contact between the ECB and the accession-country central banks. See also pp. 20-21 in Bini-Smaghi *et. al.* (1994) on the circumstances which led to the formulation of this position, called ‘parallelism’ during the course of the Maastricht Treaty preparatory talks.

stability, which should also be supported by fiscal policy. Finally, they add that it is at each country's discretion to choose which path for convergence to follow towards currency union membership, as long as the ultimate objective remains convergence. Similar statements could be cited from speeches by high-ranking officials of the ECB delivered at various forums and from European Commission documents⁵. They all have one feature in common in that by real convergence they mean the similarities between economic structures and the level of economic development, while regarding economic integration, privatisation and progress with structural reform to be more important than the catch-up in respect of per-capita GDP.

Taking into account the requirements of economic theory, the ECB and the European Commission, we view real economic criteria marked by the optimum currency areas as authoritative in deciding whether Hungary is sufficiently mature to become a member of the monetary union. These criteria are discussed in detail in Section III. But before examining the issue, we would like to analyse using another method whether Hungary has already achieved the level of economic development required for accession to the euro area. In the following, we will compare Hungary's most important economic properties with those of the less advanced euro area member states in the five years preceding their entry. A comparison of real convergence indicators allows us to judge whether or not Hungary is mature for European Union membership. On the other hand, this comparison may serve as a yardstick against which to measure the feasibility of meeting the convergence criteria. However, the results of comparisons should be treated with reservations – the accession countries are now faced with both a different external economic climate and different economic policy challenges⁶.

The lower stage of development of the Hungarian economy has no bearing on the question whether the economy is mature enough to join monetary union. But this lower level does have an important macroeconomic consequence – should the exchange rate be fixed, the process of catching up will entail higher *structural or equilibrium inflation*. The Bank's estimate of expected equilibrium inflation is presented in Chapter II.2.

⁵ See, for example, Padoa-Schioppa (2002) and Rempesberger (2001), pp. 5-6.

⁶ For more details, see Horváth-Szalai (2001).

II.1. Hungary and the less advanced EU member states five years prior to currency union membership

This chapter compares some of Hungary's key real and nominal convergence indicators with those of the less advanced EU member countries. Assuming 2006 as the earliest possible date of joining the euro area, Ireland's, Portugal's and Spain's data for 1994 and those of Greece for 1996 provide the basis for comparison with Hungary's data for 2001.

Admittedly, in respect of per-capita GDP Hungary lags behind the four countries examined – Hungarian per-capita GDP, measured on a purchasing power parity basis, was 53% of the EU average in 2001 (see Chart II-1). Using OECD and Eurostat methodologies, this ratio rose by 6% between 1997 and 2001. Thus, Hungary managed to reduce this gap by an annual 1.5% on average. Taking other real and welfare indicators into account, however, the calculation of Hungarian GDP currently underestimates actual income, due to the differences between Eurostat and CSO methods of calculating GDP (for example, the method of recording imputed income from owner-occupied dwelling and tourism).

As noted earlier, neither economic theory nor the EU requirements contain numerical criteria for economic development. Indeed, from which aspect may the stage of economic development still be of relevance?

One of the issues to consider is that membership in the EU⁷ and the euro area entails certain *commitments* which place material burdens on the acceding country (e.g. centralising part of international reserves at the ECB, or other obligations stemming from the common monetary policy). The relevance of these for membership in monetary union is not too large and they are not materially different from the costs which would be incurred should independence be retained. Indeed, some minor cost savings can be achieved, for example, by reducing international reserves to lower levels over the longer term.

Second, the size of the income gap may reflect the expected structural tensions. However, the importance of structural problems may be measured more accurately using direct indicators. For example, the issue whether domestic companies will be

⁷ EU membership may involve major obligations in respect of issues such as environmental protection and transport, which may entail financial burdens in the short term.

Chart II-1

Per-capita GDP measured on a PPP basis (EU15=100)



Source: Eurostat.

able to stay afloat in a market also unified from a monetary perspective can be examined through the depth of integration in foreign trade and production, in addition to the general indicator of income levels (for more details, see Chapters III.1.1 and III.1.2). The Copenhagen criteria for EU membership also follow the method of direct comparison (e.g. the ability to undertake commitments arising from membership or the ability of a country to withstand competition in the EU market). This approach makes the requirement for the use of the national income level as *indirect* indicator unnecessary.

The level of economic development is also used to indirectly measure the expected *migration of labour force* following accession. There are much more precise direct indicators in this area⁸; suffice it to note that monetary union membership influences migration less than EU membership.

Finally, differences in income levels can show indirectly the extent of expected *structural inflation*. It should be stressed, however, that the inflation criterion for

⁸ For more details, see Chapter III.1.2.

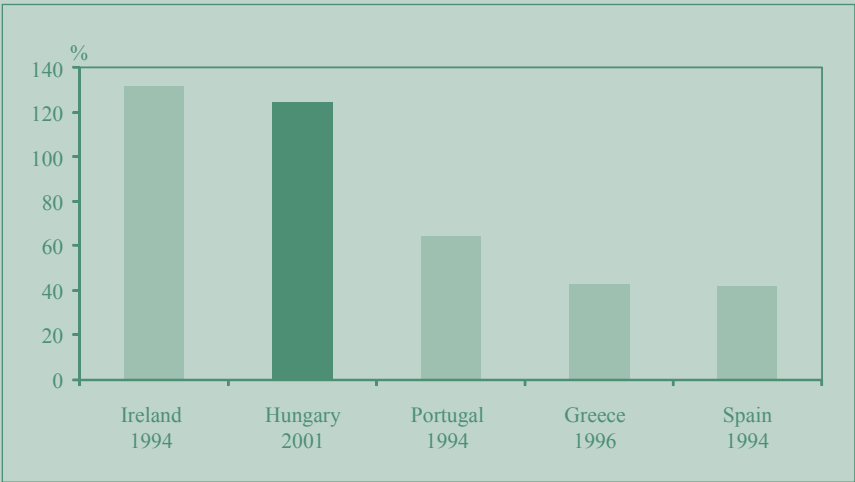
monetary union membership measures structural inflation *directly*, on the basis of inflation convergence, and not indirectly, through the income level.

A comparison of major economic indicators, particularly those expressing the degree of foreign trade integration, reveals that Hungary is at a more advanced stage of integration with the euro area than the less advanced EU members had been five years prior to the euro's introduction (see Charts II-2, II-3 and II-4). The euro area is Hungary's most important trading partner – Hungarian manufacturers have increased their share in the European single market over the past five years; the proportion of high value-added products has risen within exports to the EU; foreign trade accounts for a relatively high percentage of manufacturing, a sector reflecting the state of economic integration⁹.

Chart II-2

Economic openness

(goods and services exports plus imports as a percentage of GDP)



Sources: European Commission (2000) and Bank calculation.

⁹ For more details, see Chapter III.1.2.

Chart II-3

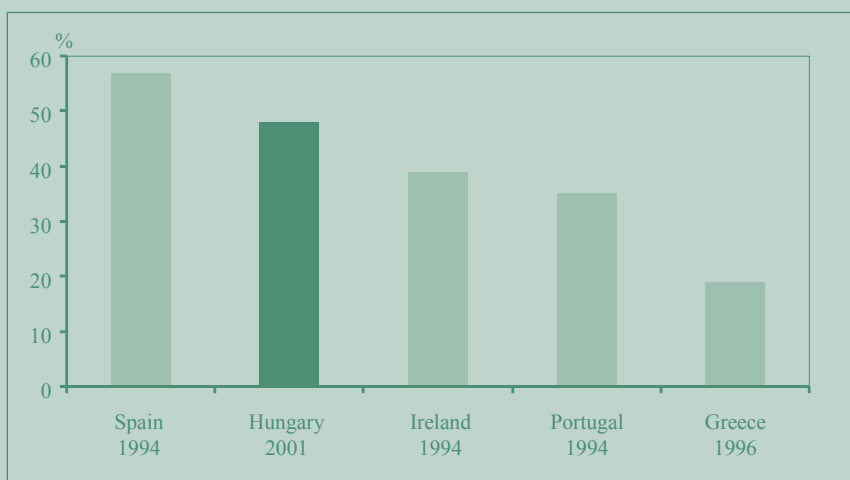
**Proportion of exports to the euro area
within total exports**



Sources: OECD SITC database.

Chart II-4

Proportion of intra-sectoral trade within exports to the EU



Sources: Bank calculation for Hungary and Kaitila (2001), p. 9.

A comparison of contributions to GDP by the main sectors shows that Hungary's economic structure is very similar to that of Ireland, when it was at the same distance from monetary union (see Table II-1). However, industry accounts for a higher share and services for a lower share of Hungarian value added relative to other countries. As in the case of Ireland, this relatively high proportion of industry rests basically on comparative advantages¹⁰; being mainly reflected in business services and less in financial services, the lag of services behind other sectors does not hamper future economic growth. Moreover, with the increase in income levels, the proportion of these up-to-date services will rise to the detriment of industry, as is suggested by the Irish model.

Table II-1

Sectoral breakdown on a value-added basis (%)

	Hungary 2001	Ireland 1994	Portugal 1994	Spain 1994	Greece 1996
Agriculture, hunting, fishing, forestry	4.4	8.1	5.3	5.1	9.4
Manufacturing (including energy)	28.0	31.4	22.8	21.8	16.1
Costruction	4.8	5.2	6.4	7.4	6.4
Wholes. and retail trade, Repairs, Transp., Hotels and restaurants	22.3	18.0	23.6	26.6	27.0
Financial, real estate, renting and business activities	20.9	16.1	16.4	18.5	21.5
Other services	19.2	21.2	25.4	20.7	19.6

Sources: CSO and OECD SNAV databases.

The OCA theory places great emphasis on product and labour market flexibility, being factors reducing the costs of adjustment in the event that the independent exchange rate and monetary policies are abandoned. In the absence of a single, consensus gauge for product and labour market flexibility, we have relied on the OECD's 1998 indicators of composite market regulation (see Tables II-2 and II-3). Clearly, Hungary's product market is similarly regulated, while its labour market is much less regulated than the average for the less advanced EU member countries. An assessment of compliance with the Maastricht convergence criteria reveals that

¹⁰ For more details, see Chapter III.1.2.

Table II-2**Product market regulation (OECD composite indicators, 1998)**

	Hungary	Periphery average	Portugal	Spain	Greece	Ireland
I. State control	2.9	2.6	2.8	2.6	3.9	0.9
II. Barriers to entrepreneurship	0.7	1.5	1.5	1.8	1.7	1.2
III. Barriers to trade and investment	1.1	0.9	1.1	0.7	1.3	0.4
IV. Economic regulation	3.1	2.0	2.1	2.5	2.6	0.8
V. Administrative regulation	0.5	1.8	1.5	2.3	2.0	1.5
Total product market regulation (I-V)	1.6	1.6	1.7	1.6	2.2	0.8

Source: Nicoletti *et al* (2000), p. 81, Table A3.8.

Table II-3**Labour market regulation (OECD composite indicators, 1998)**

	Hungary	Periphery average	Portugal	Spain	Greece	Ireland
1. Administrative barriers	1.6	2.6	3.7	2.8	2.0	1.8
2. Direct cost of dismissals	2.6	3.0	5.2	2.1	2.9	1.7
3. Delay of dismissals	2.8	3.2	4.3	3.5	3.3	1.6
<i>I. Regular contracts (1-3)</i>	<i>2.2</i>	<i>2.9</i>	<i>4.3</i>	<i>2.8</i>	<i>2.6</i>	<i>1.7</i>
4. Administrative barriers	0.7	3.1	3.1	3.7	5.1	0.4
5. Duration	0.6	2.7	3.3	3.7	3.5	0.2
<i>II. Temporary contracts (4-5)</i>	<i>0.6</i>	<i>2.9</i>	<i>3.2</i>	<i>3.7</i>	<i>4.5</i>	<i>0.3</i>
Total labour market regulation (I-II)	1.4	2.9	3.7	3.2	3.5	1.0

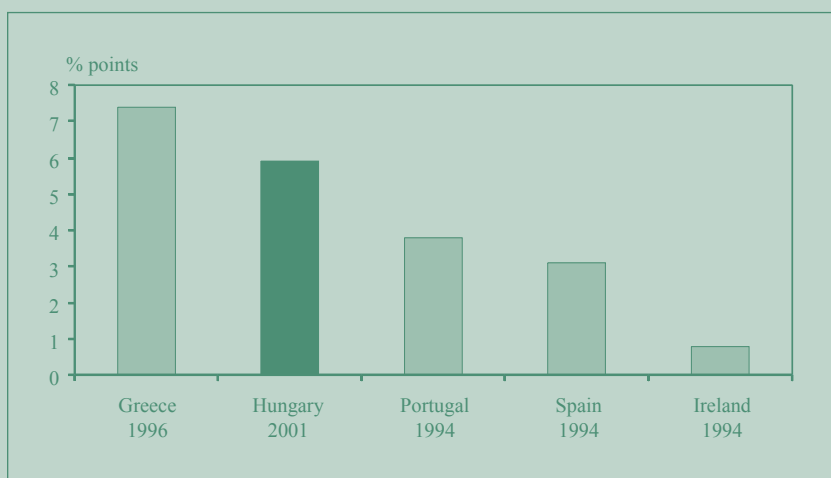
Source: Nicoletti *et al* (2000), pp. 82–84, Tables A3.9–11.

Hungary does not have a larger lag in fulfilling any of the criteria than the member countries reviewed when they were five years prior to accession. Indeed, the picture is much more favourable in respect of long-term interest rate convergence and gross public debt (see Charts II-6, II-7 and II-8).

Hungary's lag in terms of meeting the inflation criteria appears to be relatively greater; yet the gap does not fall outside the range of values for the countries examined (see Chart II-5).

Chart II-5

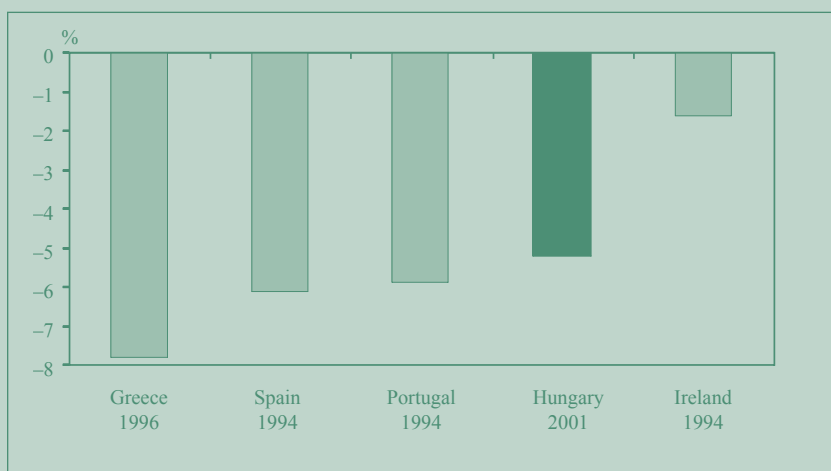
**Deviations from the inflation criterion
(HICP)**



Sources: Eurostat and NBH.

Chart II-6

General government deficit* as a proportion of GDP



Sources: Eurostat and NBH.

* Hungarian general government deficit on SNA basis; NBH estimate.

Chart II-7

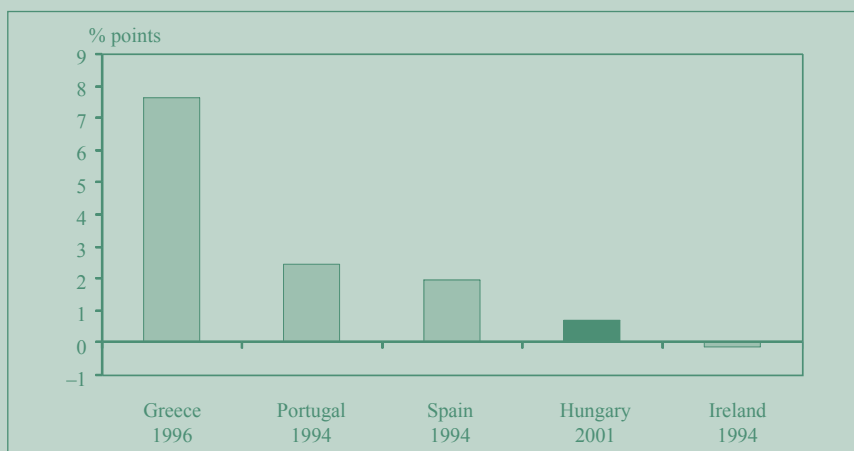
Gross debt as a proportion of GDP



Sources: Eurostat and NBH.

Chart II-8

Deviations from long-term interest rate convergence



Sources: Eurostat and NBH.

Hungary introduced a more proactive disinflation policy in 2001, with its constituents being the changes made to the monetary and exchange rate policy regimes. Similarly, there are no material differences in meeting the fiscal criterion. Thanks to a steady reduction in gross debt in recent years, the fiscal indicator for Hungary has been below the 60% reference value for a sustainable period. Hungary is faced with a fiscal adjustment of a magnitude, in terms of general government finances, comparable to that which the reviewed members, except Ireland, faced in the nineties (see Chart II-6). The high degree of long-term interest rate convergence indicates that market participants judge early membership in monetary union to be a realistic prospect.

II.2. Equilibrium level of Hungarian inflation in the event of entry into monetary union

As discussed in Chapter II.1, although lagging behind the less advanced euro area countries in terms of per-capita GDP, Hungary has reached, and in certain dimensions even surpassed, comparable indicators of those countries in the area of structural similarities and integration. Consequently, based on international comparison, Hungary forms an optimum currency area with the euro area, but, due to the phase of real economic catch-up, Hungarian inflation will likely be higher than in the euro area following the changeover to the common currency. Although the time that has passed since the introduction of currency union has been too short to allow separation of cyclical from structural shocks, there has been a higher level of inflation observable in the less advanced euro-area countries as well. Excess inflation above the euro area average has been 1.1 percentage points in Spain, Portugal and Greece, and 2.9 percentage points in Ireland, since joining the euro. Below, we will attempt to quantify the size of the expected excess inflation in the case of Hungary.

The size of excess inflation is *determined by the equilibrium real appreciation* of the forint.¹¹ This means that at any given exchange rate, domestic inflation is derived as the sum of average foreign inflation and equilibrium exchange rate appreciation over

¹¹ The remainder of the chapter draws on a study by András Kovács Mihály: Equilibrium Real Exchange Rate in Hungary. See Kovács M. A (2001).

a longer period.¹² The equilibrium real exchange rate is usually defined as the relationship between foreign and domestic price levels in the same currency at which the economy is in a state of *external and internal equilibrium*.¹³ In other words, at a given exchange rate level the economy grows along with the trend potential output, in a way that the current account balance moves on a sustainable path over the long term.¹⁴ A general equilibrium model describing the Hungarian economy in detail would be required in order to define the *level of equilibrium real exchange rate*. However, such a model is currently not available. But, starting from the theoretical framework, it is possible to determine the most important factors underlying the *variations in the equilibrium real exchange rate*. Below, we attempt to provide estimates for this.

The real exchange rate is the *ratio of general domestic and foreign price levels expressed in the same currency*. The aggregate real exchange rate can be decomposed into two factors – (i) real exchange rate of tradables,¹⁵ i.e. *external real exchange rate* (the ratio of domestic and foreign tradables prices expressed in the same currency) and (ii) the ratio of services and tradables prices (both for domestic and foreign prices), i.e. the *domestic real exchange rate*.¹⁶ According to economic theory, the first component does not reflect a trend over the long term, developing as it does in a stable way.¹⁷ In contrast, the second component grows along a long-term trend, according to both theory and the empirical literature.

The consumer price-based real exchange rate appreciated by 28% in Hungary in the period 1990–2000. This implies a 3.2% real appreciation on a yearly average. However, the evolution of the indicator can be divided into two clearly distinguishable *phases*. Annual average appreciation amounted to 8.5% in the period up to 1993; and since then appreciation has only been of the order of 1%. In the first, *transition*

¹² The calculation of the equilibrium real exchange rate uses inflation data on Hungary's major trading partners according to their weights in trade, which is not identical with the weighting applied in the HICP. The section below does not take account of the bias arising from the composition effect.

¹³ See Black (1994).

¹⁴ Balance of payments current account sustainability can be interpreted in several different ways. In its stronger version it can be viewed as a path for the balance of payments which allows debt accumulation to be covered by future savings. Its weaker version refers to a current account that is consistent with a constant debt rate. Sustainability is also sometimes seen as a deficit that can be *financed* by capital flows stable *over the medium run*.

¹⁵ This study undertakes a separate analysis of two sectors within the economy, with regard to price behaviour. They are the sectors of internationally traded and non-traded goods, hereinafter referred to as *tradables* and *services*, for simplicity.

¹⁶ See Kovács and Simon (1998).

¹⁷ See, for example, Rogoff (1996).

phase, massive appreciation was required as a consequence of market liberalisation, although available information suggests that the extent of this appreciation was exaggerated, contributing to upsetting external equilibrium in 1993–1994.¹⁸ However, the 1% real appreciation observed ever since has been somewhat less than the 1.5%–3% values estimated for the *equilibrium real exchange rate* so far.¹⁹ This is attributable mainly to the fact that, while the *domestic real exchange rate* has appreciated continuously, the *external real exchange rate* has depreciated due in large part to the operation of the crawling-peg exchange rate mechanism (see Table II-4).

Table II-4

Components of the real exchange rate between 1991–1999*

(Annual average growth in per cent)

External real exchange rate	Domestic real exchange rate	Weights* *	Aggregate real exchange rate
–2.1	3.5	–0.1	1.2

* The Bank's own calculation based on the methodology by Kovács and Simon (1998); on a GDP deflator basis. Negative values denote real depreciation.

** Statistical impact arising from the domestic and foreign sectoral differences.

In the monetary union, variations in the external real exchange rate can be treated as negligible. Therefore, the factors determining the services-to-tradables prices ratio should be taken into account in order to estimate the expected size of equilibrium real exchange rate appreciation. These factors can be categorised into the main groups below.²⁰

Supply-side shocks: the Balassa-Samuelson effect

On the supply side, the mechanism hallmarked by *Balassa* (1964) and *Samuelson*

¹⁸ See Kovács (1998).

¹⁹ See Oblath (1997), and Kovács and Simon (1998).

²⁰ In the following, any reference to the relative situation of the service and the tradables sectors (relative prices and productivity) is intended to describe domestic conditions relative to abroad even when there is no explicit indication. This is because the constant repetition of the long phrase 'services/tradables price ratio relative to the corresponding price ratio abroad' would be rather cumbersome stylistically. Whenever the reference is to the tradables/services price ratio or productivity ratio of one single country, there is a special note made.

(1963), based on the productivity gap between the services and tradables sectors, is generally taken into account. On the assumption that the profitability of wages and capital is equilibrated across the two sectors, the following relationship emerges. If the tradables sector is more capital intensive and/or, by nature, offers higher productivity gains, the services sector will only be able to maintain its initial profitability by raising services prices, due to the general wage increasing pressure from the productivity gains in the tradables sector. If the difference in productivity gains between the two sectors persists, services prices will continue to increase as a trend relative to tradables prices. This implies that the equilibrium real exchange rate will be under permanent pressure to appreciate.

Chart II-9

Tradables/services sector productivity and the services-to-tradables price ratio between Hungary and its competitors (1992=100)



Source: Kovács (2001).

A number of studies have attempted to quantify the pressure of real appreciation arising from productivity gaps in the cases of developed, catching-up and transition economies. In general, a *significant relationship* has been found between relative prices and productivity rates. There are a number of studies on developed economies which have run regressions across services and tradables prices and

the performance of the services and tradables sectors. A major finding of these studies is that, over the long term, services/tradables price indices correlate, with unit elasticity, with movements in labour productivity in tradables/services.²¹ No similar exact econometric tests have been conducted for the transition economies. The studies have in general searched for a relationship between the real exchange rate and aggregate productivity, and between the real exchange rate and real productivity rates, or else they have applied indirect methods to investigate the Balassa-Samuelson effect.²² Although these studies have also not tested the unit elasticity between labour productivity and relative prices, the majority of estimates do not contradict with the unit productivity–relative price elasticity, provided the assumptions are plausible.²³ Unit elasticity appears to be supported by Hungarian data as well. Table II-5 clearly shows that gains in tradables/services productivity entailed price changes of virtually the same order in Hungary between 1991 and 1999.

Table II-5

**Developments in relative prices and productivity
in Hungary and its competitors***

(Annual average rises between 1991–1999)

	Hungary	Competitors	Relative
Services/tradables productivity	6.5	2.3	4.1
Services/tradables prices	6.2	0.9	5.3

* The Bank's own calculation based on the methodology by Kovács-Simon (1998).

²¹ See Canzoneri *et al* (1998) and Alberola *et al* (2000).

²² Halpern *et al* (1997, 1999, 2000), Krajnyák *et al* (1997), Oblath (1997), Corricelli *et al* (2001), Darvas (2001), De Broeck *et al* (2001) and Dobrinsky (2001), Jakab and Kovács (1999).

²³ By taking into account the CPI weight of the service sector and the relationship between aggregate productivity and the tradables/services productivity ratio.

Cyclical swings in demand generally do not influence the equilibrium real exchange rate. In contrast with this, lasting structural changes in the pattern of demand do have an impact on the size of the equilibrium real exchange rate. The impact of these permanent demand twists is clearly demonstrable in the opposing developments in the services-to-tradables price ratio and consumption. Should the services-to-tradables price ratio be exclusively determined by supply, a rise in the services-to-tradables price ratio would cause the share of services consumption to fall relative to the share of tradables consumption. However, it has been observed empirically that simultaneously with the rise in the services-to-tradables price ratio, there is also an increase in the consumption of services/tradables, in evidence of the role played by demand over the longer term. This is generally attributed to a *shift in consumer preferences* or the *increasing role played by fiscal policy*.

Research into the role of demand factors has generally been less successful than research based exclusively on productivity regressions. The analysis of cyclical effects has revealed significant relationship between certain demand variables and relative prices over the short term, but the coefficients obtained for the long term often proved to be non-significant and highly volatile.²⁴

Other factors may influence the size of equilibrium real appreciation, in addition to demand and supply shocks. A change in the terms of trade will alter the amount of disposable income and induce substitution on the part of consumers and producers. In addition, it directly influences the goods balance. Whether this terms-of-trade shock will be negative or positive is not unequivocal, due to the complexities of the impact, although empirical evidence has generally shown that deterioration in the terms of trade tends to devalue the equilibrium real exchange rate, as it worsens the external balance.²⁵

The analysis of the Portuguese catch-up process has raised the issue that EU transfers following accession put significant upward pressure on the equilibrium exchange rate.²⁶ An explanation for this is that such funds were used in large part

²⁴ See Micossi *et al* (1994), De Gregorio *et al* (1994), Jakab and Kovács (1999), Halpern *et al* (2000), Dobrinsky (2001).

²⁵ See Williamson (1994).

²⁶ See Abreu (2001).

to finance infrastructural investment, which in turn boosted the economy's supply capacity. The impact of financial integration may also increase upward pressure on the real equilibrium exchange rate. Accession to monetary union tends to reduce a country's risk premium. This implies more capital for the domestic economy and so greater economic potential, which is also a factor putting pressure on the exchange rate to appreciate.²⁷ These two influences, *ceteris paribus*, would imply a greater Balassa-Samuelson effect. However, we believe that economic and institutional change influencing the earnings potential of capital investments in the years of transition were at least as influential as those associated with EU membership and creation of the currency union. Hence, the Balassa-Samuelson effect observed in the recent period is probably an adequate estimator of expected developments following the creation of currency union.

Based on the theoretical and empirical considerations outlined above, in the following we will attempt to estimate the evolution of the forint real exchange rate during the convergence period. Taking the theoretical considerations into account, we have focussed primarily on the *productivity impact* and, secondarily, with a higher uncertainty, we have tried to quantify the impact of the *preference shifts* as well. The estimate of the *productivity impact* is based on the hypothesis that services/tradables productivity raises the services-to-tradables *price ratio* according to *unit elasticity*.

It is important to note that, theoretically, unit elasticity relates to value added deflators. This impact is presumably smaller on final, i.e. consumer, prices. An explanation for this is that the services-to-tradables price ratio has risen by less in the consumer price index since the political changeover in Hungary than suggested by the value added deflators. The principal reason for this is that services in the consumer price index include a tradables component and vice versa, tradables in the index include a services component. Based on average deviation in the past, this impact may reduce the impact of the productivity gap on consumer prices by a couple of percentage points.

We have used two scenarios in the case of productivity gaps. In the first case, we have assumed that the relatively stable *trend observed between 1991 and 2000 will continue*, which implies a 6.5% gap in productivity gains in the services/tradables sectors. In the second case, we have assumed that the domestic productivity gap

²⁷ See the analysis by Abreu (2001) of the experiences with inflation in Portugal.

is somewhat less, at 4.6%, which is broadly comparable with the *values for Portugal in the 1980s and 1990s*.²⁸ In each case, foreign productivity is assumed to be equal to productivity values registered by Hungary's trading partners between 1991 and 1999, at 2.3%.

Two scenarios have been tested in relation to a *lasting demand impact* – (i) there is no such demand effect and (ii) the coefficient of the lasting demand effect is 0.12.²⁹ In this case, the proxy-variable of demand is real GDP growth, set at a 4.5% rate. Hence, demand raises the services-to-tradables price ratio by an annual 0.5% *over the longer term*.³⁰

The behaviour of products belonging to the *non-tradables and non-services price categories of the consumer price index* must be determined, in order to quantify real appreciation. *Market energy, motor fuel, and drinks and tobacco* prices have been assumed to move in line with *tradables prices*. We have been faced with uncertainties mainly in respect of assumptions for *food prices and regulated prices*. According to economic theory, foodstuffs are tradable goods. However, in practice their prices may differ significantly from the exchange rate due to various administrative measures. Observing past trends, *food prices* have been moving somewhere *between tradables and services prices*. Taking this into account, we have examined *two scenarios* – (i) *food prices* are assumed to behave *similarly to tradables prices* and (ii) *food prices* are determined *50% by tradables prices and 50% by services prices*.

Regulated prices have risen more strongly than market services prices in the past (see Table II-6). This, however, is attributable in large part to the very depressed level of the relative prices of government services in the communist era. In developed

²⁸ See Alberola *et al* (2000).

²⁹ As noted earlier the coefficients of the estimates for the demand effect vary widely. This paper has drawn on estimates by Micossi *et. al.* (1994), which relate to the service-tradables price ratios within the EU countries. We have adjusted the coefficients estimated by the authors so that they show the effect as projected on the overall CPI. We have relied on the cited authors' estimates because we have been curious about the relationships prevalent in normal market economies rather than in transitional economies. Note, however, that the coefficient obtained in this way does in effect correspond to Dobrinsky's (2001) estimates for transitional economies.

³⁰ This refers to the demand impact prevalent over the long term, measuring thus not the impact of excess demand due to unsustainable economic policy which may divert the current real exchange rate from its equilibrium value, but rather the impact of generally manifest long-term *change* in private or state *preferences*. Being permanent demand shocks, they will modify price relations over the long term so that the price of goods in greater demand will rise. If services are in relatively greater demand than tradables during the convergence process, services prices will increase.

market economies, government services prices move in tandem with market services prices; we have therefore built this assumption into our forecast.

Based on the factors noted above, we have conducted our simulation taking three major factors into account:

- How large will Hungary's productivity advantage be in the future?
- Should we reckon with a lasting demand impact?
- What assumptions should we use for movements in food prices?

Based on all these, there are altogether eight possible scenarios, which are summarised in Table II-6:

Table II-6

Equilibrium real exchange rate appreciation
(annual percentage change)

Assumptions for food prices	Productivity difference	
	High (Average of past 8 years: 4.1%)	Low (2.2%)
	Without lasting demand effect	
Move aligned with tradables prices	1.6	0.8
Move 50% per cent aligned with tradables prices	2.0	1.0
	With lasting demand effect ³¹	
Move aligned with tradables prices	1.8	1.0
Move 50% per cent aligned with tradables prices	2.2	1.3

Based on the calculations, the measure of equilibrium real exchange rate appreciation moves in a range of 0.8%–2.2%. This is somewhat higher than the Bank of Spain's estimate of $\pm 1\%$ inflation volatility for the euro-area countries, which, however, was

³¹ This relates to the special long-term demand effects. See footnote 30.

entirely based on quantifying the productivity impact.³² Our estimate is comparable in size with earlier calculations for the Hungarian economy³³ and the result of international panel estimates.³⁴ However, as noted earlier, our estimates may be downward biased, due to the not quantified effects, so a higher equilibrium real exchange rate appreciation than the estimate cannot be ruled out. It is important to stress, nevertheless, that the actual equilibrium inflation difference may perhaps diverge from the estimates in a direction which cannot be determined beforehand, due to the not quantified effects noted (joining the euro area, the difference between final prices and value added deflators).

On the whole, our calculations show that inflation in Hungary as a member of the euro area will exceed inflation of our major trading partners by 0.8%–2.2%. This higher rate of inflation will not jeopardise either Hungary's competitiveness or price stability in the euro area, as it will be made necessary by the economic catch-up and restructuring rather than by rapid economic growth above its potential. Another consequence of equilibrium real exchange rate appreciation is that monetary conditions will be less tight in Hungary than in the countries of the region with lower inflation rates. The implications of this are dealt with in Chapter III.2.

³² See Alberola *et al* (2000).

³³ See Oblath (1997), and Kovács and Simon (1998).

³⁴ Halpern *et al* (2000). Even though the latter authors forecast the Balassa-Samuelson effect to be of the order of magnitude of roughly 3%, their calculations focus on the services/tradables price ratio, with the foreign variables treated as exogenous. Correcting the CPI with the weight of the service sector and extrapolating the historical path of foreign variables, the calculations derived from Halpern and Wyplosz's equations yield an approximately 1.5% real appreciation of the overall CPI. This falls within our estimated range.

III. COSTS OF JOINING THE EURO AREA

Participation in the euro area entails the abandonment of an independent exchange rate and monetary policy, and importation of a monetary policy that takes into consideration economic developments within the entire euro area. In principle, monetary autonomy is a device which helps to manage certain kinds of shocks affecting the economy, thereby dampening business cycle fluctuations. Thus, the size of costs arising from giving up monetary autonomy broadly depends on whether there is an increase or decrease in the volatility of Hungarian business cycles following entry into the monetary union. This is because business cycle volatility also passes through to household income. In turn, strong volatility in national income will create lower welfare than stable income, even if the two income levels are identical on average. Recent research, relating in particular to the USA, suggests that the welfare costs arising from cyclical volatility may be high (see Box III-1). However, it is extremely difficult to quantify these costs in the case of Hungary. This is because such quantification would require not only knowledge of prospective changes in volatility but also that of such illusive parameters as the risk aversion preferences of Hungarian households and the cyclical vulnerability of resource allocation efficiency. Therefore, the noted difficulty of estimating an *absolute* measure of welfare costs has prompted us to apply a different approach based on a *relative* view. We have compared Hungary with the present member states of the euro area from the point of view of exposure to asymmetric shocks and the effectiveness of alternative devices available for the management of these shocks. The following analysis will prove that the state of affairs with regard to these factors is at least as promising in Hungary as in the currently less-developed euro area member states.

In addition to the above factors, there is a palpable and easily quantifiable cost associated with giving up autonomous monetary policy, namely the loss of seigniorage. Once a member of the euro area, Hungary will also have its share of seigniorage revenue from the use of euro notes and coins, but due to accounting rules, this share will be lower than if the National Bank retained its right of issue.

Box III-1

Measuring the welfare loss arising from cyclical fluctuations of the economy

The higher volatility of business cycles arising as a result of a country maintaining its own currency causes losses in welfare. This can partly be explained on the basis of the assumption that households are risk averse, in the sense that faced with future consumption paths with equal expected values they will prefer the more certain path (showing lower variance). Using US consumption data series, Lucas (1987) showed that given plausible parameters for risk aversion, welfare losses associated with the economic cycles are negligible; households would sacrifice only a tiny 0.1% of their annual consumption in order to reduce the variability of their consumption from the observed level to zero.

Recent research has, however, revealed that the welfare losses arising from business cycle fluctuations cannot be identified simply with losses arising from fluctuations in consumption. Galí, Gertler and López-Salido (2002) claimed that due to price and wage rigidities presumed to exist within the economy, business cycles cause inefficient fluctuations in resource allocation. They measure the efficiency of resource allocation in terms of the size of the wedge between the marginal product of labour and the marginal rate of substitution between labour and leisure, referred to simply as 'the gap'.³⁵ Deviations of this gap from zero reflect an inefficient allocation of labour during the period reviewed. Based on US data, they demonstrate that this gap, which measures the inefficiency of resource allocation, shows strong correlation with the business cycle. However, its fluctuations are asymmetric, i.e. the losses incurred on inefficient allocation during a recession by far exceed the advantages arising from improved efficiency when output rises above the potential level. Hence, even if the fluctuations of economic activity are symmetrical, the bigger they are, the more strongly they will increase the losses caused by inefficient resource allocation. Based on research of post-war US business cycle data, Galí, Gertler and López-Salido conclude that the ensuing welfare losses are not negligible, perhaps even one order of magnitude higher than those estimated by Lucas.

³⁵ Put differently, the 'gap' denotes the difference between 'reservation wages' related to labour supply and labour demand existing at a given rate of employment.

The literature on OCA suggests that a final fixing of exchange rates cannot be optimal unless there is only a small likelihood that the participating countries are exposed to asymmetric shocks. For example, if demand for a particular country's goods declines asymmetrically, autonomous monetary policy would be able to offset this fall in demand by lowering interest rates, that is by encouraging domestic demand and/or having a weaker exchange rate make domestic products cheaper relative to foreign goods. Within monetary union, however, the common monetary policy will not react unless the impact of the demand shock has an effect at the overall level of the union. Even then, the size of monetary easing might be smaller than if the country had an autonomous monetary policy, and would also affect the countries that had no need for it. Furthermore, changes in the exchange rate affecting the structure of demand will have to be given up altogether.

The probability of asymmetric shocks occurring depends primarily on the similarity, the degree of integration and diversification of production structures. Structural similarities will cause common shocks, especially when there is a high proportion of intra-industry trade. The markets for individual goods within monetary union will be linked by intra-industry foreign trade, making it unlikely that an asymmetric shock will only affect the goods produced by one particular country. On the other hand, provided there is a sufficiently diversified economic structure, the treatment of temporary shocks affecting one particular industry would not require the adjustment of the exchange rate even given an autonomous monetary policy. Such an adjustment would only be necessary if the industry involved were of crucial importance at the macroeconomic level.

To assess the probability of asymmetric shocks, the first two sections compare the production structure of the Hungarian economy, the depth of foreign trade and production integration with those of the euro area participating countries. The analysis of these two dimensions has not revealed a lag in respect of the real economic convergence of the Hungarian economy. As the Hungarian economy has implemented structural convergence towards the euro area over the past decade, there is not a single industry left that contributes to the Hungarian GDP with a weight unprecedented in other euro area member countries. As there has been a sharp rise in export diversification, a change affecting one single industry can now have only a minor impact on the evolution of GDP. At the same time,

there has also been a shift in the structure of exports, with a considerable fall in the share of goods with high price sensitivity and an increase in the weight of goods requiring high technological standards and greater human capital.

The third section will look into the question of whether the Hungarian economy has been subject to asymmetric shocks *in the past*. Our findings suggest that industrial production is in close cyclical correlation with that of the euro area. As far as demand shocks are concerned, even the past decade has been characterised by a high degree of synchrony. By contrast, the supply side has not historically exhibited such a high measure of harmony, due to structural changes in the Hungarian economy concomitant with the economic transition. Nevertheless, as a production structure similar to that of the European economies is in place now, the Bank believes that the significance of prospective asymmetric supply shocks has declined.

A common currency may be optimal for a country even in the presence of asymmetric shocks, if there exist some adjustment mechanisms that can substitute for the exchange rate changes and smooth the production and consumption fluctuations. Based on the OCA theory, we will look at some potential adjustment mechanisms such as wage and price flexibility, factor mobility and fiscal policy.

Historical analysis paints a favourable picture as far as price and wage flexibility are concerned. Available data show that the repricing period is short by international comparison. It calls for caution, however, that empirical studies on the issue were conducted when inflation was still in the double-digit range, and a lower inflation environment is likely to increase the duration of the repricing period. Wages have also adjusted rapidly in the past, but lower inflation is expected to lead to higher nominal wage rigidity as well. It is promising, however, that in view of the institutional features determining wage and price flexibility over the longer term, Hungary is in a better position than the majority of the euro area countries.

Just as the other EU member states, Hungary faces low labour mobility and permanent regional differences. International mobility is hindered by linguistic and cultural barriers, restricted mobility of social insurance, pension schemes and other social benefits, and temporary restriction on the free flow of labour in respect of certain members. In addition, even national mobility is low, attributable to a number of factors including regional differences in housing costs. Nevertheless, this low labour mobility is not viewed as an obstacle to Hungary's entry into the monetary union, as even for the present euro area

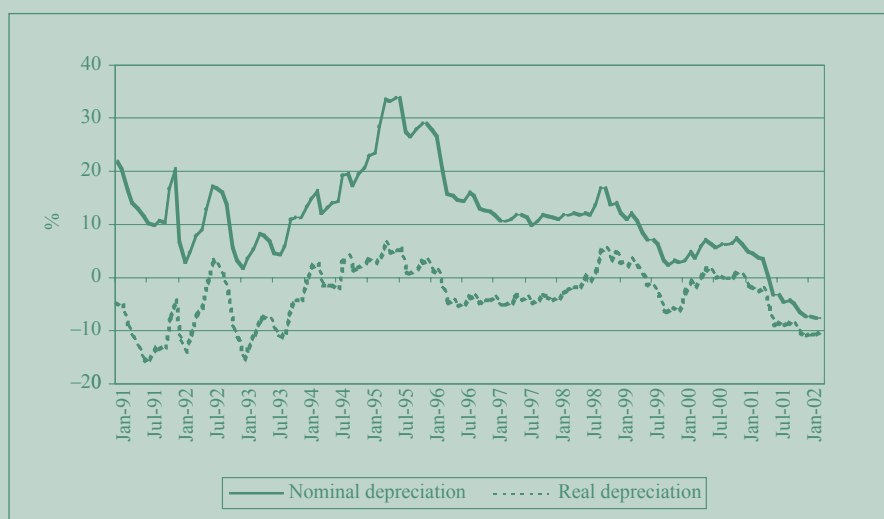
member states the free flow of labour plays a negligible role in adjustment to shocks. Fiscal policy's role of regulating aggregate demand may be restricted in the coming years by the need to adjust in order to meet the Maastricht criteria and the Stability and Growth Pact. Nevertheless, the present structure of the budget also enables a certain degree of smoothing of aggregate demand to be made, partly via the automatic stabilisers and partly via the funds earmarked for extraordinary expenditures. From another perspective, participation in the euro area will even facilitate compliance with the SGP, as real interest rates of forint-denominated public debt are expected to decrease inside the monetary union (for more on this, see Chapter IV.4).

The Bank believes that Hungary has achieved a stage of integration where the **real economic costs of fixing the exchange rate are low**. However, the costs are also influenced by the extent to which autonomous exchange rate policy can be an efficient means of managing asymmetric shocks under the Hungarian economic conditions. Providing that certain conditions are met, exchange rate policy may assist economic policy in its efforts to restore and maintain domestic firms' competitiveness. The main question is whether the exchange rate has preference over other objectives within a particular country or economic region's monetary policy. Under an inflation targeting regime the primary objective of the central bank is to meet the inflation target, while the exchange rate may be used to enhance competitiveness to the extent that it does not pose a threat to meeting the inflation target. In the past, nominal exchange rate fluctuations could not permanently influence the evolution of the real exchange rate. Any change in the exchange rate passed through rapidly to consumer prices, *thereby absorbing any increase in competitiveness caused by devaluation*. It is common knowledge that the more open a country is, the less capable it is of influencing its real exchange rate on a permanent basis by changing the nominal exchange rate (McKinnon, 1963). And Hungary is one of the most open economies in Europe.

The most important question in the presence of asymmetric shocks is what structural weight the sectors hit by negative shocks hold within the economy. Unless the afflicted sectors have a crucial share, exchange rate policy may predominantly improve the position of sectors that have not suffered, triggering an upsurge in nominal profits, which may soon exert inflationary pressure. The share of transnational companies in the afflicted sector's output should also be taken into consideration,

Chart III-1

**Annual depreciation of the nominal
and the CPI-based real effective exchange rates, 1991–2001**



Source: NBH.

a measure reflected in the high proportion of FDI within the sector as a whole. This is because this set of economic agents tends to focus on the profitability of the entire corporate group, making the factor of prices governed by the exchange rate not necessarily of paramount importance to them.

The exchange rate can also influence aggregate demand by affecting incomes and economic agents' wealth. The literature on the sustainability of currency areas does not deal with the role which exchange rate devaluation and the resulting rise in inflation play in the conduct of economic policy, focussing as it does on the effect of the exchange rate on relative prices. Nevertheless, the importance of this channel must not be neglected from the Hungarian perspective, as the nominal imbalances of the past ten years, originating from the preceding period, have been typically corrected by devaluing the forint. In the early 1990s, the pegged exchange rate in principle represented a nominal anchor for the economy. However, this announced anchor lacked credibility and economic agents had expectations of an exchange rate adjustment. Indeed, wage growth was not in line with the announced exchange rate, making a devaluation of the

forint inevitable.³⁶ In the past, inflation was instrumental in formulating the general government position. This is because a portion of general government expenditures is not fully indexed. Hence, an unexpected rise in inflation following forint devaluation had the effect of improving the fiscal position, affecting as it did a much wider section of the receivables from the state. In the wake of the 1995 correction, the value of existing nominal wages and other expenditures plunged in real terms and the real burden of the fixed-interest domestic debt also eased. Devaluing a currency will reduce the purchasing power of a country's income as well as the real value of national-currency-denominated liabilities. Thus, surprise inflation triggered by the devaluation proved to be an efficient instrument in rapidly lowering the current account deficit.

After the entry into the euro area, economic policy will no longer be able to take advantage of the income and wealth effects of the exchange rate. However, the likelihood will also decrease that the country faces a situation where devaluation is the most efficient solution. The strengthening of ownership controls has significantly reduced the danger that nominal wages will grow at a rate far removed from corporate income growth, and it is no longer typical that wage settlements determine wage increases for several years ahead. One of the requirements of joining the euro area is that the fiscal position is sustainable and can be financed over the long term. This also implies that once the fiscal adjustment set as a necessary condition for monetary union membership is attained, the chances that the fiscal authorities have to resort to surprise inflation will fall substantially. Furthermore, the future lack of today's permanent inflation gains will be offset by the prospect of robust growth and the fall in interest rates on the general government debt (see Chapter IV). Hungary's participation in the euro area will cause a shift in the significance of the balance of payments. Of course, every country should seek to achieve a sustainable balance of payments position over the long term, but as a euro area participant Hungary will run a much smaller risk of losing investor confidence to an extent that would call for urgent and radical change in the external balance position.

Another further implication of the common currency is that *Hungary will also adopt the common interest rate policy*. Should monetary conditions for the euro area as a whole be inconsistent with domestic economic developments, the economy would

³⁶ Although here the purpose of the exchange rate correction is also to improve competitiveness, it is important to distinguish between the situations when an unforeseen shock necessitates a correction and when devaluation to restore competitiveness is applied due to the economy's lack of nominal discipline.

incur excess costs. The effectiveness of the common monetary policy in the domestic economy depends on several factors. The most crucial factor appears to be that we now have in place the institutional conditions facilitating the effective transmission of monetary impulses towards the real economy. Private sector indebtedness which is lower than the euro-area average and the low stock of lending makes the transmission mechanism less efficient in Hungary. Thus, one unit of change in central bank interest rates has a smaller impact on the interest spending of the corporate and household sectors, investment and consumption decisions and, ultimately, inflation. This impact dampening effect is partially offset by faster interest rate transmission in Hungary than in the European countries, and by a high proportion of short-term and floating rate loans.

The second condition for monetary policy efficiency is that the reviewed economies should be in cyclical harmony, as the ECB decisions take into consideration the average cyclical position of the euro area. As noted earlier, the Hungarian economy is characterised by a high degree of cyclical co-movement with the EU. Due to the similarity of production structures and the high weight of EU imports, there is also a high degree of synchrony in respect of the price shocks. Therefore, the Bank believes that the ECB's interest rate policy would be consistent with the requirements of the Hungarian economy. Indeed, it can even be argued that should Hungary not enter the euro area, this would lower its ability to adopt an interest rate policy that is consistent with the economy's cyclical position. The reason for this is that the countries outside the euro area fall into a different risk category, which makes them much more exposed to financial market contagion (see Chapter IV.3).

The impact of an imported monetary policy also depends on the equilibrium real appreciation concomitant with real economic convergence. Due to higher inflation, a single level of nominal interest rates leads to lower real interest rates than in the more advanced countries of the region. The fall in real interest rates will in turn set the economy on a new growth path, presumably characterised by more rapid growth financed by larger amounts of foreign funds. The short-term expectation, however, is that the drop in interest rates upon accession will trigger asymmetrical demand shocks, while supply will only be affected more slowly. The ensuing imbalances will have to be offset by fiscal policy, that is *common monetary policy will impose increased burdens on fiscal policy in controlling aggregate demand.*

III.1. Integration and structural similarity

The size of the costs entailed when a country gives up its own monetary policy depend on the extent to which the economic behaviour of the member countries (regions) participating in monetary union is in synchrony. A condition for similar behaviour is the similarity of economic structures, and at least as importantly, similar behaviour by economic agents. Similar structures enhance the probability that the individual shocks will affect the economies of the various countries to a similar extent. In turn, similar behaviour implies that economic agents' responses to the shocks will be broadly consistent, and hence that the intertemporal behaviour of the economies will remain similar. The section below will use multiple indicators to explore the extent of this similarity between Hungary and the euro area member states. Based on the OCA literature the probability of the incidence of asymmetric shocks to an economy is affected by the following factors:

- structural similarities;
- degree of trade integration;
- synchrony of business cycles.

As economic theory fails to provide precise numerical measures for optimality, the degree of real convergence attained by the Hungarian economy can be assessed by a comparison with *euro area countries that are closest to Hungary* in terms of the level of development and economic structure. This is based on the implicit assumption that participation is beneficial to the least developed euro area countries.

III.1.1. Similarity of economic structures

A comparison of the *contribution of the main sectors to GDP* reveals that the Hungarian data fall between euro area extreme values in respect of each sector (see Table III-1). As far as the sectoral breakdown of employment is concerned, the percentage of manufacturing employment shows some deviation from the maximum value for the euro area (see Table III). It is a fair assumption that *as manufacturing productivity increases, the employment ratios will also converge towards the euro area average*.

Table III-1**Shares of value added by economic sector (%)**

	Hungary	Poland	Czech Republic	EMU12 weighted average	EMU min.	EMU max.
Agriculture, hunting, and forestry; fishing	4.4	6.4	5.3	2.9	0.8	8.9
Manufacturing (including energy)	28.0	33.4	36.8	23.2	15.2	32.8
Construction	4.8	7.9	4.6	5.5	4.2	7.9
Wholesale and retail trade; repairs; transport, hotels and restaurants	22.3	28.1	25.2	21.3	17.7	28.3
Financial intermediation; real estate, renting and business activities	20.9	8.3	18.0	26.1	17.9	38.6
Other service activities	19.2	15.9	10.1	21.0	17.0	23.9

Note: 1999 data, except for Hungary (2001), and Ireland (1998).

Source: OECD Annual National Accounts (SNAV) database, CSO.

Table III-2**Shares of employment by economic sector (%)**

	Hungary	Poland	Czech Republic	EMU12 weighted average	EMU min.	EMU max.
Agriculture, hunting and forestry; fishing	5.9	18.8	5.1	5.3	1.9	18.1
Manufacturing (including energy)	28.1	23.8	30.2	20.4	13.9	23.7
Construction	6.4	7.0	9.3	7.3	6.0	10.5
Wholesale and retail trade; repairs; transport, hotels and restaurants	24.5	23.4	25.6	25.0	22.3	28.2
Financial intermediation; real estate, renting and business activities	7.2	7.7	10.6	13.0	7.0	23.5
Other service activities	27.9	19.3	19.2	29.1	22.0	36.3

Note: 1999 data, except for Ireland (1997), Portugal (1998), Hungary, Poland and the Czech Republic (2000).

Source: OECD Annual National Accounts (SNAV) database, Czech and Polish 2001 Regular Reports, CSO.

International experience suggests that industrial production follows a cyclical growth path, posing excess risk to countries (including Hungary) where manufacturing

Table III-3

Shares of gross manufacturing output by industry

MANUFACTURING	Hungary		EMU- average	EMU10 (excl. Belgium, Luxembourg)	
	2001	1997	Weighted	Min.	Max.
15 Food products and beverages	15.5	21.7	15.0	9.3	28.7
16 Tobacco products	0.8	0.7	1.5	0.1	2.6
17 Textiles	1.3	2.2	3.0	0.8	7.6
18 Wearing apparel and fur	1.9	1.5	2.0	0.3	6.9
19 Leather and leather products; footwear	0.6	0.8	1.3	0.2	4.5
20 Wood and wood products; furniture	1.1	1.6	1.5	0.9	5.1
21 Paper and paper products	1.8	1.9	3.0	1.4	14.2
22 Publishing, printing and recorded media	2.6	3.3	3.7	2.6	7.7
23 Coke and refined petroleum products; nuclear fuel	5.0°	7.1°	2.1	1.4	2.9
24 Chemicals and chemical products	6.8	9.2	11.8	5.1	17.8
25 Rubber and plastic products	3.7°	3.6°	1.4	0.7	2.2
26 Other non-metallic mineral products	2.8	3.3	3.7	1.9	6.5
27 Basic metals	3.9	5.5	5.1	0.9	7.8
28 Fabricated metal products, exc. machinery	4.1	4.5	6.1	2.1	7.0
29 Machinery and equipment	4.3	5.5	9.6	3.1	12.4
30 Office machinery and computers	5.2	6.0	1.9	0.0	17.8
31 Electrical machinery and apparatus, n.e.c.	11.2°	4.3	4.6	2.2	5.4
32 Radio, TV, and communication equipment	10.0°	5.0	3.6	1.1	8.1
33 Precision instruments	1.0	1.4	1.9	0.3	3.0
34 Road vehicles	14.5	9.0	11.9	0.6	14.5
35 Other transport equipment	0.5°	0.4°	2.4	0.7	3.7
36 Furniture and manufacturing not elsew. classified	1.2°	1.2°	2.7	1.4	4.6
37 Recycling	0.1	0.1	0.1	0.1	0.1
Total	100	100	100		

Source: OECD ISIS (isic_3) database, except for Hungarian data for 2001, reported by the CSO.

GDP weights are derived from the European Commission (2000) appendix.

Notation:

Bold print denotes Hungarian data for industries in 2001 which exceeded the EMU weighted average by at least 20% and have an over 5% share of Hungarian gross manufacturing output.

The upper index 'e' indicates that the value is outside the minimum or maximum for the EMU-10.

Technical notes:

We have increased the French figure for Category 15 from 1.6% to 16%, by multiplying it by ten, to correct what was clearly a misprint. The weights are derived from GDP data at current prices, in euros. The weights have been corrected for the missing data for each industry. All data are unavailable in the case of Belgium and Luxembourg. Data for Austria and France are unavailable in respect of category 16 and for Greece and Ireland in respect of category 25. Data for the Netherlands is absent in respect of categories 31, 32, 33, 34 and 35, and for France and Ireland in respect of category 37. Due to the missing data, the EMU average has had to be rounded to 100%.

holds a relatively high weight within the economic structure. Hence, whenever the manufacturing sector as a whole is hit by a symmetrical shock, the aggregate impact will be greater in the case of Hungary than the euro area average.

In the following, we will attempt to determine those manufacturing sectors that are most exposed to asymmetric shocks entailing considerable macroeconomic implications. As will be pointed out in the next section, due to the large share of intra-industry trade, foreign direct investment and intermediate goods, *manufacturing is closely integrated* with the euro area countries, sharply reducing the probability of asymmetric shocks. Nevertheless, there are a couple of industries with a higher weight in industrial production than is typical in the European countries, and hence a shock to the sector will likely have a greater impact on domestic output. (See Table III-3.)

Table III-4

Manufacturing asymmetry indicator*

Ireland	76.9
Finland	73.6
Greece	54.1
Portugal	49.8
Hungary	49.1
Poland	39.3
Austria	32.7
Netherlands	31.7
Italy	31.2
Czech Republic	30.2
Spain	24.9
Germany	20.5
France	16.7

Source: OECD SNAV database.

Note: data for 1999, except for Hungary (2001) and Ireland (1998).

* Sum of absolute values of the differences between the shares of gross manufacturing output by industry and EMU-weighted average. The higher the indicator, the greater the deviation from the average manufacturing structure of the euro area.

Of the euro area countries, Greece and Portugal appear to be the closest to Hungary in respect of the size of structural asymmetry within manufacturing (see Table III-4). Ireland and Finland show the greatest variance from the euro area average, while France and Germany are the closest to it.

A comparison of the manufacturing structures of the two economic regions has revealed four industries with a large weight in Hungarian gross manufacturing output, which may thus expose the Hungarian economy to asymmetric shocks. Table III-5 lists the detailed industries and products involved.³⁷

As shown in Table III-5, the individual industries carry significantly different

Table III-5
**Industries with a large weight in manufacturing GDP,
exposed to asymmetric shocks**

Industry	Products and industries with the largest weights	Export revenue of industry/ Total export (%)	Gross value added of industry/GDP (%)
30 Office machinery, computers	30.02 Computers	11.4	0.5
31. Electrical machinery and apparatus n.e.c	31.50 Lighting equipment	3.4	0.5
	31.61 Elect. equip. for engines and veh. n.e.c.	2.6	0.3
32. Radio, television and communication equipment	32.10 Electronic components	2.4	0.4
	32.30 Television, radio receivers, sound or video recording etc.	5.2	0.3
34. Road vehicles	34. Road vehicles	26.1	2.3

Source: CSO; data on enterprises required by the tax authority (APEH) to complete corporate tax returns, 2000 report.

weights as a proportion of exports and GDP. While the specified industries account for 51% of exports, their share of GDP hardly exceeds 4%, due to the high share of

³⁷ Hereinafter referred to as 'specified industries'.

imported components. Car and motorcycle manufacturing and computer manufacturing deserve special attention as they account for merely 2.8% of GDP but as much as over 37% of exports. As will be shown later, these industries have large shares not only in total Hungarian exports but also exceed the corresponding European Union average. This means that a potential asymmetric shock hitting these industries would have a deeper impact on Hungarian exports and imports than on the EU members on average, while such an industry-level disturbance would have only moderate implications for domestic GDP. It should be noted, however, that a specific shock affecting a particular industry may, in the long run, feed through to the performance of other sectors. Taking this multiplier effect into account, Appendix F1 attempts to quantify the effect on Hungarian gross domestic product of a negative external demand shock to the specified industries.

In order to assess the effects of structural asymmetry, one must examine the likelihood of shocks affecting the industries reviewed.³⁸ Domestic data for the past 12 years are an inadequate basis for making inferences about the cyclical vulnerability of Hungarian manufacturing. Certain industries have experienced annual increases in volumes amounting to several hundred per cent, which cannot be explained by an increase in external demand. These increases basically reflect growing output as a result of foreign direct investment in new production capacities. Nevertheless, production structures involving sales activities that already reacted to potential demand shocks were more or less in place by the late 1990s. Remarkably, even in this phase of tremendous growth, manufacturing of electronic component parts showed surprisingly high volatility, with real output in 2000 up to double the figure for 1998, only to plunge in 2001 to below the level of three years before.

There are no international data available to compare volatility in the various manufacturing industries. According to a less detailed OECD time series, the

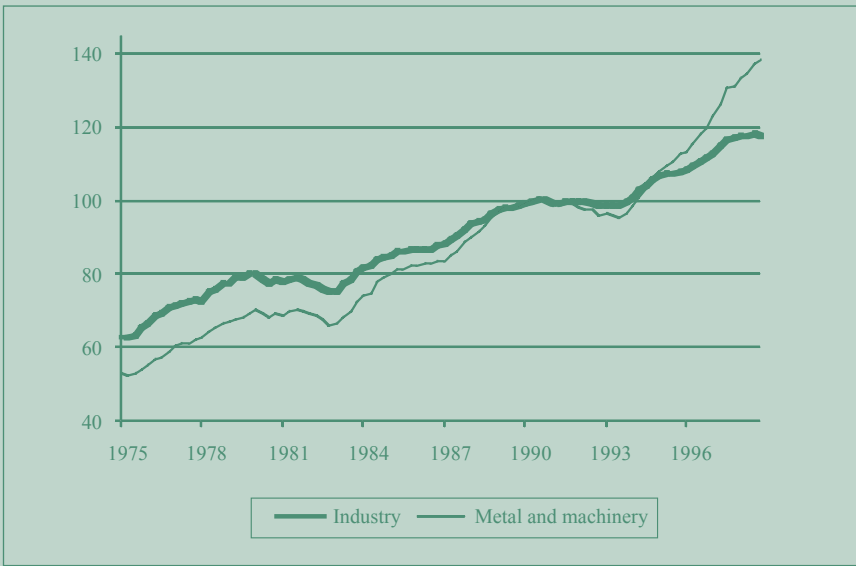
³⁸ Examination of production volatility can only be the first step in analysing risk. Another non-negligible threat to Hungary is that there are only a small number of companies active in any one industry. Hence, macroeconomic analysis should also be complemented by exploring risk at the company level within the key industries. Note also that the main players in the Hungarian economic arena are transnational companies, which may make business policy decisions (use of internal transfer prices, etc.) without regard to the risk profile of the industry or the company as a whole. This would also have a significant effect on their Hungarian subsidiaries' operations, with special regard to profitability.

metal and machinery industry, which includes some key areas for Hungary, has been even more volatile than manufacturing over the last 25 years, while its average rate of growth has surpassed that of the manufacturing sector as a whole.

Chart III-2

Volume of industrial production in OECD countries, 1975–1998

(Seasonally adjusted data, 1990=100)



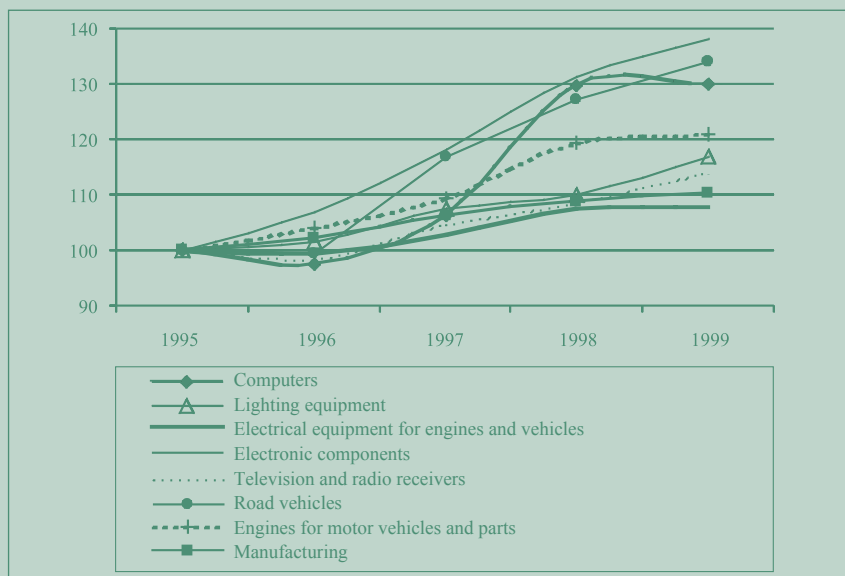
Source: OECD.

Detailed OECD data on individual industries are only available for the post-1995 period. On the basis of assessing this short period of time, the production volumes of three industries – such as the manufacturing of computers, manufacturing of electronic component parts and manufacturing of consumer communication goods – appear to be highly volatile. Meanwhile, production of road vehicles and related industries shows moderate variability, similar to the industrial cycles, while lighting equipment manufacturing output appears to be very stable.³⁹

³⁹ Appendix F.1 contains further calculations on the estimation of the impact of export shocks on GDP.

Chart III-3

Production of manufacturing and its individual industries in the European Union, 1995-1999 (Seasonally adjusted volume indices, 1995=100)



Source: EUROSTAT, representative data collection, with not every member country included.

Hungary's economic development lags behind that of Europe only slightly with regard not only to structure but also quality. In respect of its *economic structure*, Hungary was sixth place in a ranking of OECD countries according to the relative weights of industries belonging to the *knowledge-based* (technology/knowledge intensive) *economy*. Such industries account for 25.9% of Hungarian gross value added, relative to the OECD average of 27% and the EU average of 26.1%. Hungary is in 11th position with regard to the share of knowledge and technology intensive services.⁴⁰ It should be mentioned, however, that in addition to these indicators, the OECD report also tested forty other, mainly microeconomic, indicators, and Hungary performed less well in terms of these. Nevertheless, the results are

⁴⁰ OECD (2001b). D5. pp 124-125. The study was conducted by the OECD, and the results were published in November 2001.

crucial for highlighting the many structural advantages the Hungarian economy possesses, enabling it to achieve a rapid catch-up and make the best use of the advantages of participation in monetary union.

The similarity of economic structures and the likelihood of asymmetric shocks are not exogenous but rather endogenous properties, as they may change under the influence of monetary union. Frankel *et al.* (1998) and Krugman (1997) predict economic structures and diversification to develop along two opposing lines. On the one hand, Frankel *et al.* anticipate that with deepening integration and participation in monetary union, countries' economic structures will assimilate and cycles will converge. By contrast, the 'Krugman hypothesis' claims that by encouraging a regional agglomeration of industries, the common currency will enhance regional specialisation. This would in turn raise the likelihood of asymmetric shocks, as the economies are becoming less and less diversified as a result of monetary union (automobile industry in the area of the Great Lakes in the USA, semiconductor manufacturing in California, etc.). For the time being, however, there is no evidence in Europe of the American-type agglomeration predicted by Krugman.⁴¹

III.1.2. Integration of the Hungarian economy into the euro area

We describe the state of economic integration in terms of the volume change affecting the goods and services trade and the structural and qualitative indicators of trade. The structure of trade with the EU and the various indicators of comparative advantages can reveal which Hungarian product categories may be exposed to asymmetric shocks. In particular, we will examine how successful Hungary has been in increasing the market share of products with higher added value. This is because goods representing higher quality are less exposed to competition based on cost competitiveness, thus reducing the importance of exchange rate policy as an economic policy instrument.

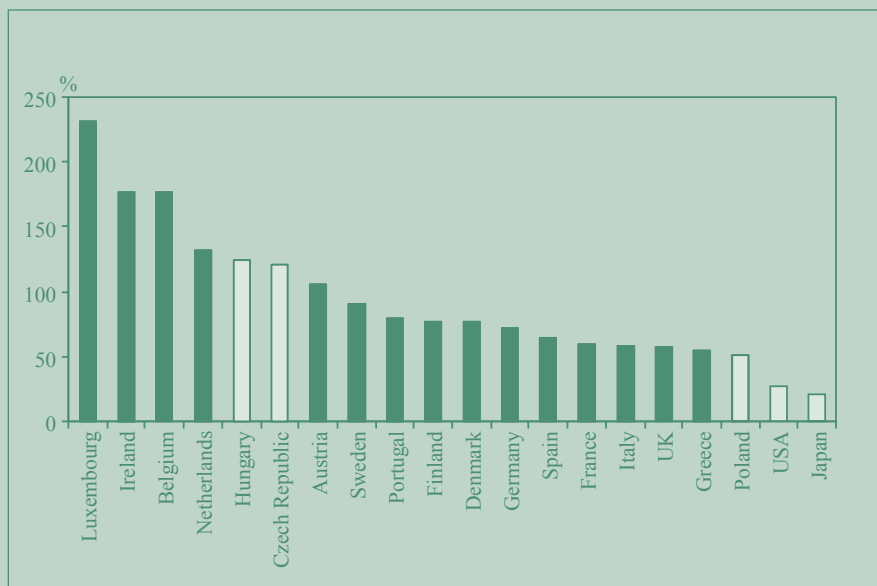
Thanks primarily to foreign direct investment, the openness of trade increased at a rapid pace in the 1990s. Total export volumes exceeded the level for 1989 as early as 1994-1995. Hungary's current degree of economic openness exceeds the

⁴¹ Mindelfart-Knarvik *et al.* (2000).

European average, with trade (comprising exports plus imports of goods and services) estimated at 124% of GDP in 2001 (see Chart III-4).

Table III-4

Export plus import trade as a percentage of GDP (2001)



Source: OECD database, 2001 Regular Report for the Czech Republic and Poland, NBH.

The western orientation of Hungarian trade became nearly exclusive in the course of the 1990s. While 67% of exports went to the developed countries in 1992-93, the corresponding percentage was up to 82% in 2000. Hungary's main trading partners today are Germany, Austria and Italy. Exports to the euro area accounted for 70% of total exports in 2000, higher than that of any euro area members. The euro area is the source of 54% of Hungarian imports, which is also above the EU average (see Table III-6).

Table III-6**Shares of EU/euro area exports plus imports of selected countries' total exports plus imports (%)**

	Exports to EMU12		Exports to EU15			Imports from EMU12		Imports from EU15	
	1995	2000	1995	2000		1995	2000	1995	2000
Hungary	58	70	63	75	Portugal*	66	69	75	78
Portugal*	65	68	81	83	Austria	71	62	76	67
Czech Republic	42	62	44	69	Belgium	61	57	73	68
Belgium	67	62	73	68	Czech Republic	40	56	43	62
Spain	62	60	72	70	Spain	56	54	66	63
Poland	60	60	69	69	Hungary	56	54	62	58
Netherlands	60	57	71	71	Poland	53	52	64	60
Austria	58	55	64	61	France	55	49	65	60
France	52	50	63	62	Italy	52	48	60	56
Italy	49	46	57	55	Germany	45	41	55	51
Germany	44	43	56	55	Netherlands	49	37	61	49
Ireland	44	38	72	62	Finland	35	31	58	52
Finland	32	33	55	54	Ireland	19	21	56	55

Source: OECD database.

* The data for Portugal are for 1999. The countries are ranked on the basis of export plus import shares vis-à-vis EMU in 2000.

The past ten years have also witnessed landmark changes in the structure of trade. Manufacturing exports rose at the most exceptional rate, up from 55% to 92% as a proportion of total exports to the EU between 1989 and 2000. The fastest growing manufacturing industry has been machinery, with its share of EU exports up from 11% to 66% over the noted period.

The exposure of the export sector to asymmetric shocks can be assessed by comparing Hungarian and EU trade structures. Table III-7 shows that Hungary has more than doubled its share of EU imports over the past five years. This increase in market share

Table III-7

**Shares of main trade categories
of exports directed to the EU (%)**

	Hungary		Poland		Czech Republic	
	1996	2000	1996	2000	1996	2000
I. Food, beverages and tobacco	13.4	4.1	7.3	5.3	3.1	1.6
II. Crude materials	5.3	2.2	3.8	3.1	6.6	3.9
III. Energy	4.3	1.3	6.3	5.4	4.2	2.9
IV. Manufactured goods	49.6	26.3	58.0	49.5	52.4	43.4
V. Machinery and transport equip.	27.4	66.0	24.6	36.6	33.7	48.2

Source: OECD SITC database and CSO Trade Statistics Yearbooks.

has been accompanied by a restructuring of exports, with the main category of machinery and transport equipment increasing its share of EU imports more than fivefold, while other products with a low degree of manufacture have lost significance.

The similarity of trade structures can be measured in terms of Balassa's *revealed comparative advantage indices* (RCA). An RCA index larger than one means that a particular product category accounts for a higher share of a country's total exports than its share of EU exports. In other words, the country involved exports a higher proportion of that particular product than the EU members on average, which implies that it may possess a comparative advantage in that particular area.

The similarity of trade structures is analysed in two dimensions. First, the structure of Hungary's extra-EU exports is compared to that of the European Union. If exports directed outside the EU show some structural similarity, it is a fair assumption that the EU (member countries) would have largely the same response to potential external shocks as Hungary. This implies that giving up autonomous monetary and exchange rate policy will effectively entail no costs. Table III-8 shows that Hungary's trade structure is very similar in respect of the main categories. Only food products, accounting for 15% of Hungarian extra-EU exports, differ as

Hungary exports three times as much food as EU members. Of the other main categories, only manufacturing of plastic raw materials and computers has a higher proportion in Hungary's extra-EU exports.

Table III-8
Structure of extra-EU exports of Hungary and the EU

	Share of commodity group in Hungary's total extra EU exports (%)		Growth rate (%)	Adjusted Balassa index (RCA)* (1999)
	1996	2000	2000/1996	Extra EU-export alapján
I. Food, beverages and tobacco	26.6	15.5	-42	3.0
Meat and meat preparation	6.1	3.2	-47	6.2
Cereals and cereal preparations	2.6	3.5	+32	5.8
Vegetables and fruit	6.6	3.0	-55	5.6
II. Crude materials	5.2	2.9	-45	1.6
III. Energy	3.7	3.0	-17	1.0
Crude oil and oil products	2.9	2.5	-16	0.8
IV. Manufactured goods	42.1	36.9	-12	0.9
Organic chemicals	2.5	2.7	+9	0.9
Medical and pharmaceutical products	5.6	4.3	-23	1.1
Plastics in primary forms	3.7	3.2	-14	2.4
Paper, paperboard and articles of paper pulp	3.0	2.5	-17	1.7
Non-metallic mineral manufactures	2.5	2.3	-9	0.7
Manufactures of metals	2.0	2.3	+13	1.1
Articles of apparel and clothing accessories	2.6	2.4	-7	1.5
Miscellaneous manufactured articles	3.0	2.7	-9	0.7
V. Machinery and transport equipment	22.4	41.7	+86	0.8
Power-generating machinery and equipment	1.1	2.0	+84	0.6
General industrial machinery and equipment	2.8	2.8	+1	0.5
Office machines and automated data-processing machines	0.3	16.7	+4923	5.7
Electrical machinery, apparatus and appliances	7.0	7.5	+7	0.9
Road vehicles	6.9	5.7	-17	0.7
Total (I-V.) export share	100	100		

Source: OECD SITC database and CSO Trade Statistics Yearbooks.

* Extra-RCA-index shows the share of Hungary's exports directed outside the EU by product category divided by the corresponding export share of EU members of the same category.

Next we compared the structures of intra-EU exports. The implication of a similarity in the structure of intra-EU exports is the assumption that Hungarian economic policy will probably respond in a similar way to the demand shocks hitting an

industry as other EU member nations. Table III-9 illustrates that even though the Hungarian export structure is essentially similar to that of the EU, the proportion of the machinery sector, with special regard to the manufacture of automobile motors (power generators) is significantly higher than in the EU.

Table III-9

**Structure of exports by Hungary
and the EU members directed to the EU**

	Share of Hungarian exports in total EU imports*(%)		Growth rate (%)	Adjusted Balassa index (RCA)** (1999)
	1996	2000	2000/1996	Based intra-EU export
I. Food, beverages and tobacco	0.6	0.6	-5	0.5
Live animals	1.7	1.5	-12	1.1
<i>Meat and meat preparations</i>	2.2	2.1	-6	1.5
II. Crude materials	0.5	0.6	+16	0.8
Oil-seeds and oleaginous fruits	1.3	1.8	+34	4.5
Cork and wood	0.9	1.0	+18	1.5
III. Energy	0.2	0.2	-38	0.6
IV. Manufactured goods	0.5	0.6	+31	0.6
Rubber manufactures	0.6	1.2	+97	0.9
Cork and wood manufactures (excl. furniture)	1.0	1.3	+34	1.3
<i>Manufactures of metals</i>	0.8	1.0	+32	0.9
Sanitary, plumbing, heating and lighting fixtures and fittings	1.0	1.7	+77	1.5
<i>Furniture and parts thereof</i>	1.1	2.2	+104	2.0
<i>Articles of apparel and clothing accessories</i>	1.3	1.5	+12	2.4
Footwear	1.6	1.7	+7	1.9
V. Machinery and transport equipment	0.3	1.6	+410	1.5
<i>Power-generating machinery and equipment</i>	0.2	4.7	+2012	5.2
<i>Office machines and automated data proc. mach.</i>	0.0	2.0	+6487	2.2
<i>Telecommunications and sound recording and reproducing apparatus and equipment</i>	0.4	3.0	+575	2.5
<i>Electrical machinery, apparatus and appliances</i>	0.9	1.8	+94	1.9
<i>Road vehicles</i>	0.1	1.0	+774	0.7
Total (I-V.) export share	0.4	1.0	+134	1.0

Forrás: OECD SITC database and CSO Trade Statistics Yearbooks.

Notes:

* Data in the table indicate the share of Hungarian exports directed to the EU by industry. The total value of the italicised entries accounts for two-thirds of total Hungarian exports (both intra and extra EU).

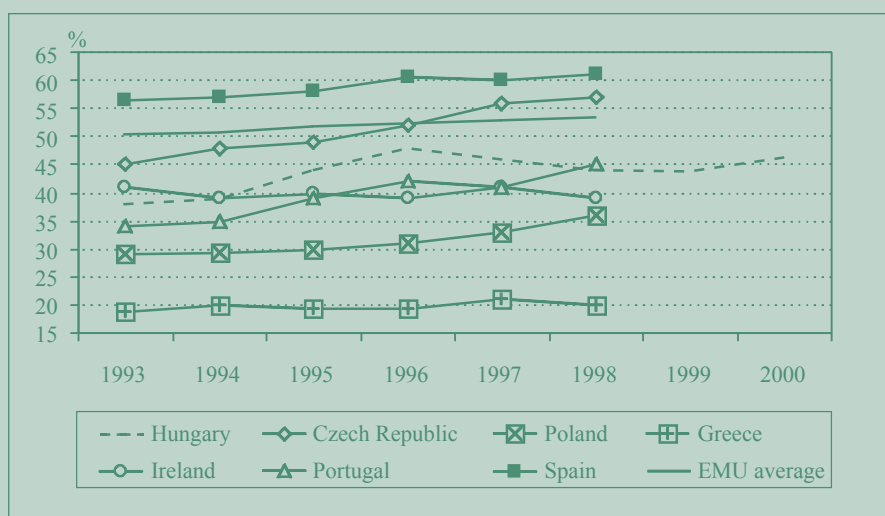
** Intra-RCA-index is derived by dividing the shares of Hungarian exports directed to the EU by products category with EU members' shares of intra-EU exports of the same product category.

Intra-industry trade is an indicator of the degree of economic integration. The higher the proportion of intra-industry trade in total trade, the *smaller the probability of asymmetric shocks* and the tighter cyclical co-movement is between the economies. The size of the intra-industry trade is usually expressed in terms of the Grubel-Lloyd index.⁴²

Of the EU periphery and Visegrad countries, the indices for 1998 exceeded the EU average in the case of Spain and the Czech Republic. Hungary lagged only slightly behind, approximating the value for Portugal (see Chart III-5).

Chart III-5

**Intra-industry trade
as a proportion of trade with the EU
(Grubel-Lloyd index, %)**



Source: Bank calculations and Kaitila (2001), page 9.

⁴² Formula of the Grubel-Lloyd-index:
$$GL_{ij} = \left(1 - \frac{\sum_k |x_{ij}^k + m_{ij}^k|}{X_{ij} + M_{ij}} \right) \times 100,$$

where x_{ij} and X_{ij} denote exports from country i to country j by product category and total exports respectively; m_{ij} and M_{ij} denote imports to country i from country j by product category and total imports respectively, and k stands for the number of product categories. The closer the value of the index to 100, the higher the proportion of intra-industry trade.

An important question is to what extent the Hungarian goods have been able to break into *high-value-added markets*. The 1990s saw an upsurge in the export share of technology and human capital intensive goods to the detriment of resource-based products requiring largely unskilled labour. In their studies on the structure of exports, Landesmann (2000) and Freudenberg *et al.* (1999) reached similar conclusions. The *export-price/quality* indicator reflects a country's *vertical specialisation*. Vertical specialisation shows whether the country in question is specialising in high, medium or low quality segments of a particular industry, and hence whether it is a supplier of high or low price market segments. A higher quality/price class ensures more secure long-term growth for a country, as competitors find it harder to break into these segments, there is higher value added and cyclical vulnerability is also assumed to be smaller than that of products in a lower-quality class. Landesmann finds that Hungarian manufacturing exports approximated the euro area market average in terms of the price/quality indicator to 95% as early as 1996, which is very close to the performance of the less advanced participants of monetary union.⁴³

The groundwork for the competitiveness of Hungary's manufacturing sector has been laid by foreign direct investment, with annual average FDI inflows amounting to 5% of GDP in the first half of the 1990s. Human capital and technology transfers by non-resident-owned companies and the possibility integrating into European networks made a major contribution to rapid economic restructuring and the increase of Hungary's market share in Europe in respect of higher value added products.

The Central Statistical Office's FDI statistics indicate that over two-thirds of Hungary's FDI stocks come from EU countries (76% in 1998) and the euro area (70% in 1998). Detailed flow data, which are available for the post-1999 period, also reflect that European residents continue to be Hungary's main foreign investors. The inflow of FDI has

⁴³ In addition to the output of domestic producers, every country in the world exports to the euro area market. This implies that the average may be derived from generally higher-than-average indicators for countries inside EMU and nearly exclusively lower-than-average rates for exporters outside EMU. In fact, this seems to be the case, as of the EMU participants, only Greece and Italy fell short of 100% in 1996. The value for Greece was also below that for Hungary, showing a downward trend, while the value for Italy was slightly above it and remained flat. See Landesmann (2000), Chart 4.6.1, page 108. It is unfortunate that the detailed WIIW database series used by Landesmann did not go any further than 1996, as based on the rapid pace of the Hungarian catch-up process, the picture of the Hungarian economy must be even better today.

enhanced Hungary's economic integration in several respects. First, investment in Hungary was usually aimed at increasing export capacities, which strengthened the country's trade integration. Second, the transfer of technology and human capital has improved conditions for long-term growth. Third, via the flow of incomes produced by non-resident-owned companies the degree of harmonisation of cycles has also been enhanced.

Table III-10
Foreign direct investment stocks as a percentage of GDP

		1990	1995	1999
Hungary	Inward	1.7	22.4	39.9
	Outward	0.6	0.9	3.2
Czech Republic	Inward	4.3	14.5	33.0
	Outward	..	0.7	1.3
Poland	Inward	0.2	6.6	17.2
	Outward	0.2	0.5	0.9
Ireland	Inward	12.2	18.6	50.7
	Outward	4.8	6.4	16.4
Greece	Inward	16.9	16.6	17.7
	Outward	1.0	0.7	0.4
Portugal	Inward	15.3	17.6	21.2
	Outward	1.3	3.0	10.6
Spain	Inward	13.4	23.3	20.5
	Outward	3.2	7.8	19.0

Source: World Investment Report (2001), Annex, Table B.6.

III.1.3. Business cycle linkages

Structural similarities and differences provide a picture of the extent to which the economy is exposed to asymmetric shocks and of the *likelihood of those shocks occurring*. In contrast, co-movement between observable business cycles, such as upswings and slumps, suggests that either there were no asymmetric shocks or autonomous monetary policies neutralised them in the period under review. Thus, a comparison of cyclical movements in the real economy across countries may provide useful information on the *extent to which the countries examined have behaved as optimal currency areas in the recent past*.

Similarly to the structural differences, individual countries' diverging cyclical positions cannot be taken into account by a common monetary policy, which therefore cannot be optimal for those countries whose cycles are desynchronised. In the worst scenario, common monetary policy responses would not smooth out but rather increase economic fluctuations. This, in turn, would have negative implications for a given country's economic performance.

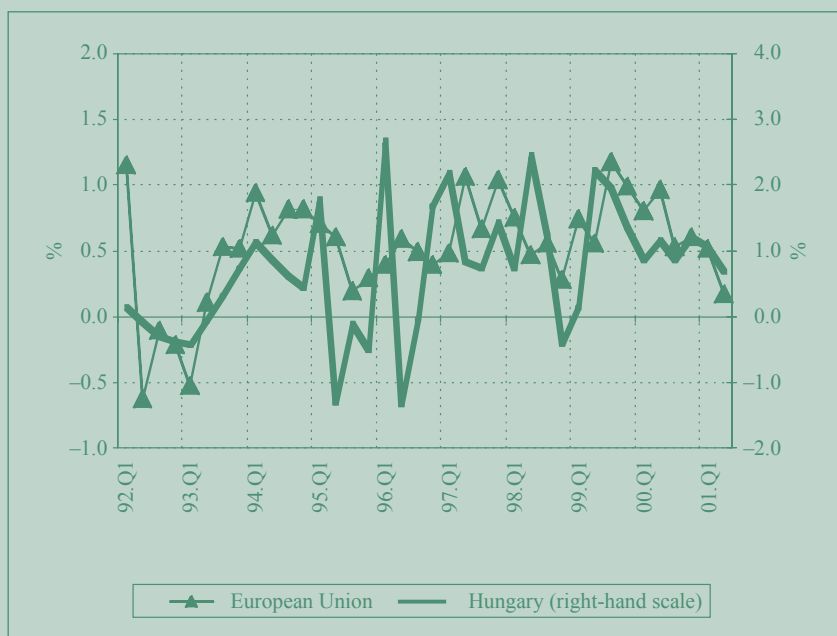
Several studies have dealt with the cyclical alignment of the Hungarian economy and other accession-country economies. Although the methods of measurement and the chosen time series have varied, the studies have unequivocally found that Hungary is not far from the European average regarding the co-movement of business cycles.⁴⁴

A comparison of even rough GDP data series reveals that the cyclical position of the Hungarian economy is often determined by factors identical to those affecting Western Europe. Co-movements observed in the first half of the 1990s cannot be attributed to symmetrical economic shocks in the usual sense. Hungary's economic transition and German reunification, ultimately responsible for the economic slowdown in Hungary and Europe in 1992–93, are both seen as the consequences of the political restructuring in Eastern Europe. Similarities in cyclical movements are more clearly visible in the second half of the decade. Both in the European Union and Hungary, the slump caused by the Russian financial crisis was followed by rapid growth in 1999 and the first half of 2000, whereas since then global recession has hampered economic growth.

⁴⁴IMF (2000), European Commission (2001a), Fidrmuc and Korhonen (2001), Frenkel, Nickel and Schmidt (1999), Boone and Maurel (1999).

Chart III-6

**Quarterly real GDP growth
in the 15 EU members and Hungary***



* Quarter-on-quarter growth rates, derived from seasonally adjusted data. Data for Hungary for the period prior to 1995 Q1 are NBH estimates.

In order to define the cyclical position more accurately, the trend (potential GDP) should be detached, and the output gap isolated. We have accomplished this by using the time series for industrial output.⁴⁵ Although industrial output accounts for only a portion of total output, it is nonetheless a good cyclical indicator for several reasons. First, international experience⁴⁶ has shown that industrial output correlates well with GDP. Second, industrial output data are available more frequently, on a monthly basis, and with much shorter time lags than total GDP statistics, which are

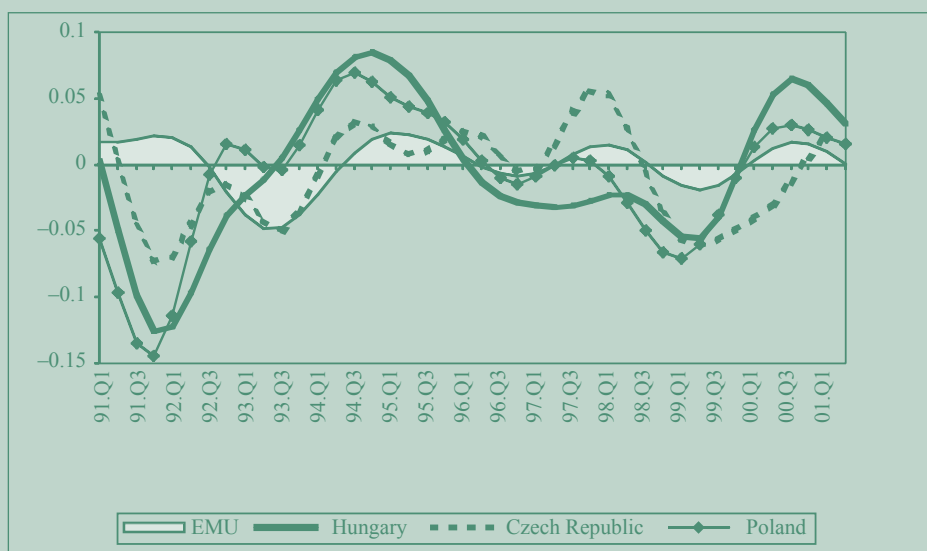
⁴⁵ The cyclical component has been extracted from the logarithm of quarterly series measured at constant prices using the Baxter-King filter. According to international practice, the two parameters were selected to be 6 and 32, removing movements with wave length shorter than one 1.5 years and longer than 8 years. In this way seasonality and the trend have also been removed.

⁴⁶ See, for instance, ECB (2001a).

available only quarterly. Finally, it is reasonable to choose industrial output, which can be measured quickly and accurately, for data quality reasons, as the GDP times series for accession countries under observation are much less reliable and the scope of their international comparability is much more limited.

Chart III-7

**Cyclical component* of industrial output
in the euro area** and three accession countries**



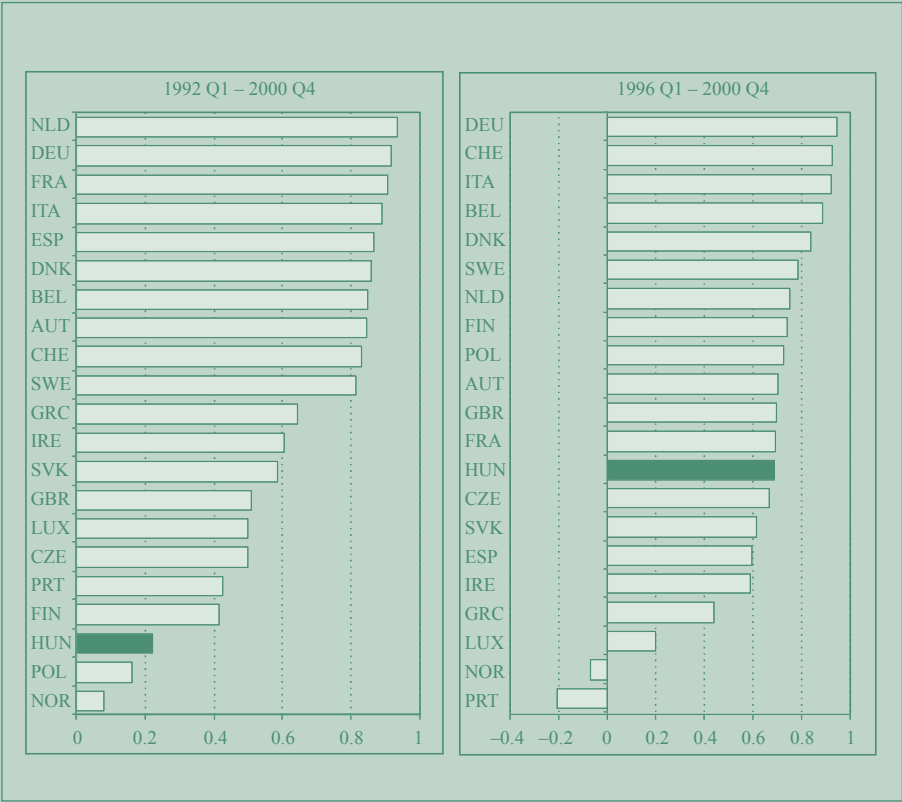
* Natural logarithm of the deviation from trend.

** An aggregate re-calculated for earlier periods using the current composition of EMU.

It is characteristic for each of the accession countries observed, namely the Czech Republic, Poland and Hungary, that, whereas the EU's cyclical position was on an upswing in 1991 (mainly on account of stronger demand on the heels of the German reunification), these three Eastern European economies were still dominated by the recessionary effects of the transition process. Recession in Europe following the EMS crisis in 1993 had only a subdued impact, leaving Hungarian industrial output, which had just begun to recover, virtually unaffected. In the second half of the 1990s, synchronised movements became characteristic, replacing the earlier divergence, explained in large part by the change in the direction of accession countries' foreign

trade. After the CMEA market collapsed, the role of the EU increased gradually. Meanwhile, the correlation coefficient,⁴⁷ taken as the cycle of the euro area, rose above 0.6 in all four countries. Nevertheless, it remained characteristic throughout the decade that the cycles of accession countries were comprised of wider swings, which was a natural companion of transition and the higher average growth rate.

Chart III-8
Correlation of cyclical components of industrial output in the countries observed with those of the euro area*



* An aggregate re-calculated for earlier periods using the current composition of the euro area.

⁴⁷ Four-year rolling correlation of cyclical components with those of EMU (an aggregate re-calculated for earlier periods using the current composition of EMU).

Convergence among the peripheral member nations of the euro area developed similarly. The initial asymmetric shocks were primarily the consequences of German reunification and the EMS crisis. Except in the case of Portugal, correlation coefficients of between 0.4 and 0.8 were typical both in this group of countries and the accession countries towards the second half of the decade, which suggests the adequate synchrony of the cycles. It is worthy noting that in the past 5 years the cyclical asymmetry among countries has moderated across Europe, except in Portugal and the non-EU member Norway.

Structural Vector Autoregression (SVAR) models may help to decompose business cycles into shocks originating from the demand and supply sides. Distinguishing between demand and supply effects may be useful for two reasons. First, supply shocks may be interpreted as autonomous factors which affect the economy anyway, even in a currency union. Explanation for this is that supply shocks do not reflect the effect of monetary policy influencing typically the demand side. At the same time, monetary policy may behave differently from country to country, which affects the symmetry of demand shocks. Consequently, they give limited information on future co-movements within the euro area.

The second advantage of segregating demand and supply shocks is that in this way we can distinguish between long-term (supply) and short-term (demand) effects. Supply shocks tend to be more persistent, as they are partly attributable to changes in and development of production technologies. According to modern-day theory, the primary task of monetary policy may be to smooth out temporary fluctuations rather than influence trends. Accordingly, it can achieve price stability and contribute to more balanced output growth mainly by neutralising demand shocks. So, somewhat in contrast with our previous argument, the degree to which a currency area is optimal will depend on the similarities of demand shocks.

An analysis of the past suggests that the second approach can be seen as more relevant, as the post-communist countries experienced economic restructuring in the 1990s, which was accompanied by a series of country-specific supply shocks. In contrast with technological innovation in the developed regions of Europe, technology imports appear to have played a dominant role in supply shocks in the accession countries. That is why it is not surprising that we have been able to find only modest correlation for supply shocks. However, the catching-up process will likely entail a

reduction in supply-side asymmetries, and thus supply correlation is expected to increase in the coming years.

Our method, pioneered by *Blanchard and Quah* (1989), was introduced to the literature on OCAs by *Bayoumi and Eichengreen* (1993). Segregation of demand and supply fundamentally rests on the simple assumption that demand-pull price increases induce a *temporary* rise in output, whereas supply-push inflation triggers a *lasting* drop.⁴⁸

After calculating demand and supply shocks for each country, they can be compared to demand and supply series relating to Europe or the euro area as a whole. Three methods are used to determine the latter. These methods are similar insofar as the European or euro-area demand and supply shocks are derived as some kind of weighted average of the individual country series. In the first method, the basis of comparison is the component that principally accounts for variance in the series of the West European countries. In the second method, individual countries' demand and supply shocks are weighted together on the basis of their effect on inflation in the current euro area. Finally, in view of the fact that external demand is crucially important for the state of the Hungarian business cycles and external balance, comparison is made with the weighted average of the roles of Hungary's trading partners in Hungarian exports.

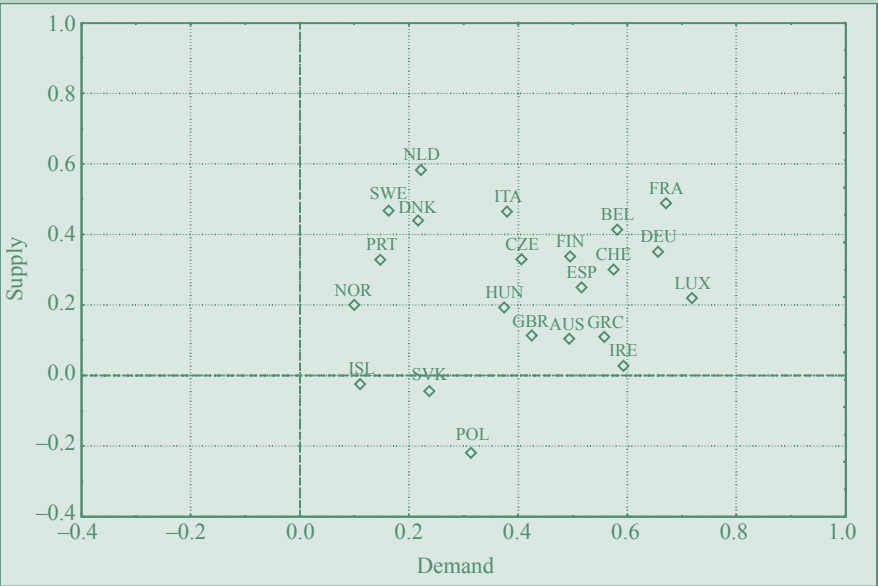
The advantage of using the principal component analysis to derive European demand and supply series⁴⁹ is that larger countries will only carry a higher weight to the extent that they exhibit actual correlation with the cycles of several other countries. Thus, this approach provides a numerical representation of genuine shocks common to several countries simultaneously. During the period between 1992 Q1 and 2000 Q4, France, Germany and Belgium showed much higher-than-average correlation with the European component in respect of both demand and supply. Similarly, Switzerland, Spain and Finland also exhibited significant correlation in terms of both constituents. Luxembourg and the Netherlands preceded all the other European states with regard to demand and supply correlation, respectively. Of the

⁴⁸ For a detailed description of the method applied, refer to Appendix F.2.

⁴⁹ The inclusion of other principal components in addition to the first principal component, which accounts for 10-50% of the demand shocks and 0-45% of the supply shocks to non-peripheral EU member states, will not significantly increase explanatory power. This justifies the proposition to view the first principal components as common European components, with their values interpreted as pan-European demand and supply shocks.

accession countries under review, the Czech Republic can be viewed as the country least exposed to asymmetric shocks in the 1990s. Demand shocks affecting Hungary showed broadly the same degree of correlation (0.4) with Europe as those

Chart III-9
Demand and supply correlations with the all-European component
(1992 Q1 – 2000 Q4)

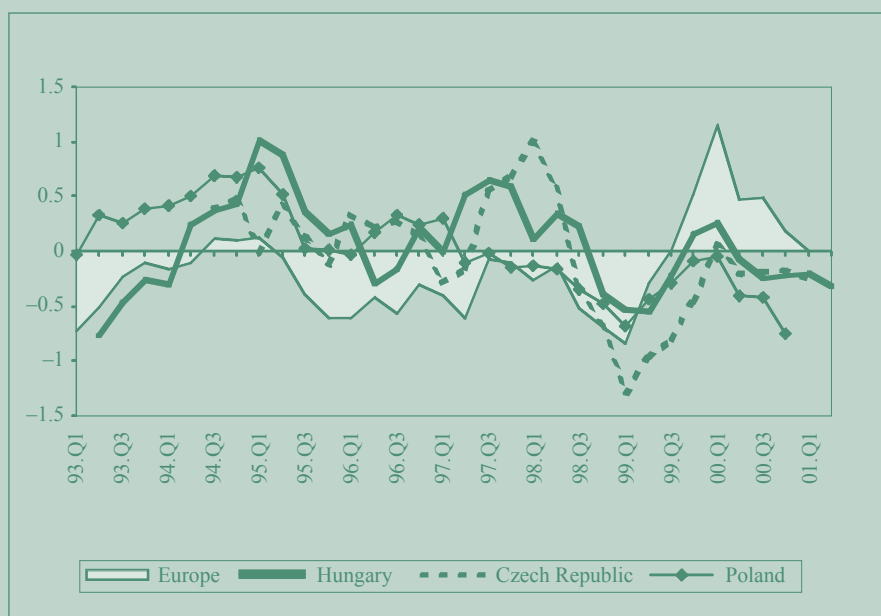


in Italy, the Czech Republic and Great Britain. Its correlation coefficient of 0.2 for supply fluctuations, corresponding to the level for Norway and Luxembourg, represents a slightly greater degree of symmetry than that of Austria and Greece, and slightly smaller degree than that exhibited by Spain and Portugal.

It is primarily Hungary's demand correlation that exhibits symmetry of a magnitude that corresponds to that of many current euro-area member nations. At the same time, the inference suggested by the country's supply correlation is that the exchange rate of the home currency is needed as a shock absorber. Nevertheless, the situation appears to be more promising from the perspective of accession,

Chart III-10

Four quarterly moving averages of demand shocks in Europe* and the accession countries



* First principal component

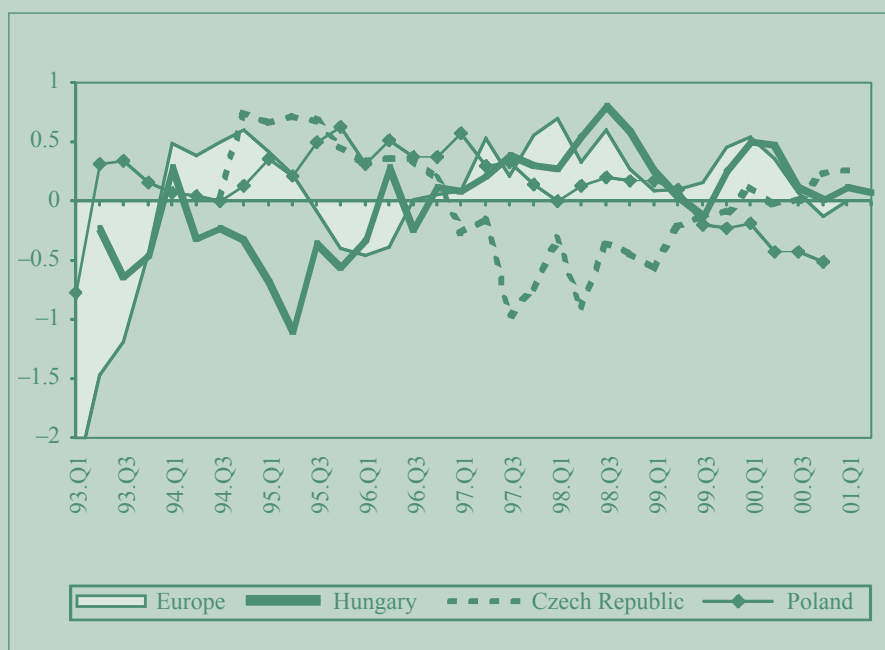
because the results seem simply to reflect the characteristics of the transition and catching-up process noted earlier, thus an increase in the symmetry of supply shocks is to be expected in the future.

Even though pan-European shocks may play a crucial role in euro-area business cycles, it seems worthy to concentrate on inflation shocks relevant for decision making within the ECB. Assuming that the European Central Bank seeks to neutralise only demand variability and only insofar as it causes excess growth in the harmonised index of consumer prices (HICP) expected in six quarters' time, we have constructed a European demand shock series effective for the ECB. The weights applied to this series are the current HICP weights, and the inflationary effect of unit demand shocks of the individual euro-area member countries appearing one and a half years later.⁵⁰

⁵⁰ The correlation coefficient for the series obtained in this way and the principal component of demand is 0.82 for the sample as a whole and 0.84 for the period between 1992 and 2000.

Chart III-11

**Four quarterly moving averages of supply shocks in Europe*
and the accession countries**



* First principal component

The degree of correlation with European demand defined in this way shows how far the adoption of the ECB's monetary policy assists, or in the event of negative correlation, hampers the smoothing of demand fluctuations. Hungary's correlation coefficient is in effect identical to the value calculated using the principal component of demand, implying that the symmetry of Hungarian demand shocks is already at par with or above that for several current euro-area member nations.

Finally, we have attempted to find the degree of symmetry in the variability of Hungarian demand and supply in respect of our key international trading partners. To this end, we have weighted the demand and supply shocks of the individual countries with their shares within Hungarian exports towards the euro area in 2001. This has enabled us to directly estimate the effect of losing the ability of nominal adjustment based on an autonomous exchange rate policy.

Chart III-12

Correlation of demand in the reviewed countries with the average of the euro area weighted with HICP effect of demand shocks



Demand and supply shocks calculated using export weights appear to be less correlated with those of Hungary than the series estimated earlier using the other two methods. This is primarily due to the fact that cyclical co-movement with the two key destinations for Hungarian exports, and especially Germany, was negligible in the decade as a whole. It should be noted, however, that demand and supply correlation between Germany and Hungary also showed a slightly upward trend during the decade.

Recent research using a similar approach has also found that of the former CMEA countries Hungary can be viewed as the economy showing the highest degree of symmetry with the euro area. Based on SVAR estimates of quarterly GDP and GDP deflator series by *Fidrmuc and Korhonen* (2001), the Hungarian supply correlation coefficient equals 0.46 relative to the euro area, while the demand correlation coefficient is 0.25. This puts Hungary directly after the four largest euro-area member

nations in respect of symmetry. Estimates by *Frenkel, Nickel and Schmidt* (1999) also based on GDP and its deflator suggest that of the accession countries, only Hungarian demand and supply shocks are positively correlated with those of both Germany and France. It should be kept in mind, however, that although based on an essentially identical SVAR model, the results of the two papers cited and of our calculations differ significantly. This is partly because estimation is sensitive to specifications (such as the selection of lags in the VAR model, the length of the sample period) and data selection, and partly because the benchmark for comparing the correlations is different (the euro area, Germany and France, European principal component).

Table III-11

**Demand and supply correlations with Hungary
(1992 Q1 – 2000 Q4)**

	Demand	Supply	Export share (%)
Germany	0.12	−0.08	52
Austria	0.10	−0.07	11.3
Italy	0.36	0.23	9.1
France	0.39	0.19	8.6
Netherlands	0.15	0.17	6.6
Belgium	0.03	0.33	4.8
Finland	0.24	0.05	2.9
Spain	0.17	0.17	4.8
Weighted with their share in exports	0.22	0.04	

III.2. Adjustment to asymmetric shocks

As shown in the previous chapter, Hungary has a similar production structure to the European Union, and the Hungarian economy has achieved a high degree of integration with the European Union. Nevertheless, the incidence of asymmetric shocks cannot be ruled out. One of the conditions for monetary union participation is that the economy is able to adjust to potential disturbances via either the *markets* or *economic policy*. Movements of the exchange rate cause shifts in the relative price of goods produced by the various countries, thereby affecting the demand for these goods, and thus smoothing cyclical fluctuations of the economy. The effect of the exchange rate on relative prices may be substituted for by flexible price and wage adjustment and a flexible flow of labour towards production sectors with improving sales prospects. As far as the aggregate smoothing of cyclical fluctuations is concerned, fiscal policy can take over the role of the exchange rate.

III.2.1. Price adjustment

There is only one international study available on the comparison of Hungarian and European product and labour markets in terms of flexibility. This OECD study⁵¹ found the composite indicator of product market regulation in Hungary to be 1.6 in 1998⁵². This means that prices in Hungarian product markets are at least as competitive as those in Spain (1.6), and even more so than those in Finland (1.7), Belgium (1.9), France (2.1), Greece (2.2), Italy (2.3) and Portugal (1.7). Thus, only four euro area countries rank higher than Hungary in terms of product market regulation.

Recent Hungarian price setting behaviour is covered by two empirical studies. The first paper⁵³ is based on a questionnaire survey conducted in the summer of 1998

⁵¹ Nicoletti, G. *et al.* (2000).

⁵² The composite indicator of product market regulation shows how restrictive the regulatory environment is for competition in the product markets of a given country. When constructing the indicator, the authors did not assess the objective of regulation, the aptness in achieving this objective or the grounds for setting the objective. Nor did they cover competition policy regulation or its effectiveness, although these factors bear essentially on price flexibility in product markets. The indicator ranges from 0 to 4 - the higher the number the less competitive the regulatory framework.

⁵³ Tóth I. J. and Vincze J. (1999).

and the second paper⁵⁴ is based on micro-econometric studies on a panel series ranging from 1993 to 1996. The questionnaire surveyed 451 manufacturing, construction and retail companies. As it dealt only with pricing behaviour on the Hungarian market, the sample did not include companies that exported their total output during the period reviewed. The database of the other paper includes monthly price data of nine Budapest processed meat retail units, operating throughout the sample period.

Perhaps the most important indicator of price rigidity measures the average time between two price revisions. The questionnaire-based survey suggests that 15.6% of the firms queried revise their prices once a month, 28.5% once a quarter and 22% once a year. The econometric study measured not the frequency of price revisions but of the actual price changes. Accordingly, during the first part of the sample period from 1993 to 1995, a price had an average life-span of 2.71 months, whereas the corresponding value during the second part of the sample period, from 1995 to 1996, was 3.64 months. Although both studies covered only a narrow sample of firms, one may risk the inference that in the period of 1993 to 1998 Hungarian pricing behaviour was characterised by quarterly or more frequent price changes or at least price revisions.

For comparison's sake, let us add that based on questionnaire surveys in the US prices are typically revised on an annual basis there⁵⁵ Other US studies reveal that catalogue companies change their prices with even less frequency⁵⁶ Hence, Hungarian pricing behaviour is relatively flexible. However, caution is needed when using the aforementioned findings to draw conclusions about the present. It is a well-documented fact of empirical literature that one of the key determinants of pricing behaviour is the rate of inflation. In a high inflation environment, pricing behaviour tends to be more flexible and prices are reviewed more frequently. By contrast, when inflation is low, prices tend to be sticky and are revised more rarely.

⁵⁴ Rátfai A. (2000).

⁵⁵ Blinder, A. (1991).

⁵⁶ Kashyap, A. (1995).

III.2.2. Wage adjustment

Countries participating in the monetary union vary substantially in terms of labour market flexibility. There are differences in terms of labour market regulation and institutions, with trade unions not having the same significance everywhere and the framework of wage negotiations also showing variance (see Box III-2), in addition to the institutions relating to employment, dismissal conditions and unemployment benefits. Hence, both labour mobility and wage flexibility may vary substantially from country to country, leading to potentially different responses to a common asymmetric shock. Less flexible labour markets may trigger higher unemployment and inflation, and weaker long-term growth.

On the basis of the aforementioned OECD study, the *Hungarian labour market* appears to be flexible in an international comparison.⁵⁷ The study shows that the EPL (*Employment Protection Legislation*) index, which is one of the indicators of labour market rigidities, stands at 1.4 for Hungary. Corresponding figures for the English-speaking countries are 0.2 and 0.5, with those for Germany at 2.8, for France at 3.1, and for Belgium 2.1. Of the countries with more relevance to Hungary, Spain has an index of 3.2, Portugal 3.7, Greece 3.5 and Ireland 1.

Hungarian wage bargaining has no elements that would hinder wage flexibility in the course of or following accession. Even though the employers, employees and the Government's representatives meet to reach an agreement on the recommended rate of earnings growth within the private sector, bargaining at the company level is the most crucial instrument of wage setting, which is conducive to flexible adjustment.⁵⁸ In this way, wages can be set that are in line with the level of productivity at the individual companies.

⁵⁷ Nicoletti, G. *et al.* (2000). o. The OECD's EPL index gives summary information on how easy it is for companies in terms of money and time to reduce the number of their employees. A low value indicates flexibility, and a high value inflexibility. The indicator also shows how easily companies can take on new staff during an upswing. Hence, low values should signal low unemployment, which appears to be approximately the case. The European Commission DG Employment and Social Affairs held an interesting debate on the methods and concepts of labour market flexibility liable to be operational for policy purposes. For contributions to the debate, see http://europa.eu.int/comm/employment_social/empl&esf/concepts_en.htm

⁵⁸ Neuman L. (2000).

Box III-2

Institutional framework of wage bargaining in the EU member countries

Every EU member nation has multilevel wage bargaining both at the industry and the company level. Five countries even have wage negotiations between the individual industries - Finland and Ireland between representatives of the entire economy, Belgium and Greece within the private sector and Denmark between industry representatives.

The importance of any particular level in wage bargaining varies across countries. Inter-industry coordination is dominant in Belgium and Ireland, while France and the UK put greater emphasis on negotiations at the corporate level. While industry-level bargaining is effective in eight member countries, there appears to be no dominant level in Denmark and Luxembourg, and the identity of the dominant participant varies from negotiation to negotiation in Finland.

Although every member country has a certain measure of industry-level bargaining, there are significant differences in terms of content and the number of industries involved. Irish and UK industries participate in extremely limited numbers. While in France, the Netherlands, Portugal and Spain mainly small and medium-sized companies take part in industry-level talks, and large firms typically meet at the company level, in Italy small and medium-sized firms are not at all represented at industry-level talks. Wage negotiations also vary in terms of geographical coverage. While the talks have nation-wide relevance in most of the countries, they only relate to the region in question in France, Germany and Spain.

Another difference is that most countries set a minimum wage growth rate at the industry or inter-industry levels, which could be in significant variance with the results achieved at the company-level bargaining (e.g. in Denmark). By contrast, the practice in Ireland and Belgium is to prescribe a maximum rate for wage growth, which of course allows for different outcomes at the company level of bargaining.

As far as *wage* flexibility is concerned, a look at the years of economic restructuring suggests that apart from the early stage of economic transition, nominal wages have changed in line with the inflation rate, and real wages have also been in correlation with growth of productivity. The flexibility of wages in relation to productivity rose substantially, from 6% to 20%, over the period from 1986 to 1996.⁵⁹

One of the *indicators of labour market flexibility* describes the sensitivity of real wages to unemployment. In the early 1990s, regions hit hard by the shock caused by the economic transition experienced a marked fall in labour costs. The flexibility of the wage level in relation to regional unemployment levels rose from -0.015 to -0.1 , a ratio typical for market economies. However, in the subsequent stages of the transition period, these regions lost most of their labour market edge, due primarily to the productivity advantage of regions with lower unemployment. From 1996, wage flexibility in relation to unemployment started to decline. Although even as late as 1998 earnings flexibility remained around the value of -0.1 , noted as typical by the literature, there was some degree of loosening apparent in the correlation between wage costs and unemployment.⁶⁰

III.2.3. Labour mobility

The traditional OCA theory places great emphasis on the adjustment to asymmetric shocks by means of factor (especially labour) mobility. This is a focal issue because nominal wages are assumed to be rigid downward, and hence wages cannot adjust to a negative demand shock, which might lead to high unemployment. Recent literature on the subject has, however, questioned whether labour immobility represents a genuine obstacle to a country giving up its own currency. Under this approach, labour mobility is *not a response to shocks* that monetary policy is able to handle. Monetary policy is *primarily useful in dealing with temporary shocks*. Obviously, due to the substantial costs of moving, there is no need for regional labour adjustment in the face of transitory shocks.

Even giving up the autonomy of monetary policy, it is not true that the market will

⁵⁹ Kertesi, G. *et al.* (2000).

⁶⁰ Kertesi, G. *et al.* (1999).

have no other way to adjust but via mobility. The primary means for the labour market and companies to respond to temporary adverse demand shocks will be by downward flexibility in *wages and prices*. Once a shock is over, the labour force that has left for abroad cannot be expected to return shortly, as the costs of moving are substantial. Flexibility or mobility in this sense is not only hard to imagine but would literally *threaten long-term growth in the region* or the countries hit by the shock. Adjustment to permanent shocks may naturally be made easier if labour supply can adjust to the geographical distribution of demand. This, however, has little to do with the fact whether the country in question has an autonomous monetary policy. Mobility can first and foremost be promoted by instruments of structural policy, such as training, the removal of linguistic barriers, higher mobility in the housing market, etc.

The *geographical mobility* of the Hungarian population is by no means negligible. In the early 1990s about 3.5-4.6% of the country's base-period population (360-470 thousand people) went to live in a different location. This, however, does not mean that the interregional unemployment gap can be reduced automatically by movements of the population (see Table III-12). Assuming this relatively strong domestic mobility to be stable it would take as much as 20 years to reduce the initial 20% difference between the unemployment rates of the 170 regions to 12.8-15.8%.⁶¹

As shown by Table III-12,⁶² differences in terms of both unemployment and earnings have been rather persistent over the last decade. The possibility of equalising unemployment rates and wage levels across the various regions by *commuting* is restricted due to high transport costs and the consequent segmented nature of the labour market.

In addition to the regional imbalances in terms of unemployment, the Hungarian labour market is also troubled by *relatively low employment and participation rates*. The mechanism of labour market adjustment to negative shocks by increasing inactivity is also known in Europe. While in a global comparison, the EU member countries also have a low employment rate, the figure for Hungary is even lower. The EU's employment target is set at 67% in 2005. The Hungarian employment rate

⁶¹ Kertesi, G. (1998).

⁶² Fazekas, K. (2000). pp. 278-282

Table III-12

	Percentage differences between the unemployment rates of regions with the highest and lowest unemployment (LFS)	Percentage differences between gross average monthly earnings levels of regions with the highest and lowest levels*	Relocation in the 15-55/59 age group as a percentage of population in the 15-55/59 age group
1989		21.1	2.2
1992	6.7	38.9	2.3
1993	7.0	35.8	2.3
1994	7.3	38.2	2.3
1995	9.0	39.7	2.3
1996	8.2	41.1	2.2
1997	7.9	41.9	2.3
1998	6.6	48.5	2.4
1999	7.1	48.4	2.4
2000	5.9	55.8	2.6

* Unadjusted for the effect of age differences, sex, education, etc.

stands at roughly 56%, relative to 61.3% for the EU-11 (and 63.1% for the EU-15) in spring 2000.⁶³ Of the EMU participants, Greece, Spain and Italy have lower rates than Hungary. Our relatively lower participation and employment rates are primarily due to the large-scale restructuring that has been implemented. By consequence, the geographical distribution of newly created jobs differs from that of the jobs that ceased, and these new jobs require considerably different skills. Hence, there appears to be a permanent structural gap between labour market demand and supply. Consequently, the inactive can be viewed as potential labour only to a limited extent not only during a cyclical upswing but also in the medium term.

III.2.4. Adjustment via fiscal policy

The success of economic policy adjustment hinges on the efficiency of fiscal policy. By giving up autonomous monetary policy, the task of dampening the aggregate effects of asymmetrical shocks is taken over by fiscal policy. Fiscal policy can only respond in a timely and efficient manner if there are no structural rigidities in the

⁶³ Eurostat (2001b).

way. Should a negative shock hit the economy when the budget is already suffering from high debt and/or deficit, fiscal policy would not be able to respond immediately and there might even be a worsening in the factors bearing on its ability to adjust. Fiscal policy works in two ways: the *automatic stabilisers* and *discretionary measures*.⁶⁴ These channels are not effective unless fiscal policy has the necessary scope of action.

Two of the nominal convergence criteria pertain to the budget, requiring that consolidated government debt and current deficit not exceed 60% and 3% of GDP, respectively. Unlike the relative criteria on inflation, exchange rates and interest rates, these are absolute figures. Within these limits, the Stability and Growth Pact requires that the planned deficit be zero on average over the economic cycle, and that countries with large debt and high future fiscal commitments (e.g. expected pension increases) even plan for a slight surplus. These requirements are designed to ensure that accession countries have the necessary leeway for manoeuvre in fiscal adjustment, both in respect of the automatic stabilisers and active policy instruments.⁶⁵

The automatic stabiliser effect of government arises from the fact that receipts and expenditures change in opposing directions over the cycle, i.e. when activity is strong, social spending (such as unemployment benefits, for instance) declines

⁶⁴In practice, it is methodologically difficult to *measure* the size of the necessary transitory deficit and the *cyclical position* of fiscal policy. It is even one of the requirements for EU membership that in addition to fiscal stability member countries should also include a historical and prospective description of their cyclical budgetary positions in the convergence programmes, using a uniform methodology. These indicators are instrumental in economic policy coordination within the EU. Countries participating in the monetary union draw up stability reports while non-participant union members (members with a derogation) submit convergence reports every year. The reports must be in line with the Broad Economic Policy Guidelines passed by ECOFIN. Accession countries prepare a Pre-Accession Economic Program, which is also aimed at stability and convergence.

⁶⁵The experience of the EU countries suggests that the Maastricht deficit criterion leaves sufficient leeway for fiscal policy to adjust to the cyclical movements of the economy. In the past, shocks would have only rarely led to a situation when the 3% limit is exceeded, provided that the countries involved did not have an initial deficit higher than 1 to 2%. Providing that the initial deficit is near zero, only permanent and severe recession would lead to exceeding the 3% criterion. However, the sanctions contain exemptions for such situations, especially if the recession is caused by factors that are not controlled by economic policy. Furthermore, in the past there were no similar restrictions on fiscal policy as those laid down in the Stability and Growth Pact, so, clearly, these requirements are not so strict that they hinder adjustment within EMU.

and tax revenues rise, thereby increasing the government's receipts. As the two items are entered on opposite sides of the budget, their changing in opposing directions dampens the cyclical upswing. At the time of a downswing, everything happens the other way round, with the automatic stabilisers mitigating the economic slowdown. Not every budget item has equal importance to cyclical stabilisation. The most sensitive items are corporate profit taxes, and the least sensitive are social security contributions, which are, in general, regressive. The sensitivity of personal income taxes and value added taxes lies somewhere in between the previous two.

Comparable calculations for automatic stabilisers (or cyclical components) carried out by the EU member countries have revealed that the automatic stabilisers within monetary union vary widely in size. They are typically in the upper range in small and Northern countries relative to larger and non-Northern countries.⁶⁶ According to the EU Commission's calculations the marginal sensitivity of the budget balance as a proportion of GDP is at 0.5% on average for the EU-15 as a whole, with individual percentages of 0.5 for Germany and Portugal, 0.6 for Denmark, Belgium and Spain, 0.7 for Finland, 0.8 for the Netherlands and 0.9% for Sweden. By contrast the figure for Greece was as low as 0.4. These numbers indicate that based on the EU-15 average, if GDP grows at one percentage point below trend, the budget deficit will increase by 0.5% as a proportion of GDP.

As the highest tax receipts are associated with the evolution of wages and consumer spending in Hungary, fluctuations in the economic cycle will not automatically create significant tax surpluses or losses, as wages and consumption fluctuate less markedly than the cycle. Items on the expenditure side are not significantly sensitive either, with unemployment benefits having a low weight and wages, linked to pensions via Swiss indexation, fluctuating only moderately. As far as tax receipts are concerned, corporate profits and investment are the two areas that could be affected more by the cycle. Due to the low tax burden on these items, however, the current budgetary sensitivity is estimated to be merely 15% in Hungary.

⁶⁶ In the period from 1960 to 1997, the largest negative cyclical component within the EU-15 countries stood at -1.3% on average, and the largest positive figure was 1.7% as a proportion of GDP. In a breakdown by country the corresponding percentages were -1.1 and 1.6 for Greece, -2.1 and 2.8 for Spain, -2.7 and 2.0 for Ireland, -2.4 and 2.4 for Portugal and -5.9 and 5.3% for Finland [see Buti et al. (1998)].

The *smoothing effect* of the automatic stabilisers also depends on factors such as the openness of the economy and the share of the public sector, in addition to the deficit's marginal sensitivity and the tax receipts and expenditure structure. In small open countries, the smoothing effect tends to be smaller, due to the imported components of aggregate demand. Accordingly, achieving the same smoothing effect requires higher variability in the deficit. A larger public sector also tends to have a greater smoothing effect. The European Commission estimates the automatic smoothing effect for EU member states to be in the range of 15% to 41%, assuming unit shocks. In other words, if automatic stabilisers are allowed to work, cyclical swings will be 15-41% lower than otherwise.⁶⁷

No comparable calculations have been prepared to describe the fiscal smoothing effect in Hungary. As in terms of the government's tax and expenditure structure Hungary resembles the class of less cyclically sensitive European countries, and in terms of openness it is like the countries that have a small stabilising effect, the Hungarian fiscal sector will resemble the group where the automatic stabilisers play a less pronounced role (such as mainly the South European countries, with a value below 20%). On the other hand, due to the openness and the ongoing catch-up process, Hungary must be prepared for higher-than-average volatility in the output gap. Consequently, stabilising the economy may require stronger reliance on discretionary moves aimed at boosting investment activity, which tends to be more exposed to cyclical fluctuations.

Smoothing by discretionary moves is allowed as fiscal planners have some leeway in modifying the majority of expenditures. Apart from the relative inertia they have, state-financed or subsidised projects - expenditures typically viewed as provisional items - *can react flexibly to cyclical changes*. This is because, depending on commitments and the state of completion of various projects, it is equally possible to launch or speed up projects and slow down or postpone new ones. Flexibility to make adjustments is also there *during the year* as the government controls the allocation of reserves set aside to cover unforeseen expenses (and unrealised receipts), in addition to having the power to decide on the utilisation of chapter and institutional residual funds or the freezing of appropriations. It is also possible for

⁶⁷ Measures obtained are 15% for Greece, 18% for Portugal and Spain, 31% for Ireland, 30% for the Netherlands and Germany, 41% for Finland. Buti *et al.* (1998) P. 135 Table 9.4.

Parliament to pass a supplementary budget if there is a danger of a higher-than-planned deficit, or to amend the budget to decide on the allocation of possible excess revenues. The Budget Act contains fewer constraints for institutions that perform government functions outside the government's legal framework. Specific regulations govern the activity of the State Privatisation and Holding Company (ÁPV Rt.), with the exception of reserve utilisation. As far as other organisations are concerned, the Act sets a ceiling for state-guaranteed borrowing. As some of the capital expenditures at the government's discretion, such as road construction, are financed by such extra-budgetary organisations, there is a high degree of flexibility during the year.

III.2.5. Financial integration, international risk sharing and asymmetric shocks

To the extent that it reinforces international risk sharing, financial integration may dampen the adverse effects of asymmetric shocks. If, for instance, instead of holding their savings exclusively in domestically-issued securities, households also diversify them within the monetary union, this will help reduce the impact of negative shocks on incomes in their countries or regions. A fall in the price of domestically-issued securities triggered by a negative shock would also reduce the value of household savings. By contrast, the prices of foreign securities would remain unchanged which may act as a stabilising force for their savings. If households in a region comprising several countries increase the share of foreign (but intra-regional) assets within their savings portfolios, this will enhance risk sharing in the region. With the increase in international risk sharing, households would be better able to smooth their consumption over time, which could also dampen the effect of asymmetric shocks to the individual countries.

Although securities issued abroad account for only a modest share of household financial wealth even in the developed countries, this proportion is expected to increase within EMU. In addition to the common currency and the resulting elimination of exchange rates, further harmonisation in the field of financial regulation will encourage portfolio diversification and risk sharing within EMU. The greatest progress in this area is expected from pensions funds and equity purchases by pension funds. The relaxation of rigid restrictions on foreign investment (currency

matching) and on the proportion of equities is expected to induce a large-scale reallocation of portfolios, which will also involve Hungarian households. All in all, financial integration will enhance the stability and closer correlation of incomes and ultimately output, across the participating countries.

III.3. Effects of the common monetary policy

Joining the euro area will mean that *Hungary adopts a single, uniform monetary policy*. This common monetary policy will not be efficient unless imported monetary conditions are consistent with domestic economic developments. This requires meeting a number of conditions simultaneously. First, the direction of interest rate moves should be in line with the cyclical position of the Hungarian economy, based on the condition that the Hungarian economy shows strong co-movement with the euro area economy. Second, the interest rate moves by the ECB should also be of the appropriate size. This can only be guaranteed if transmission has similar speed and effect in the different member countries. The third requirement is that fiscal policy play an active role in aggregate demand management, substituting for monetary policy in dealing with potential macroeconomic imbalances that might arise within the single interest rate policy environment. This is not merely a theoretical possibility as the first such situation can already be anticipated. Joining monetary union will trigger a fall in the level of nominal interest rates, causing an asymmetric demand shock relative to the other euro-area countries.

III.3.1. Optimality of the uniform interest rate policy for the Hungarian economy

To the extent that the ECB sets its key interest rate at any point in time in accordance with conditions in the euro area, it will be automatically acceptable for Hungary as well,⁶⁸ provided that domestic business cycles are sufficiently synchronised with those in the euro area as a whole. The chapter dealing with

⁶⁸ This is meant to refer to the cyclical position, i.e. whether nominal euro rates are at the peak, the trough or somewhere in between. The same nominal levels will presumably represent different real rates for the catching up and the most advanced EMU members.

Box III-3

Change in the lender of last resort function after joining monetary union

The central bank can act as a lender of last resort if the banking system has a temporary shortage of liquidity, which cannot be remedied by private means and poses systemic risk. In accordance with international financial institutions' recommendations, central banks do not in general make public the procedures followed when acting as a lender of last resort, and apply the principle of constructive ambiguity to reduce moral hazard.

When Hungary enters monetary union, this central bank function will be transferred from the National Bank's authority to the Eurosystem. Similarly to the international and current Hungarian practice, the Maastricht treaty makes no mention of the lender of last resort function among the Eurosystem's functions either. This can only be derived from its other functions. Accordingly, the Eurosystem contributes to the smooth conduct of policies pursued by the competent authorities relating to the prudential supervision of credit institutions and the stability of the financial system and promotes the smooth operation of the payment system. In critical situations the national authorities and the Eurosystem can cooperate on an *ad hoc* basis to eliminate the systemic risk.

Based on the reasoning of Chapter IV. 3, the Bank believes that the risk of a liquidity crisis with a potential for systemic risk is much lower in the unified financial market of the monetary union. Were a liquidity crisis to occur, the Eurosystem, also including the National Bank of Hungary, would take the necessary measures to maintain the stability of the financial system and ensure the smooth operation of the payment system. Thus, joining EMU will not affect the operational conditions of domestic banks in respect of the lender of last resort function.

business cycle correlation cites research results derived by various methodologies and the Bank's own calculations, which reflect sufficiently strong co-movement. Accordingly, assuming a greater degree of correlation following accession, Hungary will not suffer a greater disadvantage than most current euro member countries.

The question, however, is whether monetary policy as it has been conducted so far is not more in harmony with the cyclical position of the Hungarian economy. Answering this question is no easy task, but recent experience shows that, in addition to monetary policy, emerging market financial crises as well as global investor sentiment have also had major effect on the evolution of exchange rates and interest rates in Hungary, an emerging economy itself. Under the exchange rate system based on a narrow fluctuation band, interest rate policy had but limited room for manoeuvre. Thus, movements in the risk premium required by foreign investors appeared in forint yields. The same is the case now under the broad-band exchange rate regime, with the exchange rate continuing to play a key role in disinflation.

It should be borne in mind when determining the factors affecting the cyclical movements in forint yields that the recent gradual disinflation has caused forint yields to evolve along a trend. In order to obtain data that are dynamically comparable with risk indicators and euro yields, we have transformed one-year zero-coupon forint yields into ex ante real interest rates using expectations derived from the Reuters inflation survey.^{69, 70} The real yields derived in this way have shown strong negative correlation with euro yields over the past five years. By contrast, international risk indicators are, at least in certain periods, in clearly positive correlation with forint yields.

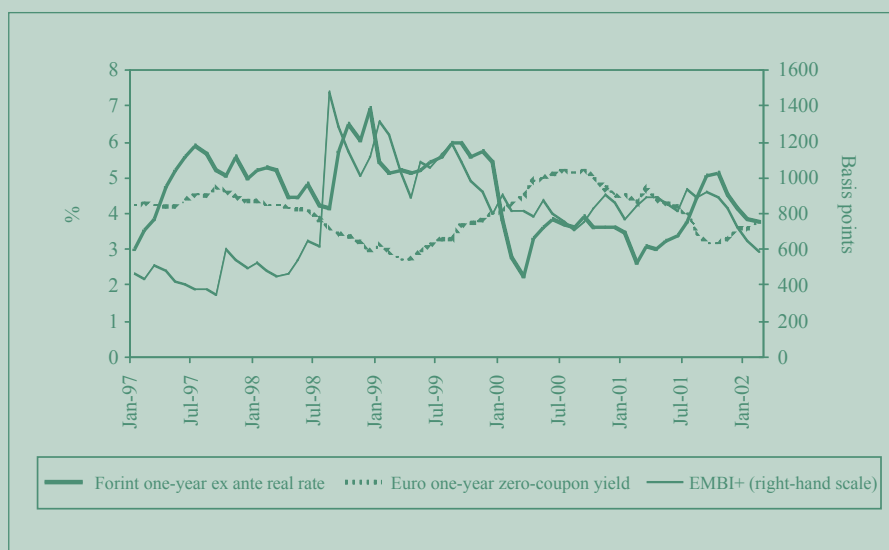
Joining the euro would in effect terminate Hungary's status as an emerging country, eliminating the effect of factors that bear on the returns of risky investments and are totally independent of the Hungarian business cycle. Furthermore, the ECB's

⁶⁹ Derived from government securities market data using Svensson's method (Svensson 1993.). The inflation expectations are computed by interpolation from the Reuters inflation survey about the year end.

⁷⁰ To support our reasoning, it is worthwhile to look at longer-term interest rates rather than very short-term ones, because they are affected more markedly not only by the central bank base rate but also the impact of market demand.

Chart III-13

Comparison of forint real interest rates with the euro yields and the EMBI+ index



Source: Bank calculations, Reuters, JP Morgan.

interest rate policy would have a direct impact, which would presumably be in much greater accordance with the state of the economy at any given point in time. Hence, it is expected that giving up the country's autonomous monetary policy would be conducive to better interest rate cycles.

Another question is whether the level of interest rates is consistent with the needs of the Hungarian economy. Due to the higher inflation level concomitant with real appreciation, the uniform nominal interest rate entails a lower level of real interest rates in Hungary than in the more advanced countries of the euro area. Economic theory offers no guideline about the magnitude of the equilibrium real interest rate in a small open economy or about the implications of a possible permanent divergence from this level. In a large closed economy, the stock of capital changes only slowly, and the equilibrium level of real interest rates is determined by the marginal product of capital in addition to the existing stock of capital. In small open models, the economy imports the level of interest rates, and the supply of capital changes

rapidly, due to the mobility of production factors. The path of the economy can only be determined by incorporating different friction variables,⁷¹ such that can often be calibrated only in an *ad hoc* fashion. One can thus only predict that, given a lower level of real interest rates, the economy may embark on a path of faster growth characterised by stronger involvement of foreign funds until the stock of capital reaches the size at which the marginal product of capital is equal to the imported interest rate.

It should be kept in mind, however, that lower interest rates will affect demand sooner than there is an expansion in supply. This will trigger an asymmetric demand shock relative to the countries of the euro area. This is not an unknown phenomenon in the euro area either, where economic policy debate about the ECB often focuses on the question whether the common interest rate level is appropriate for the peripheral economies (such as Ireland and Portugal) with higher inflation and faster growth.

When formulating an economic policy response to higher inflation, it is crucial to distinguish between an inflation differential arising from equilibrium appreciation and that due to cyclical factors. Structural inflation is not a consequence of actual output beginning to exceed potential output. Such regional differences are common within every large monetary union, such as the USA and today's euro area as well. There is no need for economic policy to adjust as long as the cyclical position is in accordance.

Cyclical misalignment may be due to several factors. One possible mechanism is that faster *price increases* are incorporated into expectations as a *secondary effect*, leading to inflation that is higher than structurally justified. If wages increase at a pace not supported by better productivity, with higher inflation expectations built into wage demands and companies' pricing behaviour, this may worsen producers' competitiveness in any given country.⁷² Due to excessive wage and price increases, the real exchange rate appreciates more strongly than justified on the basis of the catch-up process and relative productivity improvement. Market adjustment implies that aggregate demand for domestically produced goods declines due to

⁷¹ These include the cost of changing the capital stock and the tolerable level of the current account deficit, for instance. Such a model is described in Chapter IV.

⁷² Alberola et al. (1998), pages 47-48.

the worsening competitiveness, slowing down the rate of economic growth until inflation only contains the structurally justified component in addition to average euro-area inflation.

The cyclical position of the country may also be diverted if the *lower real interest rates* create too lax monetary conditions in a rapidly catching up country, causing output to grow above potential. The other threat is asset (securities and real property) price inflation due to increased borrowing enabled by the low real interest rates. *Asset price inflation* frequently lacks the ability of self-correction. When a market becomes overly optimistic, there is a danger of bubbles forming, which may burst after a while, causing a sudden plunge in prices. Drastic corrections lead to financial uncertainty and instability, with real economic repercussions. The threat of asset price bubbles is greater in economies that grow at a robust pace, especially where, due to the catch-up process, the rapid growth is due to structural and not cyclical factors.

For a rapidly catching up country, *all the aforementioned sources of the inflation differential may exist simultaneously*. In the case of Ireland and Spain, for instance, the inflation divergence could be attributed to both the Balassa-Samuelson effect and cyclical asymmetry.⁷³ The practical difficulty this entails for economic policy is to determine the sources of the inflation differential and the relative weights attached.

Dealing with the excess inflation arising from the cyclical divergence depends on the source of the excess demand.⁷⁴ If the factor behind the upswing is *external demand*, then optimal adjustment means that the real exchange rate appreciates due to the inflation differential, dampening the rate of economic growth via worsening competitiveness. Thus, higher inflation creates its own correction mechanism. There is however, the danger of overshooting, which may result in a long recession in exchange for correcting the macroeconomic imbalance. If one wishes to avoid this or if above-potential growth is brought about by excessive *internal demand*

⁷³ Ibid.

⁷⁴ Alesina *et al.* (2001), and Blanchard, O. (2000).

growth, there may arise a need for adjustment by *fiscal policy*.⁷⁵ The optimal method of adjustment may thus involve a combination of accommodating higher inflation and implementing fiscal tightening.

The danger of the formation of asset price bubbles calls for economic policy analysis and appreciation of micro- and macroprudential information so that no systemic instabilities are generated. A partial safeguard against financial market imbalances, the harmonisation of microeconomic prudential regulations, is virtually complete in the case of Hungary. This is not a perfect guarantee though, but the EU directives allow countries to tighten prudential requirements if deemed necessary. Supervisory authorities have the power to revise banks' collateral assessment procedures and sanction excessive growth in the balance sheet total or individual items. From a macroeconomic point of view, a stable macroeconomic environment (characterised by price stability and the smoothing of the rate of growth, etc.) and credible communication are the most crucial factors in preventing financial market instability.

III.3.2. Efficiency of monetary transmission

Monetary union cannot function properly unless the member economies react similarly to the common monetary policy moves, in other words there should be no major divergence between the monetary transmission mechanisms of these countries. Otherwise the common monetary policy cannot be effective, and may even become itself a source of asymmetric shocks. Failure to fulfil this condition is a frequent argument against early EMU entry by transitional countries. It is argued that in countries with relatively underdeveloped financial systems, interest

⁷⁵ Another complication with this simplified selection algorithm arises if the optimal choice for a rapidly growing economy is not a balanced trade deficit but trade deficit of a certain sustainable size. In this case the optimal real exchange rate appreciation is stronger than that consistent with equilibrium. The fiscal position also has a bearing on the optimal economic policy choice. If debt is low and falling, and if the recovery of public investment is high, optimal adjustment could mean accommodating higher inflation rather than fiscal tightening. On the other hand, if the debt and deficit are high and the rate of recovery on public investment is low, the optimal strategy may call for dampening aggregate demand by reducing fiscal expenditures. Ibid. Page 21.

rate policy can make a much weaker impact than in the present euro area countries.

If transmission mechanisms are different, the common monetary policy may magnify existing cyclical differences, hence an interest rate change following an inflationary shock may widen the inflation differential.⁷⁶ From a Hungarian perspective, principally the common monetary policy would entail higher costs if the transmission mechanism were stronger than the euro area average. This is because in that case - assuming that the ECB takes into account the transmission differences when making interest rate decisions - countries with stronger transmission would shoulder a higher portion of the real economic costs of disinflation in the euro area. This is not to say that countries where transmission is weaker only enjoy the advantages. Weaker transmission implies that the common monetary policy moves are weaker than those viewed as optimal under an autonomous monetary policy. In other words, monetary policy would not be quite as effective in smoothing cyclical fluctuations. This could ultimately hamper convergence and, in an extreme case, lead to divergence unless fiscal policy can adequately offset the effects of asymmetric transmission.

Empirical comparisons of monetary transmission across countries, relying on data from the pre-EMU period, reveal significant differences in the way the real economy responds to monetary shocks. At the same time, caution should be taken in evaluating these results, as they are by no means unanimous: the various studies estimate different measures for the asymmetries, sometimes even the directions of differences in transmission are contradictory. Nevertheless, it is possible to make a few general inferences. Most VAR models confirm that transmission is weaker in some peripheral countries, such as Spain and Ireland, than in the largest core countries, such as Germany and France. However, the various estimates are not consistent in terms of the relative situations of core countries or the assessment of transmission in some countries, such as Austria,

⁷⁶ For the sake of simplicity, it is assumed that countries do not differ in terms of the response by inflation to the output gap. Accordingly, this study does not deal with the differences between the sacrifice rates of disinflation. The other assumption is that the shocks to which the common monetary policy responds are symmetrical.

Portugal and Italy.⁷⁷ *Elbourne et al.* (2001) suggest that the contradictory results are primarily due to the fact that the sample periods and data sources are not identical, and to a lesser extent, to the choice of different models.

Comparative research on euro-area countries suggests that the euro area is far from being homogenous in terms of transmission, so it cannot be said that Hungary is exceptional, relative to the other member countries. Also, as will be seen, the Hungarian financial system is undergoing major structural changes, projecting improvement in monetary transmission over the medium term.

Factors bearing on transmission

The varying strength and speed of monetary transmission can be largely traced back to differences in the size and structure of the financial intermediation. It should be stressed, however, that different characteristics of the financial system are relevant in the different phases and channels of the transmission mechanism, and these characteristics are not necessarily in correlation and often have opposing effects on transmission.

The speed and strength of monetary transmission depend first of all on the speed and extent to which market and bank interest rates react to changes in central bank

⁷⁷ Keier *et al.* (1998) find no significant divergences between the transmission mechanisms of France, Germany and England. Similarly, the SVAR analysis of transmission within the G7 countries by Gerlach *et al.* (1995) reveals no significant differences. Using a VAR analysis, Ramaswamy (1997) divides European countries into two groups according to how output responds to monetary tightening. For countries belonging to the first group, such as Austria, Germany, Belgium, the Netherlands, the UK and Finland, the real economy takes much longer, say 10-12 quarters, to adjust, and the adjustment is much deeper, accounting for 0.6-0.8% of GDP. Monetary policy moves affecting the other group, comprised of Denmark, France, Italy, Portugal, Spain and Sweden take a very short time, that is 6 to 8 quarters, to come through, but the impact is weaker. In a study of 13 European countries, Phillipsen and Wuyts (1999) also classify countries into two groups, but their classification is not the same as that of Ramaswamy, with Italy being in the 'strong' group and Great Britain and the Netherlands in the weaker group. Comparing 14 countries, using a structural VAR model, Ehrmann (2000) also notices major differences. Interestingly, he finds the strongest transmission in the UK, in contrast with what is suggested by Dedola and Lippi (2000), and Phillipsen and Wuyts. Altavilla (2000) also defines two groups, which again differ from the above classifications. One of his key inferences is that countries vary more markedly in terms of the real economic response to monetary shocks than in terms of the adjustment of inflation.

rates. The intensity of interest rate transmission is governed by the structural properties of financial intermediation [see Ehrmann *et al.* (2001)], with special regard to:

- *the role of non-bank financing*: if capital markets play a major role in the financing of firms the private sector is less vulnerable to a decline or increase in credit supply in response to a central bank interest rate move;
- *the maturity of loans, fixed or variable interest rates, and collateralisation*: if short-term and variable rate loans are dominant, then interest rate transmission is faster, while high collateralisation indicates a strong balance sheet channel, which further boosts the efficiency of transmission;
- *market concentration and the intensity of competition*: obviously, the more intense competition is, the faster the reaction of commercial bank rates to central bank rate changes.⁷⁸

The above characteristics imply the existence of fast interest rate transmission within the Hungarian banking system, as financing via the capital market is insignificant, and both loans and deposits have short terms to maturity. In addition, there is a high share of variable rates and competition is strong, especially in the corporate business. The Bank has also researched interest rate transmission, the first phase of monetary transmission (see Árvai (1998)). The study has found effective transmission between market rates that respond immediately to central bank rate changes and bank rates, although since rates followed a downward trend throughout the period under review, it was not possible to analyse the transmission of central bank rate rises.

Rapid interest rate transmission does not in its own right ensure that monetary impulses can efficiently guide the behaviour of non-bank sectors. Interest rate policy can be expected to have a stronger impact in countries where bank lending plays a significant role in corporate financing, and where there is a high level of private sector indebtedness. This is because if private sector indebtedness is low, central bank rate changes will not have a sufficient impact on the interest expenditures of the corporate and household sectors, investment and consumption decisions and, ultimately, inflation.

⁷⁸ The assets side is primarily affected by a rate cut and the liabilities side by a rate hike.

The ratio of financial intermediation to economic activity, and particularly the relative size of financial markets, vary significantly across the euro area. At the same time, Hungary lags considerably behind the average euro area levels, and in fact each euro participant has deeper financial intermediation than Hungary (see Chart III-14).

Chart III-14

Banks' total domestic lending as a percentage of GDP (1998)



Source: IMF International Financial Statistics CD-ROM.

As far as the private sector is concerned, both household and corporate indebtedness falls short of the characteristic level for euro member countries. The difference is especially large in respect of households: while the ratio of financial liabilities to disposable income is in the range of 50 to 100% in developed countries, the corresponding ratio for Hungary stands currently at 7%. Furthermore, bank lending to households amounts to merely one-tenth of the euro area average as a percentage of GDP (see Table III-13). However, the past few years have witnessed a sharp upsurge in the level of household indebtedness, and the catch-up process is

expected to continue over the coming years. Thus, the savings ratio is primarily governed by structural factors in the short term, over which interest rate policy has only limited effect. Over the medium to long term, however, the substantial rise in household indebtedness will improve the effectiveness of transmission.⁷⁹

Over the past five years, the level of corporate indebtedness has risen rapidly, although still somewhat more slowly than within the household sector. By 2000, the stock of lending to non-financial corporations had reached 25% of GDP, still much below the 40% euro area average. It should be noted, however, that the share of direct corporate sector borrowing from non-residents has been substantial over the last decade, accounting for 13% of GDP in 2000. Taking these factors into account, the share of bank lending in Hungarian corporate financing is significantly higher than that indicated by banking statistics. Companies' balance sheets reveal that previously very low capital gearing ratios had approached those of the more advanced economies by 1999 (see Chart III-15). Another important feature of the corporate debt structure is that the proportion of foreign-currency, largely euro denominated loans accounts for over 60% of the total stock of lending, which reduces the sensitivity of corporate credit demand to changes in *forint* rates.

To sum up, after initial caution, commercial bank lending to the corporate and household sectors has gathered pace over the past one or two years, and is expected to remain buoyant. As starting from a low level, household indebtedness is approaching the long-term equilibrium level, households' contribution to financing capacity is expected to be limited over the medium term. Therefore, direct and portfolio financing by non-residents is expected to play a permanent role in the catch-up process.

It can be said in relation to monetary transmission that once Hungary enters monetary union, the harmonised regulatory and institutional framework is in place in the financial markets, hence the financial sector is capable of efficient intermediation. The financial sector is structurally stable, thanks primarily to privatisation (over 70% of banking sector capital held by non-resident professional investors) and the largely harmonised regulatory environment. Prior to monetary

⁷⁹ Árvai-Menczel (2000).

Table III-13

Bank lending to households in euro member countries in 2000
As a percentage of GDP

	<i>Households</i>	<i>Of which:</i>	
		Real property loans	Consumer credit
Austria	28	12.7	11.7
Belgium	34.1	23	3.6
Finland	27.3	18.5	2.4
France	34.4	21.2	7.8
Netherlands	67	57.9	3.4
Ireland	39.9	29.8	9.1
Luxembourg	38	27.4	3
Germany	67.6	42.7	10.9
Italy	21.2	8.4	1.8
Portugal	61.5	45.3	7.5
Spain	46.1	29.1	8
Euro area – average	42.3	28.7	6.3
Euro area – weighted average	45.9	29.1	7.3
Hungary	4.7	1.5	3.2*
Czech Republic	6.3
Poland	7.0

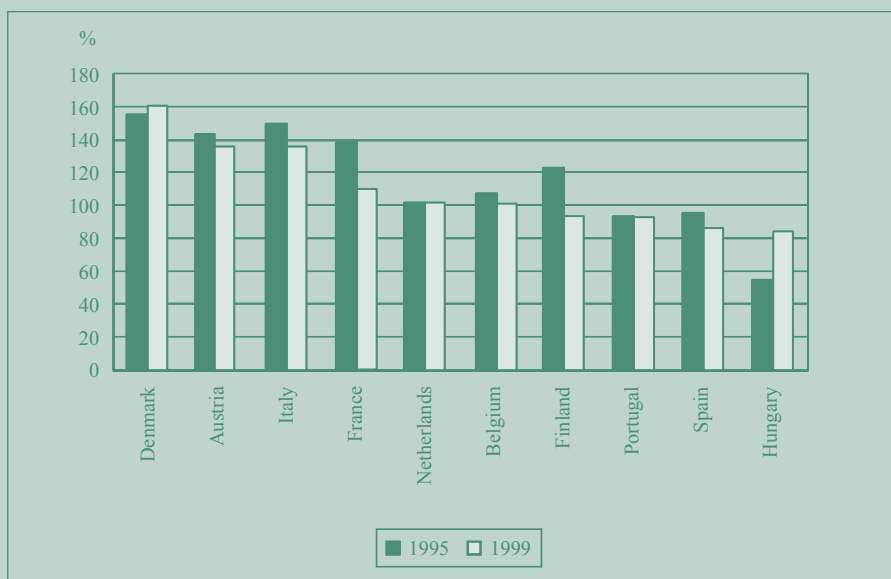
Source: ECB, Banco de Espana Annual Report 2000, p.116 and NBH.

* Consumer credit and other loans.

union entry and during the initial years, bank intermediation is expected to remain less deep than the average for the euro area, which will negatively affect the effectiveness of monetary transmission. On the other hand, the structural properties of Hungarian financial intermediation allow for more effective interest rate transmission.

Chart III-15

Corporate sector indebtedness, total liabilities (excluding suppliers) as a proportion of equity



Source: European Commission, DG ECFIN, BACH database, NBH calculations and APEH tax authority corporate database.

Prospective changes in the monetary union

Empirical studies spanning the period prior to monetary union reveal significant variance across member countries in terms of the real effects of monetary shocks and the strength and timing of transmission. These differences are partially explained by the differences in the structural properties of financial sectors and banking systems. This raises the issue of what predictive power these historical differences have for the period following the establishment of the euro zone and whether common monetary policy may become a source of instability. There are a number of arguments in favour of the proposition that monetary union will decrease these differences. First of all, financial market integration is likely to reduce the differences between the financial systems of the individual countries, fostering the harmonisation of monetary transmission.

Second, several analyses,⁸⁰ claim that prior to monetary union, countries showed differences in terms of the effect of monetary policy not merely because they had different transmission mechanisms but also because central banks used different reaction functions.

Transmission is expected to improve more strongly in countries, including Hungary, that have small liberalised capital markets but are, at the same time, characterised by considerable and volatile risk premia. The effectiveness of interest rate policy in such countries is significantly limited by the easy access to and high proportion of foreign-currency (mainly euro) denominated loans, which weaken sensitivity to changes in domestic interest rates. This was broadly the case for the other small euro member countries as well, prior to their entry into monetary union, regardless of the fact that they had larger financial sectors than Hungary. As most of the loans are provided by euro area countries and are denominated in euro, the problem will ease once Hungary joins the euro area.

III.4. Seigniorage loss as a result of entering monetary union

If a country retains its national currency, the government obtains seigniorage revenue from its monopoly on currency issue. The monetary base is basically an interest-free loan granted by market participants to the central bank. Seigniorage is the revenue derived by the central bank from the issuing of coins and banknotes. Seigniorage revenue increases central bank profits, which are transferred to the Budget at the year-end accounting of profits. In this sense, seigniorage can also be viewed as a special kind of tax paid by holders of the monetary base to the government.

Seigniorage revenue is traditionally calculated in two different ways. Under the first approach, the monetary income is derived as the annual real increase in the monetary base. Here, symbolically, the central bank transfers to the budget the notes and coins produced since the previous year, in exchange for nothing. This approach has relevance only for countries where the central bank lends directly to the government. Under the other, *opportunity cost*-based, approach, seigniorage is the income arising from the assets held as a counterpart to the monetary base. In this approach, the

⁸⁰ E.g. Clements *et al.* (2001).

size of the interest income is usually quantified via multiplying the (real) monetary base by short-term domestic market yields. This, however, is only acceptable if the increase in the monetary base is derived from the rise in the central bank's net assets *denominated in the national currency* (e.g. via the purchase of domestic government securities). If the monetary base grows via the increase of the central bank's *foreign currency denominated* net assets (via intervention in the foreign exchange market, for instance), the monetary income obtained is calculated using foreign and not domestic yields.

In the second half of the 1990s, seigniorage in the more developed Central and East European countries (such as the Czech Republic, Poland, Hungary and Slovenia) no longer played the role of intended fiscal revenue. Rather, it was a kind of by-product of exchange rate and interest rate policy dilemmas as these countries sought to prevent the appreciation of their currencies in order to stimulate competitiveness, while maintaining domestic interest rates high in order to reduce inflation. Under the fixed exchange rate regimes run by these countries, the national central banks frequently implemented foreign currency purchases in order to prevent appreciation, and then sterilised part of the excess liquidity created. The interest paid on the sterilisation instruments decreases seigniorage revenue. Finally, potential exchange rate changes may lead to substantial forex losses/gains due to the different foreign currency structure of the assets and liabilities sides of central bank balance sheets, which also has a bearing on central bank profits.

Schobert (2001) demonstrates that, taking account of these factors, seigniorage revenues obtained by the more advanced transitional countries in the period between 1995 and 2000 were much lower than those indicated by the traditional opportunity-cost-based approach. This is partly because the interest income earned on foreign currency assets as a counterpart to the monetary base was lower in these countries than that earned on domestic currency denominated assets. Secondly, the costs of sterilisation were hefty. On the other hand, depreciation of the domestic currency contributed a great deal to seigniorage revenues, via the forex gains appearing in central banks' balance sheets.

However, the question we would like to answer in this section is not the historical evolution of Central and Eastern European seigniorage but the costs of lower seigniorage, were the euro to be adopted in Hungary. This cost can be derived by

comparing monetary incomes if the country joins monetary union and, alternatively, if it stays out..

Monetary income if Hungary participates

Hungary's adoption of the euro will, in principle, mean the end of the government's revenue from issuing the country's own currency. However, the monetary income of the euro area is distributed among participant national central banks, according to their shares of the subscribed capital of the ECB. The size of the share in the ECB is determined as the sum of 50% of the share of the member state in the population of the Community and 50% of its share in the gross domestic product of the EU.⁸¹ Assuming that only Hungary joins the EU, based on 2000 figures the country's share in the ECB would amount to 1.6%, to be paid on Hungary's entry into the monetary union.⁸² The more countries join the EU in the first round, the smaller Hungary's share is. With ten new members, for instance, it would drop to 1.4%. Profit accounting within the Eurosystem (ECB + euro area national central banks) is governed by stringent rules. At first glance, it seems disadvantageous for Hungary that a certain part of the euro area monetary income (the exact amount to be determined by the Governing Council, but may not exceed 20% of the net profit) has to be transferred to the General Reserve Fund of the ECB to cover prospective losses. As a result, participating countries receive only a reduced portion of the seigniorage revenues, which is part of the profit accounting. In practice, however, seigniorage that remains with the ECB should be viewed not as a genuine loss, but simply as a higher claim on the ECB's capital.

The Eurosystem did not officially have a monetary income until the euro was adopted in 2002, as, under a provisional arrangement, seigniorage remained with the member countries. Therefore, the seigniorage income of the euro area is also estimated using the opportunity cost approach, taking into account that the

⁸¹ A country's share of the subscribed capital is set already on accession to the EU and the start of ESCB membership, but only 5% of the amount has to be paid up on accession, with the remaining 95% left until joining EMU.

⁸² The data for 2000 provide a good starting point as the capital subscription is set by using the average for the five years prior to ESCB membership. Although economic growth in Hungary will presumably exceed the corresponding rate for the euro area in the coming years, this will not have a significant impact on Hungary's share.

Eurosystem pays market rates on required reserves. If Hungary's capital share is 1.6%,⁸³ it will receive 0.24% of its GDP as redistributed income between 2006 and 2008, while under the 1.4%-share scenario, the corresponding figure will be 0.21% of GDP (including the portion transferred to the General Reserve Fund).

Monetary income if Hungary stays out

If the country does not enter monetary union, the size of the seigniorage will be determined by the level of the monetary base and the yields on the assets backing it in the central bank's balance sheet. Thus, seigniorage can only be calculated if there are data on the size of the monetary base, the central bank assets backing the monetary base and the yields on those assets at, and following, the earliest possible date of monetary union entry (2006).

The change in the average monetary base is primarily determined by such factors as the Hungarian cash/GDP ratio,⁸⁴ which is well above the EU average, and faster economic growth in Hungary than in the euro area. These factors are partially independent of monetary union membership and appear to be permanent over the long term. The cash holding ratio is not expected to change considerably over the medium term, although the widespread use of cash substitutes is likely to exert downward pressure both inside and outside the euro area. The calculations in this study are based on the assumption that the 7.6% cash ratio, measured in 2001, will remain in the future.

The monetary base has two components: notes and coins in circulation and the reserves of credit institutions held at the central bank. The calculations in this study only take account of the seigniorage revenue arising from cash balances. This is because the central bank will start paying market rates on required reserve balances at the latest following the EU accession. This will also be the end of the seigniorage income arising from this component of the monetary base.

It is more difficult to determine the prospective structure of central bank assets

⁸³ Although, in all likelihood, Hungary will not be the only country to join the EU, the number of early EMU aspirants is much lower.

⁸⁴ In 2001, the cash to GDP ratio amounted to 7.6% in Hungary, relative to 5.4% on average in the euro area.

backing the monetary base, as this will depend, to a great extent, on the exchange rate policy pursued until 2006 and afterwards, should the country remain outside. The underlying assumption here is that the existing broad-band fixed exchange rate system will remain in place over the medium term, and there will be no incidence of foreign exchange market intervention. This implies that the expansion of the monetary base will be, at least for a while, matched by an adjustment on the liabilities side, i.e. the winding up of sterilisation instruments accumulated previously. The Bank currently estimates that sterilisation instruments will be completely eliminated from the central bank's balance sheet by around end-2003. The expansion of the monetary base after this date will be countered by the rise in domestic currency denominated assets, in other words, the central bank will switch from its present liquidity-absorbing role to providing liquidity. After 2003, central bank assets backing the monetary base will be comprised partly of foreign currency assets (in an amount corresponding to the monetary base expected at end-2003) and partly of forint assets.

Our final assumptions relate to the expected yields of the aforementioned central bank assets in the period after 2006. Foreign currency assets are expected to be denominated 100% in euro, in accordance with the currency basket. Based on the implied euro forward curve in February 2002, short-term euro yields at end-2006 are assumed to be 5%.⁸⁵ As stressed in the cost-benefit analysis, with Hungary remaining outside the monetary union, the risk premium component of forint yields, compensating for the remaining exchange rate uncertainty will still be around. Chapter IV.4.1 estimates the size of this premium in the range of 150 to 300 basis points. Thus, if Hungary does not adopt the euro, prospective short forint yields may be in the range of 6.5 to 8%.

If Hungary remains outside monetary union, real GDP growth is estimated at 3.1%, according to the baseline scenario of the exogenous growth model discussed in Chapter IV.4.3. As far as inflation is concerned, a successful continuation of the disinflation programme was assumed, bringing down and maintaining price inflation at a 3% level even over the longer term.

⁸⁵ Here, we implicitly assumed a short duration (of roughly one year) for foreign currency assets backing the monetary base.

The assumption for the future path of the nominal exchange rate contains no trend-like depreciation or appreciation. In other words, the expected value of forex gains/losses is assumed to be zero.⁸⁶

If Hungary does not join the euro, the seigniorage revenues will remain low although rising over time as the expanding monetary base will increasingly have high-yielding forint assets and a shrinking share of foreign currency assets as a counterpart. Based on the above assumptions, the seigniorage revenue in the period from 2006 to 2010 will account for 0.41-0.44% of Hungarian GDP.

Size of loss arising from lower seigniorage

A comparison of seigniorage revenues in the case of Hungary joining and remaining outside monetary union shows that **the expected value of seigniorage loss caused by monetary union entry will amount to 0.17-0.23% of GDP**. It should be noted that this estimate has been based on rather conservative assumptions. The loss related to Hungary's entry would be smaller if the cash ratio were to decline towards the lower levels observed in more developed countries, as opposed to our assumption of staying constantly at the currently high level. The loss would be also smaller if the central bank could maintain stable and low inflation only via the appreciation of the nominal exchange rate in the case of non-entry, because then monetary income would be reduced by the forex loss sustained on central bank foreign currency assets. Moreover, medium- and long-term losses could be lower, if the euro's role as a global currency increased in third countries, as the redistributed monetary income would be higher under the entry scenario.

⁸⁶ Such an assumption is obviously not compatible with the assumption of stable inflation, inasmuch as a Balassa-Samuelson type real appreciation is expected for the future (see Chapter II.4). If, in accordance with its objective, the central bank manages to maintain a stable low rate of inflation (near the euro-area rate), the expected nominal appreciation will have a negative impact on central bank profits, due to the translation loss sustained on foreign currency assets. As this means a downward revision to the Bank's estimate of the seigniorage revenue, it can be viewed as a conservative assumption.

⁸⁷ Fischer *et al.* (2002) say that a 2010 entry would imply a positive outcome for Hungary in respect of seigniorage. The authors base their estimates on a cash ratio that would decrease linearly to 5.9% over the period to 2020, but a rate of real economic growth of merely 3%.

Table III-14**Parameter assumptions and calculation results**

	Outside EMU	Inside EMU (redistributed)
Cash/GDP	7.6%	–
Interest rate differential relative to EMU	150–300 bp	–
Real GDP growth	3.1%	–
Inflation	3%	–
Seigniorage revenue as a percentage of GDP	0.41–0.44%	0.21–0.24%
Seigniorage loss, 2006-2010		0.17–0.23%

IV. BENEFITS OF JOINING THE EURO AREA

In assessing the potential benefits of participating in a currency union, the academic literature on optimum currency areas primarily considers the reduction in transaction costs and its impact on foreign trade. If two countries (in this case Hungary and EMU) are in asymmetrical positions with regard to their size, credit rating, inflation record and monetary policy credibility, other factors must also be taken into account, in addition to focusing on the likely benefits of a reduction in exchange rate uncertainty. In particular, with the abandonment of the independent currency, a country's exposure to *financial contagion* will decrease.

In this cost-benefit analysis, we attempt to measure the three most important benefits of monetary union membership. Using the methodology applied in the case of countries that joined monetary union earlier, we estimate the reduction in transaction costs after abandonment of the independent national currency. We further attempt to provide an estimate of the expansionary impact of a currency union on foreign trade by adapting to Hungary the results of empirical tests published in academic literature. From among the likely benefits of a reduction in exposure to financial contagion and an improved credit rating, we try to measure the impact on GDP growth of a reduction in real interest rates and a rise in sustainable current account deficits. However, we would like to note that a more favourable credit rating (reflecting a reduced exposure to contagion), *ceteris paribus*, helps to reduce the amplitude of business cycle fluctuations, which, in turn, lessens the costs of relinquishing independent monetary policy, as discussed in Chapter III. We finally use two different approaches to measure the direct effect on growth. First, we present the results of a simulation derived from the NIGEM model employed regularly by Bank staff for economic policy analysis. Second, we also carry out simulations in a calibrated growth model, with the aim of quantifying the effects of a reduction in interest rates and a less tight current account constraint.

IV.1. Gains from reduced transaction costs

Transaction costs arising from maintaining the country's own currency which

Hungarian firms and households would no longer incur after joining the euro area may be categorised into two groups. One group consists of conversion costs which banks and other financial intermediaries charge to customers as fees for converting euros into forints (and forints into euros) and as differences between bid and ask prices. The other group is comprised of '*in-house costs*' which firms engaging in foreign exchange transactions must bear due to extra administration and risk management linked with such transactions. We assume that the resources saved by the disappearance of these activities may be re-channelled to support productive activities in other sectors of the economy. Consequently, the reduction in transaction costs entails a comparable rise in GDP.

Conversion costs

Conversion costs are an expenditure for firms and households but, on the other hand, they represent an income for banks. The disappearance of conversion costs, however, does not mean a simple transfer of income from the banking sector to firms and households. The reason for this is that, with the reduction in currency conversion, certain productive resources which have so far been tied up by an essentially administrative 'regulation' (i.e. the use of a country's own currency) will be released. This reallocation of resources towards other sectors results in a permanently higher level of GDP.

Estimating the impact on GDP of a reduction in conversion costs requires at least two assumptions. Assuming there is perfect competition in the banking sector or, at least, in the currency conversion business, income from conversion fees charged on non-bank customers and from bid-ask spreads should more or less be identical with the marginal cost of resources tied up in this business activity. Another assumption is that, after abandoning the independent currency, these resources could be used in other activities within the banking sector or in other industries to produce value added commensurate with their costs. If both conditions are met, then banks' income from foreign currency trading with their non-bank customers produces a good estimate of additional GDP growth induced by the disappearance of conversion costs. Two fundamental data sets are required for estimating this income – (i) turnover in the foreign exchange market involved and (ii) the average size of fees charged for transactions.

It is important to note that domestic banks' income from foreign exchange trading *with each other* have not been taken into account when producing the estimate. The reason for this is that domestic interbank foreign exchange trading is a zero-sum business, i.e. the consolidated income of the domestic banking sector from this business is zero. Consequently, this activity is practically financed from fees charged on non-bank customers. This, however, is legitimate, as transactions initiated by non-bank customers (for example, a bank hedges a forward transaction concluded with a non-bank customer in the interbank market) account for a considerable portion of interbank foreign exchange trading. In order to avoid double-counting, therefore, forex turnover between domestic banks has not been considered in reaching the estimate.

Foreign exchange market turnover

Comprehensive surveys were conducted on the turnover of the Hungarian foreign exchange market in 1998 and 2001, in the framework of the triennial international evaluation spearheaded by the Bank for International Settlements. As part of the survey, domestic commercial banks submitted detailed daily reports throughout an entire month (April) on the volume of foreign exchange market transactions, in a breakdown by currency, customer and types of transaction (spot, forward, swap, etc.). After processing and adjusting for double-counting, the BIS published the reported turnover data in internationally standardised statistical tables on an aggregate basis.⁸⁸

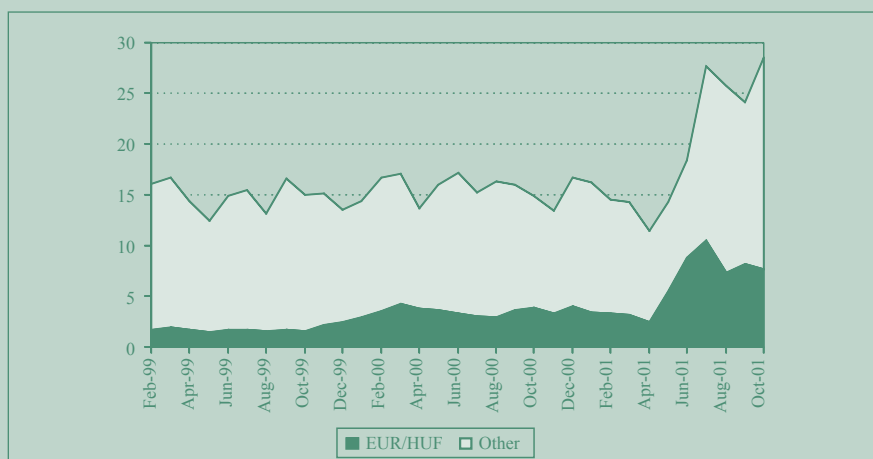
The survey helps to obtain a picture of the size of the Hungarian foreign exchange market. Daily average turnover in the domestic market (USD 587 million) accounted for some 0.5 thousandths of the global foreign exchange market in April 2001 (USD 1,173 billion daily, excluding OTC deals). Transactions with non-bank customers made up around 13% of global foreign exchange turnover in April 2001. The Hungarian forex market had a comparable ratio of 18%, of which transactions in the HUF/EUR currency pair accounted for some 6%.

April 2001, the period to which the survey organised by BIS referred, was the last

⁸⁸ For the results of the April 2001 Survey, see <http://www.bis.org/press/p011009.pdf>.

month prior to widening the intervention band of the Hungarian forint. Shortly after band widening, and as a result both of increased exchange rate volatility and the accomplishment of foreign exchange liberalisation, turnover in the domestic foreign exchange market rose significantly. This appears to be reflected in turnover data derived from banks' daily reports to the NBH.⁸⁹ Based on the experience of six months following band widening, monthly average turnover doubled relative to April. More or less simultaneously with this, trading volumes in the HUF/EUR currency pair increased, accompanied by an upsurge in swap transaction volume. There was also a pronounced rise in transactions between the domestic banking sector and foreign banks.

Chart IV-1 Monthly foreign exchange market turnover, USD billion



Source: NBH.

Average data for the period May–October 2001, which reflect turnover volumes and composition following band widening, have served as a basis for our calculations. These suggest that the Hungarian foreign exchange market will

⁸⁹ Reports by commercial banks on their daily foreign exchange turnover are somewhat different in terms of detail and the range of reporting institutions from those used for the purposes of the BIS survey. But these time series illustrate well the fall in turnover in the domestic foreign exchange market between 1998 and 2000, as noted in the BIS surveys. It is also observable that this decline, in line with global trends, affected mainly interbank trading and that turnover with non-bank customers remained much more stable.

likely produce a yearly average turnover of approximately USD 280 billion in the years ahead, provided the current trends continue. Within this, the domestic banking sector is expected to conduct business with non-bank firms amounting to an annualised amount of USD 24 billion in the euro/forint segment and to nearly USD 51 billion with foreign banks. These are the segments of the foreign exchange market which are relevant to estimating conversion costs.

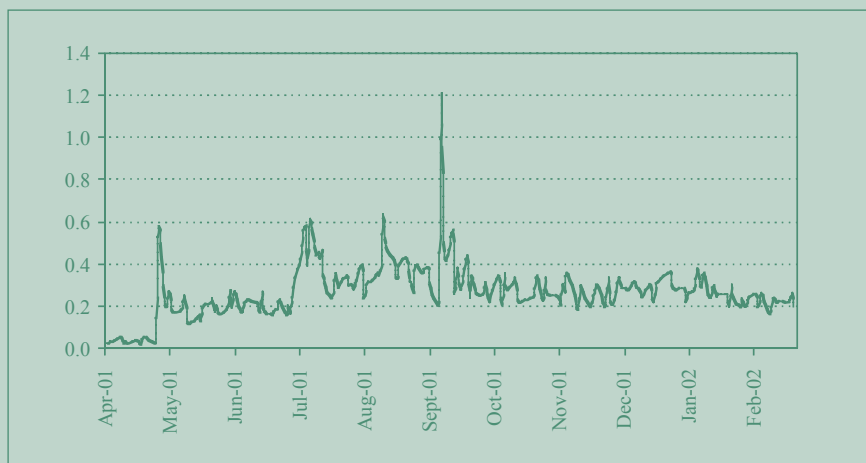
Fees charged

In addition to turnover data, fees charged by banks are also needed to enable us to estimate the likely amount of conversion costs. These may vary depending on the type of transaction (spot, forward or swap), the amounts involved and the importance of the customer. In respect of fees charged, we rely mostly on expert estimates. Fees charged by banks in the EUR/HUF segment of the interbank spot market about which the NBH has accurate information represent the only exception,

Chart IV-2

Average bid-ask spread at fixing (forints)

1 April 2001– 22 February 2002



Source: NBH.

as bid-ask spreads can be measured during the daily fixings. For a commercial bank, the implicit cost of obtaining foreign exchange is half of this spread.

Following band widening, the interbank bid-ask spread at the daily fixing increased by an order of magnitude, to 15 basis points (about 0.3 forints) on average (see Chart IV-2). However, this is not surprising, as foreign exchange trading carries a much higher risk for banks, given the significantly more unpredictable movements in the exchange rate within the wider band than in the narrow band.

The interbank spot market is the cheapest segment of the foreign exchange market. Banks charge much higher conversion fees to non-bank customers (i.e. firms and households). We used domestic commercial banks' euro/forint quotes for the general public as a basis in dealing with the issue. Quotes of buying and selling rates have revealed an approximate gap of 50 basis points. This is broadly comparable with the buy/sell spreads experienced within the EU at the time of a survey of conversion costs conducted in 1992.⁹⁰ This survey also showed that forward contracts were much more expensive than spot transactions – the fees charged were 50% to 100% higher. Due to a lack of other meaningful information, we will use this ratio (i.e. forward fees being 1.5 times higher than spot fees) in estimating the costs of both forward and swap transactions in the Hungarian foreign exchange market.

As accurate data on fees charged were not available, we attempted to provide a conservative range estimate for the conversion costs. We calculated the lower boundary of this range by halving the fees estimated on the basis of the principles outlined above. Multiplying turnover of the relevant market segments (domestic bank/foreign bank and domestic bank/non-financial company) and types of transaction (spot, forward and swap) by the estimated size of relevant fees, we obtained a total conversion cost of HUF 16–32 billion annually, which is 0.11%–0.22% of projected GDP in 2001. According to our assumptions, this would be the size of the permanent gain in the level of Hungarian GDP, if the physical and human resources tied up in the banking sector due to the maintenance of the country's own currency were released following the introduction of the euro.

Relating this result to data in the aggregate income statement of the Hungarian banking sector provides an opportunity to check our estimate of conversion costs. The aggregate income statement records income from foreign exchange trading under 'payment and transaction fees', along with a number of other revenues. This item amounted to HUF 104 billion in 2001 according to the banking sector's aggregate

⁹⁰ See, Emerson et al (1992), Annex A.

income statement. It does not seem to be unreasonable to assume that the size of fee resulting from foreign exchange transactions may have been 15%–30% of this amount. Our estimate is comparable with the results of an examination carried out in 1992, which attempted to measure conversion costs arising in the EU. This revealed that conversion costs accounted for 0.17%–0.27% of European Union GDP prior to the introduction of the euro. The survey also shed light on the fact that EU-level conversion costs were very unevenly distributed among the member states. In small, open economies with less developed banking systems relative to the EU average, conversion costs may have been 8 times higher than in the largest members, whose currencies functioned as generally accepted means of payment in international payments. Consequently, through the reduction in conversion costs these small, open economies, sharing many similar features with present-day Hungary, gained the most from the introduction of the euro.

‘In-house’ costs

Companies participating in foreign trade suffer costs when transacting in foreign currencies with banks due to the maintenance of the national currency. However, financial burdens linked with foreign currency transactions also arise within the firm. These ‘in-house’ costs may be divided into two groups.

Direct ‘in-house’ costs comprise the costs of human and physical resources tied up in the administration of foreign currency transactions and (interest rate) losses incurred due to the significantly longer time required for executing foreign currency transfers than forint transfers. In addition, this group includes opportunity costs which may arise as the consequence of a corporate strategy followed in order to protect against exchange rate risk. The reason for this is that building natural hedging positions (for example, a firm with foreign currency receivables attempts to switch a part of its costs into foreign currency based costs) entails implicit costs, as this forces them occasionally to miss certain business opportunities (for example, they may be forced to purchase their input at less favourable conditions or to employ narrower margins, etc.).

‘In-house’ costs may include *indirect* elements as well. In case of introducing a common currency, performance analysis and evaluation within a company of its

subsidiaries' operating in various countries, establishing optimum transfer costs, etc. may become much simpler. As a consequence of increased transparency, corporate management will gain in efficiency, with the result that investment decisions and the business strategy will be more solidly based. These considerations appear to reinforce the idea that, in the case of a changeover to the euro, the reduction in indirect 'in-house' costs would mostly benefit multinationals.

'In-house' costs are even more difficult to measure than the conversion costs of transactions conducted via the banking sector. As statistical data are not available, corporate-level surveys and case studies are generally referred to. At the invitation of the European Commission, *Ernst and Young* prepared case studies in 1990, surveying internationally active German, French, British and Spanish firms. Relying on these and other expert estimates, *Emerson et al* (1992) estimated indirect 'in-house' costs to be 0.07%–0.08% of EU GDP.

Other data being unavailable for the purposes of our analysis, we have adapted these ratios to Hungary. It should be added, however, that Hungarian goods exports directed to the euro area are currently much higher as a proportion of domestic GDP than the 20% accounted for by EU exports in the early 1990s, taken for the purpose of the estimate noted above. Owing to this, the values adapted to Hungary should be considered as a conservative, lower estimate. Contributing to this, the above estimate merely referred to direct 'in-house' costs and it did not include indirect costs, as there was no available reference in respect of their size.

Summing up the gains derived from a reduction in transaction costs

Summarising our estimates derived from domestic data and international experience, if Hungary introduced the euro, the reduction in transaction costs would increase the level of domestic GDP permanently by 0.11%–0.22%, and the fall in firms' 'in-house' costs by another 0.07%–0.08%. **Accordingly, transaction costs that could be saved annually by adopting the euro are estimated to be 0.18%–0.30% of GDP.** Similar estimates for euro area member states showed gains from the reduction in transaction costs reaching 0.3%–0.9% of euro area GDP.⁹¹

⁹⁰ Gros and Thygesen (1998); Emerson et al (1992).

IV.2. Gains from foreign trade expansion

The contribution of the common currency to growth through foreign trade expansion has two components – (i) foreign trade picks up as an effect of joining the common currency; and (ii) the long-term growth rate of GDP rises as an effect of rising foreign trade. Neither of the two relationships has been unambiguously underpinned by theory, and we must rely mostly on empirical work in evaluating them. In the following, we take an overview of the most frequently cited theoretical findings and then proceed to present the empirical evidence. Finally, by drawing the relevant conclusions, we attempt to quantify the growth gains which would arise from the likely foreign trade expansion associated with Hungary's membership in the euro area.

Theoretical considerations

Among the reasons behind the trade-creating impact of a common currency, the disappearance of exchange rate volatility and other transaction costs, both impediments to trade, are the most obvious and most frequently cited. But variations in the exchange rate do not necessarily imply similar variations in relative prices. On the contrary, in some cases appreciation or depreciation of the nominal exchange rate may smooth out abrupt changes in the terms of trade. Moreover, financial markets of developed countries offer efficient (cheap) hedging opportunities to protect against fluctuations in the nominal exchange rate. Due to its effects transmitted through various channels which may even be opposing, it is not surprising that exchange rate volatility has not proved to be a significant explanatory variable of foreign trade in most empirical investigations dealing with developed countries. For this reason, some authors have sought alternative explanations. Maurel (2001), for example, emphasised the role of economic policy coordination accompanying currency union. A coordinated fiscal policy brings business cycles of currency union members closer to each other. If a given country's business cycle is aligned with the cycle of its trading partner, then exports and imports change more or less at the same rate, thereby reducing the likelihood of a country running into a current account constraint. In this case, imports are mostly financed by

exports; and the financial system's role is limited to financing the remaining slight deficit. If, on the contrary, business cycles are grossly misaligned, the financial systems will be unwilling to finance deficits accumulating over long periods, which, in turn, may retard growth in foreign trade. According to this explanation, a currency union is qualitatively different from pegging the exchange rate. In a currency union, the primary source of the trade-creating effect is not the disappearance of exchange rate uncertainty.

The boost provided by foreign trade expansion to growth, i.e. the second component of the effect of a common currency, is primarily explained by factors playing a role in endogenous growth theories, such as technology transfer, adaptation of know-how and intensifying competition. However, theory cannot be considered as unambiguous in assessing the effects of these factors.

The 1980s and 1990s saw the birth of new paradigms in the theories of both growth and foreign trade. Endogenous growth theory appeared and proliferated. Its new features were that it handled technological change within the models and emphasised the role of human capital and research and development. Classical trade theory, giving centre stage to factor endowment and specialisation, was replaced by 'new trade theory', which focused more on horizontal, i.e. intra-industry, trade.

Grossman and Helpman (1991a) combined endogenous growth theory with traditional trade theory, which focuses on factor endowment. According to their results, foreign trade expansion influences a small country's growth through two channels. In their model, the allocation of resources between the two sectors of the economy, i.e. the consumer goods and the research and development sectors, has a profound impact on growth. First, through the expansion of trade, the adaptation of 'knowledge' accumulated abroad (technology, know-how, management, organisational skills, etc.) may increase. This raises the productivity of the research and development sector, through which innovation expands and the growth rate rises. Second, an indirect impact may also play a role – higher imports of human capital intensive consumer goods reduce the relative prices of these in the domestic market. As a result, a part of the human capital employed in the consumer goods producing sector flows into the research and development sector, which, in turn, also raises the rate of domestic economic growth.

Combining endogenous growth theory and 'new trade theory', however, has failed

to show a clearly positive relationship between trade and growth. In these models, part of foreign trade involves horizontal (i.e. intra-industry), differentiated intermediary goods. In their model assuming horizontal trade/innovation, Rivera-Batiz and Romer (1991) demonstrated that the relationship between the extent of barriers to trade (appearing as customs duties in the model) and growth is not monotonous – with the raising of trade barriers, the growth rate falls for a while, before it resumes rising. From their results it follows that the impact on economic growth of the decline in trade barriers (for example, in a currency union) may be either positive or negative, depending on the level of barriers in the period prior to currency union. In addition, even if ‘new trade theory’ is applied, factor endowment may retain some role. For example, in the model by Grossman and Helpman (1991b), providing there is free trade, in a country originally richer in human capital the share of innovative products in output and in exports and, consequently, GDP growth will be higher than in its trading partners originally poorer in human capital.

Empirical results

Due to a lack of theoretical consensus, the emphasis has been placed primarily on empirical research into the issue of currency union, foreign trade and growth. Several empirical studies have attempted to measure the impact of currency unions on foreign trade expansion and the effect of foreign trade on growth. These attempts have followed basically two methodological strategies.

The first strategy was to study the relationship between exchange rate volatility and the volume of foreign trade using time series-based econometric methods. Analysing trade and the exchange rate volatility of developed countries, Gagnon (1993) did not find a significant negative effect between the two variables. Sekkat (1998) provides a comprehensive survey of the empirical work aimed at examining the issue. Based on the survey, he draws the conclusion that there is no clear evidence of a negative relationship between exchange rate volatility and the volume of foreign trade. Analysing five countries that later became members of EMU in his own model which uses the co-integration technique, he reaches the same conclusion. Calvo and Reinhart (2000) also find that the academic literature is generally inconclusive in respect of this issue. However, they note that the empirical tests that have

focused on emerging countries generally have shown a statistically significant and strong negative relationship between exchange rate volatility and foreign trade turnover. Their results contrast with those involving developed countries, which the authors attribute to the relative underdevelopment of emerging-country foreign currency derivatives markets and the absence of financial instruments serving to hedge exchange rate risk.

The second strategy, which has proved to be more fruitful, was the use of the so-called 'gravity' trade models. The classical form of this was complemented with a dummy variable representing the effect of a currency union. The 'gravity' models are panel estimates, in which the cross-section dimension (often a sample of 50–100 countries) is given a much greater role than the time series dimension.

The first and most widely disputed empirical paper in this field was Rose (2000). This gave an estimate of the expansionary effect of currency unions on trade which sparked intense debate; then Frankel and Rose (2000) practically complemented this estimate with the analysis of the effect on growth. The sample included foreign trade data for more than 180 countries for the period 1970–1990. In the standard 'gravity' models, the most important explanatory variables that determine the volume of foreign trade between two countries are the two countries' total and per-capita GDP and the distance between the countries. Beyond these standard 'gravity' variables, Rose (2000) controlled with dummy variables for the effects of common language, shared borders, free-trade agreements or common colonial history. The novelty was the introduction of a currency union dummy variable, which had a value of 1 if the two countries used a common currency and 0 if they did not. The estimated model performed very well in statistical terms – the estimated parameters for the standard variables were significant and they had the expected sign. The biggest surprise was caused by the size of the parameter of the currency union dummy – in addition to being statistically very significant, it showed that the use of a common currency in two countries roughly tripled the volume of bilateral trade over the long term. This measure was a shock to many observers, despite the fact that some earlier studies reported similar magnitudes. For example, McCallum (1995) showed that trade among Canadian provinces was around 22 times higher than with US states located at the same distance and having similar size. The most probable explanation for this is the use of a common currency within Canadian

provinces. In the light of this, Rose's notorious multiplier of 3 seemed rather small than large.

Despite all this, several authors have criticised Rose's estimate of the currency union effect. Quah (2000) stressed that, first, observations of currency unions accounted for a very small portion (less than 1%) of the entire sample and, second, they involved mostly small and poor countries with colonial past. The results of estimates relying on such a sample are not sufficient to draw a conclusion for countries with other qualities which recently implemented the currency union (for example, members of EMU) or those considering the idea of joining (for example, the CEECs, Sweden, the U.K. or Argentina).

Persson (2000) pointed out that, first, the factors affecting trading costs in countries which are in a currency union may be significantly different from those in countries that do not use the common currency. In this situation, the full-sample estimate may distort the estimated parameters. Second, the log-linear specification is inadequate. Persson's own estimates, which corrected for these disadvantages, showed a much smaller, but still relatively high (40%), increase in trade compared with Rose's 200%, though his results were statistically insignificant.

In response to the criticism, Rose (2001) stressed the robustness of the estimate of the currency union in more than 50 specifications. However, in his original paper he admitted that the results obtained could not be adapted to the euro area directly. To this end, Rose and van Wincoop (2001) came up with a separate study. Complementing the earlier models, Rose and van Wincoop took into account the role of multilateral trade barriers as well in estimating the effect of currency unions on bilateral trade. Trade barriers are factors that tend to affect the volume of trade between a pair of countries negatively. For example, customs, exchange rate volatility and the cost of transport (distance) between two countries are barriers to trade. Theoretically, these may be expressed using a common unit of measure known as the customs equivalent: thus barriers to trade may be aggregated by individual trading partner (bilateral trade barrier) or by all trading partners (multilateral trade barrier). The theory behind gravity-based models [see, for example, Anderson and van Wincoop (2001)] clearly shows that trade between a pair of countries is determined by the ratio of

the bilateral trade barrier to the average multilateral trade barrier.⁹² If a country forms a currency union with another country (or group of countries) with whom it previously conducted a significant share of its foreign trade, then the average multilateral trade barrier decreases considerably, as well as the bilateral trade barriers. As a result, the relative reduction in the bilateral trade barrier will not be significant and, consequently, bilateral trade will not rise as strongly as it could in a currency union with a country with which it originally traded relatively little. This explains why the calculations by Rose and van Wincoop delivered a much lower figure for the effect of a currency union in the case of the EMU-11 than Rose's original 200% trade expansion figure. The new estimates showed a 58% expansion of trade within the EMU-11, corresponding to a 10% long-term rise in welfare (measured as household consumption) as a result of introducing the common currency.

Partly in response to the criticism noted above, Glick and Rose (2001) examined the issue from another perspective. After the earlier, mostly cross-section based investigations, they placed their emphasis on the time series dimension. They achieved this using a longer sample period (1948–1997) and estimating the fixed effect using a ‘within’ estimator in the panel. This method answers the question of ‘what is the trade effect of a country’s joining (leaving) a currency union’. In this respect, this approach slightly differs from the cross-section estimate by Rose (2000), which put the question of ‘by how much trade of currency union members is higher than that of non-member countries’. The magnitude of the results was broadly the same as in the original study by Rose (2000) – joining (or leaving) the currency union doubles (halves) trade between members.

The methodological approach of the empirical study by Flandreau and Maurel (2001) follows Rose's approach in using the ‘gravity’ model, but the sample taken for the analysis is significantly different – the authors examine the trade-creating effect of European currency unions in the 19th century. Their results are surprisingly similar to those estimated by Rose (2000) on ‘modern-day’ samples – currency union nearly triples bilateral trade.

⁹² The role of the relative size of bilateral and multilateral trade barriers becomes clearly evident from the theoretical deduction of ‘gravity’ models. Despite this fact, the ‘gravity’ models estimated in practice often ignore this factor, and they exclusively attempt to measure the trade-creating effect of the absolute reduction in the bilateral barrier.

From the observations discussed above it follows that it is difficult to derive a clear conclusion from the literature on the effect of currency union membership on trade. Rose (2002) attempts to summarise the results of empirical papers examining the issue quantitatively. For this purpose, he uses the meta-analysis approach in which he analyses the estimates of 18 papers on the subject written by various authors and employing different statistical methods (a total of 365 point estimates in the various specifications). The conclusion of his meta-analysis is that the effect is statistically significant and robust – according to the ‘aggregate’ evidence of the relevant papers, currency union roughly doubles the volume of bilateral trade. The period since the launch of the common European currency in 1999 is too short to confront the results with actual data. Nevertheless, it is perhaps worth mentioning that during the first two years of the euro trade in goods among euro area members did not grow faster than euro area trade with countries outside EMU. However, it is too early to reach far-reaching conclusions from this development, due to the short period of time elapsed and potential cyclical influences.

Trade expansion and growth gains for Hungary in the eurozone

In the following, we attempt to outline the results of the literature, which may help to measure the potential foreign trade expansion and the resulting growth effects for Hungary stemming from the country's future euro area participation.

Few studies with a special focus on Hungary have been written on the subject. Jakab, Kovács and Oszlay (2000) estimated the volume of equilibrium foreign trade of three CEECs using the standard gravity model. They found that Hungary's foreign trade had already reached the potential level implied by the model by 1997. This would suggest that relatively little room remained for further expansion of foreign trade. But because the estimated gravity model did not consider the effect of a potential currency union, this finding does not rule out a considerable rise in the potential level of foreign trade through joining the common currency, i.e. with the disappearance of a significant barrier to trade.

Frankel and Rose (2000) published explicit estimates for several countries, including Hungary, about the total gains in foreign trade and growth that can be expected if the country introduced the euro (or the dollar). As was mentioned earlier, this

model delivers a multiplier of 3 for the long-term (20-year) effect of the currency union on bilateral trade. They estimated another equation as well, in which they measured the effect of the ratio of foreign trade to GDP (i.e. openness) on output. According to the results, every 1 percentage point increase in openness produces a 1/3 percentage point gain in per-capita GDP on a 20-year horizon. Thus, the expected impact of the currency union experienced by the various countries will be different, depending on the importance of the euro area (or dollar zone) in the given country's foreign trade turnover. The greater the importance, the larger the impact of the introduction of the euro on total trade expansion and growth. As the euro area is of utmost importance for Hungarian foreign trade, the results are high relative to those of the majority of countries covered by the sample – joining the euro area would result in a 107% increase in openness and a 35% increase in per-capita GDP on the 20-year horizon.⁹³ Based on this, the estimated annual growth gain from joining the euro is 1.5 percentage points.⁹⁴ The estimated growth effect seems implausibly high. This, however, is not surprising, as the estimate did not take into account the effect of multilateral trade barriers noted earlier.

Although the model by Rose and van Wincoop (2001), which takes into account multilateral influences, only provides an estimate for the EMU-11 countries, it can easily be adapted to Hungary as well.⁹⁵ According to our calculations, within an EMU enlarged with Hungary, bilateral trade (i.e. trade between Hungary and the earlier EMU member countries) would expand by 75% over the long term. As an effect of this, the average welfare of EMU enlarged with Hungary would see a 6.5% increase over the long term.⁹⁶ However, the average welfare gain would not be evenly distributed among the member countries – as Hungary's accession obviously would raise its own foreign trade by far the most, the welfare gain for Hungary, at 16.7% over the long term, would also be the highest. Defining 'long

⁹² Frankel and Rose made calculations using openness indicators and foreign trade patterns for 1995. In the period since then, Hungary's openness has increased steadily (from 76% in 1995 to 130% in 2001), and the role of the euro area in foreign trade has grown as well (1995: 71%, 2001: 75%).

⁹³ With the currency union, the majority of EMU members in the sample have had smaller estimated GDP growth than this. The effect on Hungary is comparable to the estimated growth surpluses registered by Portugal, Ireland and the Netherlands.

⁹⁴ For a description of the adaptation of the model, see Appendix F.3.

⁹⁶ The standard error of the estimate is 1.7 percentage points.

term' as 20 years, and assuming that GDP rises at the same rate as household consumption (welfare), all this equals to an annual growth surplus of 0.76%.⁹⁷

Although the theoretical framework of the model by Rose and van Wincoop appears to be the most consistent from among those available, producing the most plausible results as well, we have treated this value as the upper estimate of the expected growth surplus. One reason for this approach is that a consensus has not yet been reached in the academic literature on Rose's parameter used in the model, the second being that Hungarian foreign trade has by now risen above the values forecast by the standard gravity models. We have calculated the lower estimate of the expected growth gains from trade expansion by substituting the higher parameter value originally used in the Rose-van Wincoop model with the 'result' of Rose's meta-analysis (currency union, *ceteris paribus*, doubles bilateral trade) which is actually a synthesis of results available in the academic literature.

According to the results obtained this way, joining the euro contributes 0.55–0.76 percentage points to Hungary's annual growth rate via the foreign trade channel.

It should be added that the model used only provides information about the expected long-term expansion of trade, and hence we have no picture of the dynamics of the estimated gains over time.

Finally, let us return to the paper by Flandreau and Maurel (2001) which contains an interesting section on economic history, relevant for Hungary, in addition to the empirical estimates. In this paper, the authors group monetary systems in operation during 19th century Europe. Accordingly, in 19th century Europe, beside floating exchange rate systems and the gold standard, there existed three currency unions, namely the Latin Currency Union, the Scandinavian Currency Union and the currency regime of the Austro-Hungarian Monarchy. Of these, only the monetary system of the Austro-Hungarian Monarchy constituted a genuine currency union, with a coordinated monetary and fiscal policy between the member states. The Latin and Scandinavian Unions, contrary to their name, were not very much different from the gold standard throughout the years of their existence. Although it happened long ago, in our view it is not negligible that Hungary was already a

⁹⁷ We have also made calculations using the assumption of entry into EMU by Hungary together with the Czech Republic and Poland. In this case, the Hungarian growth surplus is higher, at 0.82 percentage points.

member of a genuine, well-functioning currency union at one point in its history. Moreover, it participated in a currency union which may be regarded as the predecessor of EMU in many respects. Although it cannot be determined how far this can be owed to the participation in the currency union, it is an undisputed truth that the period in question was one of the most dynamic stages in Hungary's economic development. It also deserves special attention that the significant structural asymmetry which existed between industrialised Austria and mainly agricultural Hungary did not impede the successful functioning of the Austro-Hungarian currency union.

IV.3. Benefits of a reduction in exposure to financial contagion

According to the traditional theory of currency areas, the exchange rate moves to the extent and in the direction justified by economic fundamentals, thereby assisting the economy in adjusting to various asymmetric shocks. According to empirical evidence, however, the role of the exchange rate in neutralising shocks is actually weaker. This is especially true for small, open and less developed countries. In these countries, foreign investors' willingness to take risk depends strongly on the general risk perception of financial assets. This, in turn, leads to fluctuations in capital inflows and, consequently, to exchange rate volatility, often independent of domestic economic fundamentals. Moreover, the foreign currency markets of many small countries are not deep and liquid enough, which may also cause excessive exchange rate volatility. *The exchange rate, therefore, may also become a source of destabilising shocks, instead of counteracting the effects of real shocks, thereby forcing economic agents to make unnecessary adjustments.*

Although speculative attacks are a source of danger mainly for countries with fixed exchange rate regimes, financial contagion may cause significant fluctuations in the exchange rate and capital flows even within the framework of a more flexible exchange rate regime. The forex market developments in the Czech Republic and Poland in the past few years provide several examples for currency depreciation attributable to reeling investor confidence – since 1998 the CEECs have experienced 6 crises originating in emerging-country financial contagion. These events have resulted in the Czech and Polish national currencies losing 5%–10% of their values, and

their effects on the foreign exchange markets have lasted for more than one month. During the short period since May 2001 when the intervention band was widened, on three occasions the Hungarian forint has fallen victim to the collapse of investor confidence towards higher-risk assets. Unfavourable macroeconomic news from Argentina, Turkey and Poland in mid-July and early August, then uncertainty in the wake of the terrorist attack against the US in September, were in the background of capital outflows independent of domestic economic fundamentals. On each of these three occasions, the forint depreciated by more than 4%, followed by a slow recovery taking several weeks. The July–September events are evidence of the fact that, despite the major improvement in Hungary's credit rating in past years, foreign investors entering the Hungarian financial market still react sensitively to unfavourable emerging market events and to shocks from developed capital markets.

Joining the European Union, Hungary will rise from the emerging-country category. Consequently, EU membership will itself reduce the probability of shocks caused by financial contagion and, above all, their severity, without giving up the independent national currency. However, both the theory of financial crises and experience of past years allow us to draw the conclusion that Hungary's exposure to foreign exchange market contagion will only cease with abandonment of the national currency, i.e. with membership in EMU. This view is reinforced by the fact that even some developed countries were unable to escape the financial contagion-induced shocks ensuing from the currency crises of the 1990s. The experiences of Sweden and Denmark during the Russian crisis in the autumn of 1998 are especially relevant for Hungary, as by this time it had been decided that these countries would opt out from EMU. In September 1998, the Swedish and Danish currencies were under pressure from the contagion originating from Russia, and the interest premium jumped significantly higher.⁹⁸ Meanwhile, based on the decision taken in the spring, the Russian crisis did not affect the countries becoming members of EMU the following year. All this is a good illustration of the not negligible likelihood of asymmetrical financial shocks to countries outside the euro area. It cannot be ruled out that for the recently joined, less developed members of EMU that have just passed the emerging-country category, such as Hungary, the rise in interest premium and the downward pressure on the exchange rate would be higher

⁹⁸ As an effect of the crisis, the spread of Danish short-term government paper over German government paper yields soared by about 180 basis points, while the Swedish long-term government paper spread rose by 80 basis points.

than this in the event of a transmission of crisis. The example of Greece, which also opted to stay out in 1999, appears to support this view – the contagion effect of the Russian crisis on Greece was much stronger than on the more developed Denmark and Sweden. In August 1998, the Greek drachma depreciated by more than 5%, and the interest premium rose by over 500 basis points.

Costs of exchange rate volatility

The directly measurable cost of maintaining the independent currency is the exchange rate *risk premium* on forint-denominated assets. The risk premium is the price of unpredictable exchange rate movements, which makes it more expensive for economic agents to borrow, not only during financial crises but on a continuous basis. In the following, we attempt to estimate the size and effect of this spread. For a small, open emerging country, maintaining the independent currency may not only represent costs in the form of risk premium. In emerging countries, the inflow of foreign capital is the key factor of economic growth. For international investors, capital invested in these countries generally offers high returns, but carries high risks as well. Investors, therefore, continuously monitor the possible indicators of a given country's future capacity to generate income. Perhaps the most important variable of these is the expected future exchange rate of the target country's currency.

The general risk perception of a region or even the whole emerging world tends to influence investor sentiment towards a given country. Capital flows affecting a given country, therefore, often change direction drastically, without being justified by the country's economic fundamentals. As a result of such contagion shocks, capital flows may be more volatile in emerging countries relative to developed countries – steady inflows lasting for years may be replaced by sudden outflows, even independent of domestic economic conditions. One of the most important channels of the feed-through of contagion shocks is changes in exchange rate expectations. Therefore, a *higher volatility of capital flows* can be regarded as a further cost linked with the maintenance of own currency in emerging countries. Consequently, maintaining the national currency in a less developed, small, open economy leads to higher volatility of capital flows than in a developed country or

in a country which is a member of a currency union together with its trading partners. *This, in turn, affects business cycles – cyclical fluctuations may be much more pronounced than in more developed countries or in those that give up their own currency.*⁹⁹ The structure and financial development of the economy may aggravate the effects of a major depreciation of the exchange rate.¹⁰⁰ One of the reasons for output losses caused by sharp exchange rate movements is the development of imbalances in economic agents' balance sheets. Imbalances do not only develop because prudential regulations are not observed in these countries. According to the *original sin* theory, emerging countries with good economic prospects and open financial markets represent an attractive target for foreign investors, and so ample amounts of short-term foreign currency funds are available, while their access to funds denominated in their own currency or long-term finance abroad is limited or expensive.¹⁰¹ As a consequence, the corporate sector and the state accumulate foreign currency debt without natural hedging, which causes large financial losses in the event of currency depreciation or devaluation.

A further consequence of volatile exchange rate and capital flows, and the resulting higher cyclical fluctuations is that, in formulating their risk perception of a country, investors attribute a greater importance to developments in net debt and the current account balance than in the case of developed countries. A mounting current account deficit may cause devaluation expectations to develop and long-term foreign funding to dry up, which in extreme cases may necessitate economic policy adjustments (fiscal adjustment, devaluation), aimed at reducing their current account deficit through the radical curtailment of domestic demand. In order to avoid such situations, economic policy attempts to sustain a current account deficit judged by investors as favourable. Restraining external borrowing eventually retards economic growth.

Abandoning the national currency may help to reduce the welfare losses resulting from fluctuations in economic activity, as the disappearance of exchange rate

⁹⁹ Chart III.7 is a good illustration of this in respect of the central-east European accession countries and EMU.

¹⁰⁰ Calvo and Reinhart (2000) analysed the effects of currency crises in 39 countries between 1975–1999. This revealed that post-crisis declines in GDP amounted to 2% on average in emerging countries, in contrast with only 0.2% in developed countries.

¹⁰¹ Eichengreen and Hausmann (1999).

volatility reduces swings in risk perception, and the amplitude of business cycles lessens as capital flows even out (for the effects of this on welfare, see boxed text III.1). Due to exposure to financial contagion, therefore, joining EMU as early as possible is the optimal policy choice. However, abandoning the independent currency means giving up independent monetary policy as well. The question is whether the loss of this economic policy tool, suitable in principle to smooth out business cycles, will not entail fluctuations in economic activity which exceed the smoothing-out effect resulting from the disappearance of exchange rate risk. While we do not endeavour to compare these two influences, we analyse in detail the potential costs of losing monetary independence in Chapter III.

IV.4. Effect of falling real interest rates and more favourable opportunities to borrow abroad on economic growth

Joining the euro area, Hungary will be given a more favourable credit rating and may escape the costs of higher exchange rate volatility. We have attempted to capture the resulting benefits using two variables. First, domestic real interest rates will be lower due to the reduction in exchange rate risk; second, owing to the more favourable credit rating and improved capacity to repay existing debt which becomes independent of exchange rate volatility, the sustainable measure of current account deficit may be higher. Both variables allow the economy to grow at a faster rate. The expected easing of current account deficit constraint is well illustrated by empirical studies which examined capital flows among the regions or provinces of a few large countries. As an effect of a common currency, capital flows among member states will, in principle, become as smooth as are capital flows among regions within countries of large geographical dimensions. The phenomenon that the overwhelming majority of a country's savings are invested in the given country is referred to as the 'Feldstein-Horioka Puzzle' in the academic literature. But, providing perfect international capital flows, there should be no relationship of any sort between the geographical locations of savings and investment – savings should be used where they produce the highest returns (at equal levels of risk). Presumably, the current account deficit plays a role in this phenomenon – its high level indicates increased devaluation risk, which acts as a factor restraining capital inflow.

With the creation of monetary union, the mobility of capital is likely to be higher, as exchange rate risk, being an important risk factor, disappears. As other factors also affect capital flows, it is not easy to isolate the expected effects of a common currency from other (regulatory, cultural, etc.) effects. The academic literature measures the expected effect by examining the interaction between savings and fixed investment, and by assuming that the common currency will create a similar relationship. The most frequently cited work is the study by Bayoumi and Rose (1993) which analysed the interaction between savings and fixed investment in the United Kingdom using various approaches. Other studies analysed the cases of Canada, Japan and the United States.¹⁰² These studies concur in their conclusion that the relationship between savings and fixed investment is much looser and, occasionally, the reverse, among the regions within a country than on a country level. In other words, the current account balance of regions does not represent a serious hurdle to capital flows. From this it follows that the magnitude of capital flows among the participating countries will be significantly higher than earlier as a result of monetary integration. Stating it differently, member countries' current account deficits are much less of an impediment to capital flows within a currency union.

In the next section, we measure the expected size of the fall in real interest rates based on information inherent in the yield curve. We quantify the effect on economic growth on the basis of two different model simulations. The effect of variations in the current account balance has been built in our estimates on an ad hoc basis, changing the parameters of the models.

IV.4.1. Expected fall in real interest rates as a result of joining the euro area

The return for foreign investors on their forint-denominated investments is determined by the nominal depreciation of the forint, in addition to the financial return achievable in their own currencies. As future developments in the exchange rate cannot be forecast perfectly, forint yields may contain a significant

¹⁰² Thomas (1993), Bayoumi (1997), Dekle (1996), Sinn (1992), Iwamoto et al (2000) and Wincoop (2000).

premium of exchange rate risk which foreign investors require due to unforeseen exchange rate movements, i.e. exchange rate uncertainty. The exchange rate risk premium is the positive function of exchange rate volatility, therefore, the measure of this type of risk will cease with accession to the euro area, which, in turn, will result in a reduction in real interest rate levels. Country and liquidity (or size) risk premia are the other components of the risk premium on forint yields. In the case of Hungary, as an emerging economy, the country risk premium may also fall with accession to the EU and later to the euro area, as the exchange rate risk premium and the country risk premium are not independent of each other.¹⁰³

The size of the risk premium on forint yields, i.e. the sum of exchange rate risk premium, plus country and liquidity risk premia, can be measured as the difference between forint interest rates and euro interest rates and the expected nominal depreciation of the forint exchange rate. The sum of country and liquidity risk premia may be approximated with Hungarian foreign currency bond spreads, as these do not contain exchange rate expectations or exchange rate uncertainty components. Given that exchange rate expectations cannot be observed directly, estimating the exchange rate risk premium carries an extremely high degree of uncertainty.

In respect of measuring the exchange rate risk premium, the periods preceding and following band widening in May 2001 must be treated separately. Within the confines of the narrow intervention band, anticipated variations in the exchange rate could be approximated with the pre-announced devaluation rate of the forint over the short term, i.e. over a three-month horizon. Therefore, we have used the interest rate premium, calculated as the difference between three-month forint-euro interest rate differential and the pre-announced devaluation rate, as an approximating indicator of the risk premium content of forint yields.

¹⁰³ The assumption that emerging-country exchange rate risks and the default risk on foreign currency bond spreads are closely interrelated seems plausible. Explanation for this is that, in the event of a currency crisis, the likelihood of a state's default on its liabilities denominated in foreign currency rises. Consequently, in our assumption the rise in exchange rate risk premium is accompanied by a rise in foreign currency bond spreads.

However, the depreciation of the central parity did not perfectly reflect actual exchange rate expectations, as it did not contain anticipations of intra-band exchange rate movements and of a change to the exchange rate regime.¹⁰⁴

Chart IV-3

Three-month interest rate premium



Source: NBH.

Now that the band has been widened, exchange rate movements are even more difficult to forecast. We use two approaches to approximate expectations for the future path of the exchange rate. First, we use the Reuters survey which reflects macroanalysts' forecasts of the nominal forint-euro exchange rate since May 2001. As the questions in the Reuters survey refer to forecasts of the currency's future value at specific dates,¹⁰⁵ we calculate the exchange rate risk

¹⁰⁴ Interpreting the three-month interest rate premium as a risk premium raises problems for other reasons as well: market considerations and mechanisms can only have a limited impact on the near end of yield curves, given that central banks determine the near ends of curves using their policy rates.

¹⁰⁵ For the current and next year's end.

premium for the years 2002 and 2003.¹⁰⁶ Due to the high degree of uncertainty inherent in exchange rate expectations that can be derived from macroanalysts' consensus forecast,¹⁰⁷ we have also calculated the exchange rate risk premium assuming constant exchange rate expectations.

The three-month exchange rate risk premium fluctuated between 150–500 basis points in the period January 1998–May 2001, its average value being 310 basis points. The foreign currency bond spread, which reflects the country risk premium, varied between 53–130 basis points. Following the band widening, risk premia on short-term forint-denominated investments presumably rose considerably, due to the much higher-than-earlier exchange rate uncertainty. This appears to be confirmed by the data as well.¹⁰⁸ According to the Reuters survey, the average measure of exchange rate risk premium for 2002 was 480–750 basis points, and 400–600 basis points calculating with constant exchange rate expectations in the period May–December 2001, the country risk premium fluctuating between 50–65 basis points.

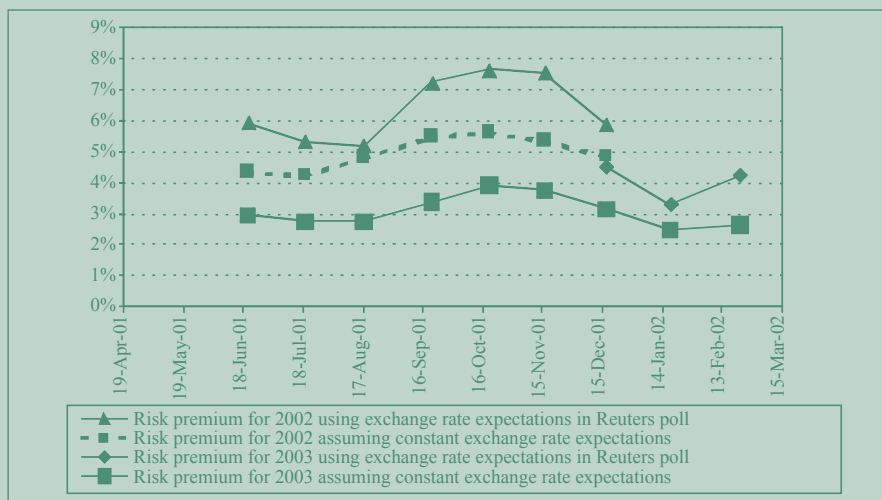
¹⁰⁶ The risk premium may be estimated using the differential between the forint and euro implied forward curves. The difference between a one-year forward differential starting at a given point and an exchange rate change expected for a given period equals to the risk premium expected for the period, provided that forint and euro term premia are equal [see, Svensson (1998)]. $RP(t, t'T) = E_t(i(t', T) - E_t^*(t', T) - E_t(S_T - S_{t'}))$, i.e. the risk premium expected for the period t' and T at time t can be defined as the difference between expected domestic and foreign yields and the exchange rate change expected for period $(t' - T)$. As $f(t, t'T) = E_t(i(t'T) + TP(t, t'T))$, i.e. the forward rate starting in t' with a $T - t'$ maturity, can be written as the sum of the yield expected for the given period and the maturity premium, $f(t, t'T) - f^*(t, t'T) - E_t(S_T - S_{t'}) = [TP(t, t'T) - TP^*(t, t'T)] + RP(t, t'T)$.

¹⁰⁷ Only 10–15 macroeconomists contribute to the Reuters survey, and the range of analysts is not constant. The volatility of forecasts in the sample is high; moreover, the day of responses cannot be defined accurately.

¹⁰⁸ As was noted earlier, the exchange rate risk premia, calculated from the three-month interest rate premium and the forward differential, are not directly comparable.

Chart IV-4

Interest rate differential and exchange rate risk premium



Sources: NBH, Bank calculations.

Chart IV-5

Path of differential between one-year forint and euro implied forward rates



Source: NBH.

However, the above calculation overestimates the benefit of the disappearance of exchange rate uncertainty arising from the abandonment of the national currency. The explanation for this is that the exchange rate risk premium is not independent of inflation uncertainty, and so the exchange rate risk premium will presumably diminish with increased price stability and the strengthening of monetary policy credibility, even without joining the euro area. As was discussed earlier, with accession to the European Union Hungary will leave behind its emerging-country status, which, in turn, is also likely to contribute to a fall in the risk premium. The probable reduction in real interest rates, expected exclusively from relinquishing the independent currency, can be defined by examining the forward differential in a maturity bracket of the yield curve when Hungary will most likely be a member of the EU and inflation will be lower, but the likelihood of monetary union membership will be zero. Assuming Hungary's accession to the EU in 2004, the earliest date of joining monetary union is 2006, and therefore the year 2005 satisfies the criteria noted above the best. The differential between one-year euro and forint implied forward rates starting in 2005 has been around 200 basis points in the period since May 2001. Subtracting from this the 30–40 basis point value of country risk premium expected within the EU, and assuming constant exchange rate expectations for the same period, produces a 160–170 basis point country risk premium expected for 2005.¹⁰⁹

However, we have treated this value strictly as the lower boundary of our estimate. There are several reasons for this approach. First, it cannot be ruled out that following accession to the EU, market participants will expect a shift in the exchange rate band and an appreciation of the forint. This would imply that the risk premia, calculated from the forward yield curves on the basis of assuming constant exchange rates, are biased downwards. Second, it can be assumed that market participants will supposedly anticipate an orderly decline in interest rates rather than a sharp fall in short-dated yields prior to accession to EMU, if the probability of monetary union membership is within reach. Thus, the forward curve shows lower expected interest rates even for the period when the likelihood of entry is still zero. The estimated risk premium, calculated under the assumption that the date

¹⁰⁹ This value is consistent with the estimate of exchange rate risk premium on the Irish pound. See, Fitz Gerald and Honohan (1996).

of accession to EMU suffers a long delay (i.e. under the alternative scenario), also underestimates the actual. Third, the method of estimating the yield curve does not allow for a sudden drop in the slope of the forward yield curve, which may also introduce a downward bias into the estimated risk premium.

An analysis of the experience of current euro-area member countries may provide more guidance to measure the size of interest rate reduction stemming from the disappearance of exchange rate risk, in addition to information that can be derived from the yield curve. Although most EMU members were characterised by well-functioning, credible monetary policies even before the creation of the euro area, real interest rates on the outstanding debt of a number of countries that joined later, for example, Finland, Italy, Spain and Portugal, were 100–150 basis points higher than Deutsche Mark real interest rates, due mainly to exchange rate risk. Following the introduction of the euro, the risk premium component of interest rates fell significantly. Since then, the widest gap to the nominal yield on German government bonds, offering the lowest yield, has been fluctuating around 35–40 basis points at the ten-year maturity.¹¹⁰

The path of interest rate convergence shows wide variations both by country and maturity. The convergence of long-term rates started years before the changeover to the euro in 1999, and its trajectory was determined by expectations of the likelihood of membership. The yield curves of Germany, the Netherlands and Belgium practically coincided in 1997, but interest rate convergence in the peripheral countries only ended in January–May 1998, the period when it was decided which countries would participate in currency union from 1999. Not surprisingly, the convergence of short-term yields showed even more marked differences – for example, Italian and Irish three-month yields were nearly 200 basis points higher than short-term Deutsche Mark rates in mid-1998. The example of Greece is even more striking, where the three-month yield was 300–320 basis points above the equivalent euro yields in August 2000, i.e. four months prior to the adoption of the

¹⁰⁹ Interest rate convergence was implemented below the average level existing prior to the creation of the euro area. A part of academic literature simply explained with ‘economies of scale’ (e.g. Coleman (1999)). For the smaller countries, the costs of maintaining the own currency are relatively higher, due to limited opportunities of diversification. Following introduction of the common currency, the improving opportunities for portfolio allocation are reflected in the reduction in risk premium of the entire system.

euro. In Portugal, the ex post real interest rate fell 4% between mid-1997 and end-1998.¹¹¹ Spanish ex post real rates experienced a 2.5% fall in the same period. Taking into account the experiences of current EMU member countries and that the risk premium estimated from the yields curve is presumably biased downwards, **the size of a reduction in real interest rates due to joining the euro area is estimated at 150–300 basis points.** The following two sub-chapters attempt to provide estimates on the effect of this fall in real interest rates on growth.

IV.4.2. NIGEM model simulation

The Hungarian block of the NIGEM world model is a frequently used tool by Bank staff to carry out economic policy simulations.¹¹² NIGEM is a modelling framework employed by several foreign central banks and economic ministries which has been developed primarily to examine economic policy effectiveness in developed countries. However, the model includes a block developed for the Hungarian economy as well. NIGEM contains relationships estimated econometrically, so the results derived from the model show, on the basis of past available data, the magnitude and the speed of economic agents' reactions to various economic shocks. The structure of the model is basically Neo-Keynesian. This means that economic agents behave in a forward-looking manner, but there exist certain nominal rigidities over the short term which act to slow adjustments to various shocks. In the following, we present the results of simulations carried in this model. Our aim is to measure the likely effects of a fall in risk premium resulting from monetary union membership relevant to growth and external balance. The reduction in risk premium affects GDP growth through the major mechanism in the NIGEM model as follows. The fall in risk premium reduces both short and long-term real interest rates and, consequently, it reduces the cost of capital. Falling costs of capital induce fixed investment, as a result of which economic capacities expand from the supply side and increased investment activity, in turn, boosts demand. However, the lower risk premium exerts a beneficial impact on technology

¹¹¹ However, the 1 percentage point rise in inflation played a role in this, in addition to a 300 basis point drop in short-term rates. According to an estimate by the Portuguese central bank in 1998, the expected reduction in real interest rates due to the disappearance of exchange rate risk was 1–3 percentage points [see Pereira (1999)].

¹¹² For a detailed description of the model, see Jakab and Kovács (2002).

transfer as well, given that lower risks encourage foreigners to invest. The rise in foreign direct investment, in turn, is associated with higher improvements in efficiency. On the whole, a reduction in the risk premium raises the economy's growth potential from two sources – first, through higher capital stocks and, second, due to rising foreign direct investment and the resulting more efficient utilisation of production factors as well. Rising propensity to invest, however, also tends to have an influence on external balance. External balance deteriorates temporarily, as increased fixed investment activity is financed from abroad. This deterioration in the external balance lasts as long as the economy adjusts to the changed circumstances and embarks on a new equilibrium path accompanied by higher income. It is important to note, however, that at this stage the rate of economic growth is not higher than in the starting position.

We have analysed the effects of two risk premium shocks. In the first case, we have assumed that, with monetary union membership, the risk premium permanently falls by 300 basis points, and by 150 basis points in the second case. We compare our results with a situation in which the risk premium does not fall radically in early 2006, i.e. Hungary does not enter EMU.

Table IV–1, and Chart IV- 6 and Chart IV- 7 summarise our results. It can be seen that, in line with those discussed above, the gain in GDP growth is associated with a deterioration in the external balance. Our results show that the level of GDP will be 1.9%–2.0% and 0.9%–1.0% higher respectively assuming a deeper or more modest fall in the risk premium. This will be associated with a lasting deterioration of 0.9 percentage points and one of 0.4 percentage points as a percentage of GDP on average over the period under examination. However, the rate of GDP growth will also be permanently higher, by 0.1 percentage point and 0.05 percentage point, on the average of a 20-year period.

Table IV–1
The effect of the decrease in the risk premium

	300 basis points	150 basis points
Permanent impact on GDP level (per cent)	1.9–2.0	0.9–1.0
Differential in growth (for 20 years, percentage points)	0.11	0.05
Average impact on current account as a percentage of GDP (percentage points)	–0.9	–0.4

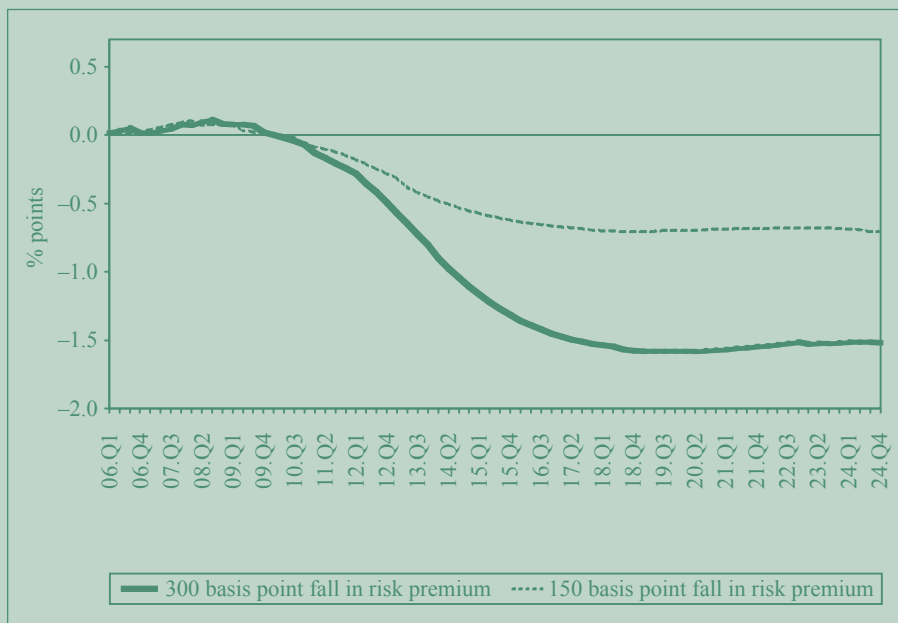
Chart IV-6

Deviation of GDP level from the baseline



Chart IV-7

Deviation of current account balance from the baseline
(As a percentage of GDP)



IV.4.3. Compact, calibrated exogenous growth model simulation

In this section, we measure the effect on economic growth of the probable fall in real interest rates as a result of joining EMU, using the growth model by Barro, Mankiw and Sala-i-Martin (1995).¹¹³ As per-capita physical and human capital is lower in Hungary relative to developed countries, return on capital is higher in the former. Consequently, although Hungary's demand for fixed investment is higher than its savings, this gap is offset by the inflow of foreign capital attracted by higher yields. Propensity to invest is a diminishing function of real interest rates – as the returns on real interest rates and capital move hand in hand, the two factors will be equal with a lower capital stock in the case of a higher real interest rate. Thus, lower real interest rates will be associated with more lively investment activity, which, in turn, boosts the rate of capital accumulation and, through this, economic growth.

But, especially in emerging markets, the inflow of foreign capital is much more modest than would be expected on the basis of the equalisation between the real interest rate and return on capital. However, the model by Barro, Mankiw, and Sala-i-Martin handles just this very problem. The authors assume that a country may accumulate debt only to the extent that its capital stock is capable of providing collateral for debt. In the original model, the upper limit to indebtedness is the physical capital stock. However, this hurdle can be easily defined in a narrower sense, which is necessary in the case of Hungary, in order to enable ourselves to reproduce the empirically observable debt-to-GDP ratio (which contains all types of foreign investments, in addition to debt).

Thus, by adapting the original model we have been able to examine two issues simultaneously – first, we have simulated the expansionary effect of a fall in real interest rates on economic growth and, second, we have measured the growth surplus resulting from the easing of the debt and current account constraints.

In the basic version, we set the parameters of the model with the requirement that it should reproduce Hungary's debt-to-GDP ratio fluctuating around 60%, and then under these conditions we examined the effect of a fall in interest rates. The highest, 350 basis point fall, was associated with a 80% debt-to-GDP ratio. Creditors generally do not tolerate levels higher than this in the case of emerging markets.¹¹⁴ In the alternative version, we assumed a loosening of the credit ceiling characteristic in emerging

¹¹³ Appendix F.4 includes a more detailed description of the model.

¹¹⁴ See, for example, Calvo and Végh (1999), pp. 1597-98.

markets. Then, we chose the starting parameters with the requirement that the debt-to-GDP ratio should be 80% and it should reach 100% in the event of a 350 basis point fall in interest rates.

Table IV–2 shows the results of a simulation conducted by assuming the more stringent debt constraint. Here, assuming a 150 basis point fall in interest rates, the growth rate projected for 20 years increases by 0.04 percentage point and by 0.09 percentage point in the event of a 300 basis point fall in interest rates. All this implies that, without an initial fall in interest rates, per-capita GDP rises by 78.6% in 20 years, by 80% in case of a 150 basis point fall and by 81.5% in case of a 300 basis point fall relative to the starting position.

Table IV–2
Effect of a change in real rates on the assumption of a stringent debt constraint

	350 bp	300 bp	250 bp	200 bp	150 bp	100 bp	50 bp	0 bp
5	119.1	118.6	118.2	117.8	117.4	117.0	116.6	116.2
10	137.7	137.2	136.7	136.2	135.8	135.4	135.0	134.6
15	158.6	158.0	157.5	157.0	156.6	156.1	155.7	155.3
20	182.1	181.5	181.0	180.4	180.0	179.5	179.0	178.6
Growth rate, per cent	3.04	3.03	3.01	3.00	2.98	2.97	2.95	2.94
Change in C/A as a percentage of GDP	0.64	0.52	0.42	0.32	0.23	0.15	0.07	0

The columns include results pertaining to the various real interest falls (measured in basis points). The rows show the level of per-capita GDP in five-year intervals at a given interest rate, if the level of year 0 equals 100. The one but last row includes the average growth rates related to 20 years. The last row shows the increase in current account deficit, expressed in percentage points, as a ratio of GDP relative to the starting scenario.

Table IV–3 includes the results of a simulation conducted by assuming the looser debt constraint. A comparison of the two tables reveals that if the 150 basis point fall in interest rates is accompanied by an easing of the debt constraint, then the average growth rate, projected for 20 years, will be 0.09 percentage point higher and it will be 0.15 percentage points higher in case of a 300 basis point fall. The stimulus of a

more moderate debt constraint to growth is reflected in the levels as well – in 20 years per-capita GDP rises by 81.6% assuming a 150 basis point fall, and by 83.7% assuming a 300 basis point fall. This, compared with the situation in which the real interest rate remains unchanged and the debt constraint does not ease off, suggests a 3 percentage point and a 5.1 percentage point higher per-capita GDP.

Table IV–3

**Effect of a change in real rates
on the assumption of a loose debt constraint**

	350 bp	300 bp	250 bp	200 bp	150 bp	100 bp	50 bp	0 bp
5	120.4	119.8	119.2	118.6	118.0	117.5	117.0	116.5
10	139.3	138.6	138.0	137.3	136.7	136.2	135.6	135.1
15	160.6	159.9	159.2	158.5	157.8	157.2	156.6	156.1
20	184.5	183.7	183.0	182.3	181.6	180.9	180.3	179.7
Growth rate, per cent	3.11	3.09	3.07	3.05	3.03	3.01	2.99	2.97
Change in C/A as a percentage of GDP	1.51	1.35	1.20	1.06	0.94	0.82	0.71	0.61

IV.4.4. Summarising the results of the NIGEM simulation and the compact calibrated model

As we have seen, over 20 years the growth surplus is 0.05%–0.1% of GDP in the NIGEM model. The calibrated model outputs are broadly consistent with those produced on the assumption of a more stringent debt constraint and are slightly higher, between 0.1–0.15 percentage points, on the assumption of a looser debt constraint. This difference between the outputs is primarily due to NIGEM being an estimated model based on the empirical observations of the past decade, and so it does not take into account the expected changes in economic agents' behaviour due to the currency union. Another major difference between the two models is that in the 'looser debt constraint' scenario of the compact calibrated model we assumed a permanently higher balance of payments deficit than in the NIGEM model, and so surplus capital inflows related to a reduction in interest rates in the former model are also higher in the 20-year period examined, which, in turn, delivers higher growth surpluses. Explanation for this is that, in the compact model, we attempted to model the effect that, as a member of the currency

union, the country's sustainable current account deficit may be higher than in the past. Whereas the assumptions of the compact calibrated model provide a better description of economic conditions arising with EMU membership, the advantage of the NIGEM model is that it takes more factors into account and that there exist central bank experiences with simulations. Based on all these, we have calculated with the average of the two models' results in analysing the cost-benefit analysis of EMU membership – **according to our estimate, the fall in real interest rates causes the long-run average growth rate of GDP to rise by 0.08–0.13 percentage point.**

It may be useful to compare our calculations with other, similar examinations. We considered an analysis of Portugal, a country similar to Hungary in many respect, as particularly relevant.¹¹⁵ The authors examined a 25-year growth period, and compared the growth path in the basic scenario (opt-out from EMU) with two alternative growth paths resulting on the assumption of a 100 basis point and a 300 basis point fall in real interest rates. According to their results, if the interest rate falls 100 basis points, then the average growth rate calculated for 25 years increases by 0.12 percentage point; if it falls 300 basis points the change is 0.41 percentage points. It can be seen that in the Portuguese model the growth surpluses are much higher than our model outputs. Consequently, our estimate of the growth surplus can be considered as conservative by international standards.

The empirical method of estimating the growth surplus arising from foreign trade expansion did not allow for identification of the sources of this growth surplus, and therefore we relied only on the results of investigating the relationship between openness and growth in the endogenous growth theory. In this theoretical framework, foreign trade expansion mainly affects growth positively through the boost of technology transfer to productivity and the fall in deadweight losses caused by trade barriers. Conceivably, though, expanding foreign trade simply contributes to growth in part through a rise in domestic fixed investment, in addition to these influences. In this case it may happen that we have accounted twice for the same growth surplus – first, as a benefit from foreign trade expansion and, second, as a growth surplus arising from the fall in real interest rates. But because we cannot measure the potential overlap and, moreover, our estimate of the growth surplus resulting from a lower real interest rate is low both in absolute value and in international comparison, we have omitted this factor in summarising the potential benefits.

¹¹⁵ See. Pereira (1999).

V. TIMING OF EURO AREA ENTRY

V.1. Time schedule of accession

The new wave of accession countries does not have the option of opting out of monetary union. Therefore, Hungary has committed itself to conducting an economic policy aimed at fulfilling the conditions for adopting the single currency when applying for EU membership. Timing of compliance with the convergence requirements remains the responsibility of the Hungarian government. However, when the convergence criteria are met, participation becomes compulsory.¹¹⁶ This implies that if Hungary should wish to postpone the introduction of the euro despite an advanced state of convergence, it could only do so by deliberately failing to meet one or more of the convergence criteria. This simple path has been chosen by Sweden. Without an opt-out right, by not entering the ERM II exchange rate mechanism, Sweden fails formally to fulfil the exchange rate criterion.¹¹⁷

The earliest date when Hungary can adopt the euro as a participant in EMU depends on a number of factors which can be more or less influenced. Monetary union membership is, by definition, preceded by accession to the European Union as well as meeting the convergence criteria. In principle, one can say that even if the convergence criteria are fulfilled, the earliest possible date of joining the euro area is two years after accession, as a minimum participation of two years is required in ERM II. In view of the fact, however, that approval of shorter formal ERM II participation is not without precedent, the following section will examine other factors that may have a bearing on the date of Hungary's monetary union entry.

¹¹⁶ Whether a country fulfils the convergence criteria, is officially decided by the Ecofin council, based on convergence reports drafted separately by the European Commission and the ECB. It is unprecedented that having met the criteria a country does not join. As Sweden has not formally met the exchange rate criterion, the Swedish example is not a precedent case for non-entry when there is no opt-out right involved.

¹¹⁷ Great Britain and Denmark have an opt-out right in respect of monetary integration.

Box V-1

The Maastricht convergence criteria

The first convergence criterion relates to price stability. Accordingly, for a one-year period specified by the convergence report, the annual average harmonised index of consumer prices (HICP) of a member state should not exceed by more than 1.5 percentage point above the average of the inflation rates of the three best performing member states in terms of price stability calculated for the same period.

The second criterion pertains to the requirement of a sustainable general government position. At the time of the examination by the Ecofin Council, the member state should not be the subject of a so-called excessive deficit procedure. According to the Treaty of Maastricht, an excessive deficit is a consolidated general government deficit above the reference values of 3% of GDP and gross government debt exceeding 60% of GDP. The deficit should not be regarded as excessive if the excess deficit and government debt have declined substantially and continuously and reached a level that comes to the reference value, or, alternatively, if the reference values have been exceeded only temporarily and exceptionally and the ratios remains close to the reference value.

The third criterion measures the durability of convergence. A member state's annual average nominal interest rate on ten-year fixed interest government bonds for a one-year period set by the convergence report should not exceed by more than 2 percentage points the average of the long-term interest rates of the three best performing member states in terms of price stability.

The fourth criterion relates to exchange rate stability. Fluctuations of each country's exchange rate should be within the normal range of ERM II, and there should be no unilateral devaluation of central parities established in relation to the other member states two years prior to the convergence report.

Date of joining the EU

In its Strategic Paper¹¹⁸ published on 13 November 2001, the European Commission confirmed the previously approved enlargement timetable (Nice, Gothenburg), indicating that it will follow a road map.¹¹⁹ Accordingly, in principle accession talks may be closed by the latter half of 2002, and accession treaties on joining the EU on 1 January 2004 could be signed at the year-end. This is the earliest possible date of accession for Hungary. Due to protracted negotiations or the ratification of accession treaties, there may be a postponement of the early 2004 date. However, since the EU stresses the objective that the most eligible candidates should participate as full members in the European Parliament elections of June 2004, an alternative date of entry could be June 2004. The next possible date is 1 January 2005. The following section looks at these three potential accession dates in relation to the timing and length of Hungary's participation in ERM II, and the reference period examined by the convergence tests.

Date of the convergence test

As a condition for entering monetary union, Hungary must meet the requirements laid down in the Treaty. In order to assess the extent to which these conditions are met, community regulations require that the Commission and the ECB prepare convergence reports once every two years about non-participating member states; the member states reviewed may also request a report in the interim period. EU institutions, such as the Council in the composition of Economic and Finance Ministers (ECOFIN), the European Parliament and the Council in the

¹¹⁸ The Strategic Paper is published simultaneously with the Commission's country reports to assess the state of the accession process and make proposals on its advance.

¹¹⁹ The road-map of Nice denotes the enlargement timetable approved by the European Council summit held in Nice in December 2000. The road-map in effect divides negotiation chapters according to the degree of difficulty involved. It is possible to deviate from the targets in both a negative and positive direction, in other words, some chapters may be brought forward in time while other, difficult, ones may be postponed.

composition of heads of state and government of member states, will take a position on the basis of these convergence reports and decide on the integration of the new member states into monetary union. This happened in spring 1998 in respect of the member states that adopted the euro as of 1999. The only difference from this procedure will be that in the case of Hungary the final decision will not be made by the Council comprising of heads of state and government, but by the ECOFIN Council (as in the case of Greece's admission into monetary union in 2000).

Experience to date suggests that convergence reports are drawn up in the spring, followed a couple of weeks later by an ECOFIN Council decision on admission. In all likelihood, the convergence test will take place sometime between March and May in the case of Hungary too. First of all, this is the earliest date when statistics for the previous year become available. It would not be desirable to postpone the test to a much later date as, providing that the decision is positive, time should be left for making the arrangements for the adoption of the euro early the following year. Despite the fact that Hungary can then look at the experience of the twelve euro members and that Hungarians will presumably have a welcoming attitude to the switch from the forint to the euro, this will be a major challenge for the economy as a whole. This will be the case especially because, in contrast to the experience of the current euro member countries, in Hungary the euro will be introduced – in all probability – simultaneously as account money and cash.

Date of joining ERM II and measuring the duration of participation

Meeting the exchange rate criterion raises two timing-related issues. One uncertainty factor is related to the question of what is the earliest possible date of Hungary's entry into ERM II, following accession. On the one hand, it can be indirectly derived from the Treaty that member states should formulate their economic policy with a view to entering monetary union. This commitment is reflected in approving the Copenhagen criteria. The implication is that entry into the EU also marks the start of our participation in ERM II. The uncertainty about this prospect is that participation in ERM II is not Hungary's unilateral decision.

Member states have to submit a request for participation in ERM II. Participation and the conditions therefore have to be agreed on by the ECB and the parties involved, taking into account the level of macroeconomic stability achieved by that point.¹²⁰ Under the exchange rate mechanism, the forint exchange rate will be pegged to the euro allowing a $\pm 15\%$ fluctuation range. The most crucial issue to be decided is the central parity of the forint in relation to the euro. Our presumption is that the request will be approved within the shortest time technically possible.¹²¹

Another uncertainty factor related to determining the earliest possible date of joining the euro is how long Hungary is required to participate formally in ERM II to meet the exchange rate criterion. While the Treaty specifies a two-year period, there have been two precedents for decision-makers accepting a shorter duration of ERM membership as satisfying the exchange rate criterion.

Pursuant to the Treaty, the convergence tests conducted so far have looked back on the two years from the month preceding the month of the test when reviewing progress in respect of the exchange rate criterion. The Test of March 1998 looked at the reference period between March 1996 and February 1998. On the occasion of the 1998 convergence test, Italy, which re-entered the exchange rate mechanism on 25 November, 1996, was only able to produce a 15-month period of ERM membership for the duration of the reference period, and the Finnish markka only 16 months. Even though their formal membership was shorter than the required two years the ECB and the Committee judged the currencies of these member countries as sufficiently

¹²⁰ Decisions on participation, the central parity and the width of the fluctuation bands are made using a “common procedure”, with the participation of the European Commission, the Economic and Financial Committee. A consensus of euro member finance and economic ministers and the ECB on the one hand and ministers and central bank governors of non-euro participants of ERM II on the other hand is necessary. Non-ERM II participant ministers and central bank governors can take part in the procedure without a voting right. The parties involved in the procedure, including the ECB, may trigger a confidential procedure to review the central parity.

¹²¹ Austria joined the exchange rate mechanism on the ninth day after its EU accession on 1 January 1995. Finland, which joined the EU in the same wave of enlargement, chose to enter the ERM much later, on 14 October 1996. Based on its own decision, Sweden has not yet joined the exchange rate mechanism.

stable for the entire length of the reference period, i.e. they satisfied the criterion on exchange rate stability. In view of the fact that the current Hungarian exchange rate strategy nearly fully complies with the ERM II standard,¹²² it cannot be ruled out that, with a stable forint, the reference period will include not only the formal ERM II membership, but also the preceding period, as needs may be.

Assuming that Hungary can participate in ERM II immediately upon its accession into the EU and that it joins in early 2004, the mandatory two-year period of ERM participation will expire in late 2005. Providing further that the other criteria are satisfied in 2004, Hungary can enter monetary union on 1 January 2006 at the earliest, if the exchange rate criterion is judged on a flexible basis. Should the criterion be interpreted formally, the earliest date of entry would be January 2007. If the date of EU accession is postponed, the earliest possible date of monetary union entry will also be postponed.

Timing of compliance with the fiscal criterion

While flexibility in judging compliance with the exchange rate criterion has a crucial bearing on the earliest prospective date of Hungary's entry into the euro, when all the other criteria are satisfied, the required (reference) periods or dates relating to the rest of the convergence criteria are much more clearly specified.

The condition for meeting the Treaty's fiscal convergence criterion does not specifically stipulate that the reference values defined in the Treaty's Protocol should be met a certain date. What is specified instead is that at the time of the convergence review the member country reviewed should not be under an excessive deficit procedure, as defined in Article 104 of the Treaty. In view of the fact, however, that the Council resolution providing for the excessive deficit procedures in detail considers the budget deficit and government debt data as a proportion of GDP in the full calendar year preceding review date, the reference year should

¹²² It fails to fully comply with the ERM II because of the formal requirement that the central parity and bandwidth within ERM II should be established jointly by the ECB and other related parties. Naturally, the ECB does not yet undertake a commitment to intervene to protect the forint's exchange rate.

be the one preceding the review year. Accordingly, in the case of a 2007 euro-area entry, for instance, the fiscal criteria should be satisfied in 2005 at the latest.

Apart from this key condition, it should be kept in mind that as far as meeting the fiscal criterion is concerned, a member state's exemption from the excessive deficit procedure is a much more complex process than a simple comparison of reference values. Indeed, it is a less clear-cut and transparent process, potentially involving political decisions. Member states' 1998 experience¹²³ indicates that in assessing the fiscal criterion the Council took a flexible approach to judging both government gross debt and the sustainability of the achieved general government position. However, considering the following practical implementation of the Stability and Growth Pact and the case of Greece entering subsequently, it is not likely that Hungary would be given similar leeway in meeting the fiscal criterion. It appears thus that it is not sufficient to meet exclusively the quantitative fiscal criterion by the set reference date, say 2005, but already in the pre-review years fiscal policy should be such that convincingly proves to the EU the sustainability of the value attained by the reference year.

Timing of meeting the inflation and interest rate criteria

In contrast with the fiscal and exchange rate criteria, the Treaty clearly states that in terms of the inflation and interest rate criteria the degree of member state convergence shall be assessed on the basis of a twelve-month reference period. The price stability criterion is met when a member state has achieved sustainable

¹²³ As the Council resolution on reviewing the existence of excessive deficit was not in place at the time, the 1998 convergence report judged compliance with the criterion by taking 1997 as reference year. For the first time, greater attention was paid to compliance with specific quantitative limits and also dealing with prospective consolidation processes. The convergence reports on Greece and Sweden in 2000 put greater emphasis than the previous reports on the when and how of ending the excessive deficit procedure. The Council made Greece exempt from the excessive deficit procedure on 17 December 1999. Remarkably, at the time of ending the excessive deficit procedure, Greece had a government debt of 104.5% of GDP, and at the time of the December resolution, there were no final results available yet, and the Committee regarded the preliminary deficit of 1.9% as adequate.

price stability and an inflation rate that does not exceed by more than 1.5 percentage points the average inflation rate of the three best performing member states in terms of price stability over a twelve-month period prior to the examination. Just as the inflation criterion, the convergence criterion on interest rates also refers to the year preceding the examination. Accordingly, the member state reviewed should have an average nominal long-term interest rate that does not exceed by more than two percentage points that of, at most, the three best performing member states in terms of price stability. In practice, the reference period is the twelve months counted from the last month for which data are available at the time of the test. The reference period of the March 1998 convergence test lasted from February 1997 to end-January 1998, while the corresponding dates for the November 1996 test were October 1995 and September 1996.

However, regardless of this twelve-month reference period, it should be remembered that just as with each criterion, examination is not exclusively focussed on comparing actual inflation or interest rates with reference values. Indeed, other indicators are also looked at to check for the sustainability of inflation (or the interest rate) attained.

Article 121 of the Treaty on interpreting 'other criteria'

Taking into account the relationship between nominal and real convergence, Article 121 of the Treaty also provides that the Commission and the ECB (or EMI, its legal predecessor¹²⁴) also 'take account of' other indicators. Accordingly, these institutions '*shall also take account of the development of the ECU, the results of the integration of markets, the situation and development of the balances of payments on current account and an examination of the development of unit labour costs and other price indices*'. The Treaty's words of 'take account of' are rather difficult to interpret on their own as, unlike the nominal convergence criteria, the indicators listed are not defined in specific terms, i.e. there are no quantified reference values and, furthermore, some indicators, such as the integration of markets, cannot be quantified.

¹²⁴ European Monetary Institute.

These indicators intended to support the real convergence of the economies and the sustainability of quantified results are referred to in the Commission and EMI/ECB's convergence reports as 'other' or 'additional' factors. As the Treaty does not specify how they should be implemented - there is no clearly defined legal provision about the procedure - the examination becomes subjective, and the question of what other factors should be included in the examination can become much more easily subject to the existing (say political) situation.

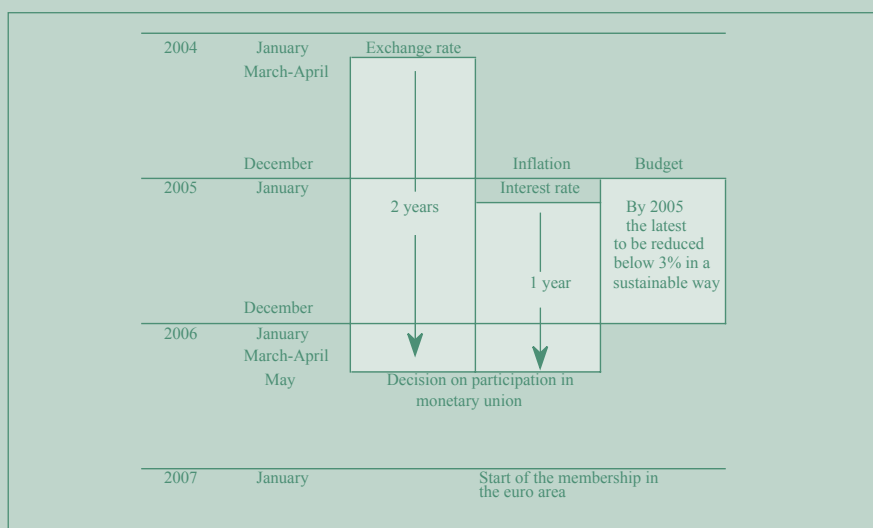
The EMI/ECB convergence reports provide insight on the application of these 'other criteria' in the assessment of individual countries' state of convergence. Since the EMI published its first convergence report in 1995, there has been a new one every year, dealing with the economic (and legal) convergence of the member states. By looking at each individual criterion, the EMI examined in this report how the Treaty's requirements are satisfied. In the convergence reports' methodological description of other factors, the EMI admits that in respect of 'other criteria' there is a need for uniform statistical concepts, in the absence of specific reference values, to enable comparisons to be made between individual national data. In its reports, the EMI (and later the ECB) assess the development of ECU and the degree of the integration of markets in relation to general development from an Economic and Monetary Union perspective. The remaining factors are selected relying on definitions that produce comparable indicators across the member states. The 'other factors' are not treated as separate criteria but rather as means of support for the nominal criteria, in the context of the requirement that the convergence criteria should be met not only at a specific time (the reference period of the examination) but also in the long term.

Of the 'other factors' underlying the nominal criteria the examination of the sustainability of inflation is the most interesting from the point of view of Hungary. The convergence reports also take account methodologically of what kind of economic environment is required to achieve price stability. They examine price changes on the basis of supply and demand, emphasising the factors affecting, among other things, productivity and unit labour costs or import prices. They also take a position on prospective trends in inflation, making use of the projections of key international organisations, in addition to assessing the structural aspects needed for the appropriate environment of price stability. In the 2000 convergence report,

for instance, examining the performance of Greece in reducing inflation, the ECB recognises the sustainability of the achieved results after a thorough examination of the above criteria, in addition to checking that the reference values for the reference period are met.

Chart V-1

**Reference period for the convergence criteria,
assuming euro-area entry in 2007**



The following section presents a comparison of the benefits and disadvantages of entering monetary union at the technically earliest date in four to six years' time, with later entry scheduled for 2010-2012.

V.2. Elements of the Hungarian convergence programme and prospective costs of convergence

Of the four Maastricht criteria, those relating to inflation and the government deficit will require the greatest efforts in terms of economic policy. Meeting these two criteria 'automatically' entails convergence of long-term interest rates. If financial market players expect the country to join the euro area, the interest rate

spread measured on long-term yields will likely drop to the size of the country-risk and liquidity premium¹²⁵, which is lower than the permitted difference of 200 basis points¹²⁶. Meeting the criterion on government debt needs no further adjustment.

V.2.1. Fiscal adjustment

The fiscal requirement for joining the euro area is that a country is not involved in an excessive deficit procedure. The excessive deficit procedure is launched when the government deficit calculated in terms of the European standard (ESA 95) exceeds 3% of GDP or government gross debt exceeds 60% of GDP. There may be two exceptions to this rule. The first is that the above ratios are on a significant and steady decline and have reached levels close to the reference. The second is that the reference values are exceeded only under exceptional and transitory circumstances and the ratios remain close to the reference values. In the course of the examination under the excess deficit procedure the Commission qualifies the extraordinary budget deficit as the consequence of severe economic recession if there has previously been an at least 2% drop in GDP of the member state under review. The Council has to take into account the comments of the member state involved and the evidence in support of the argument that a smaller-than-2% drop in GDP should also be viewed as extraordinary, with special regard to the suddenness of the recession or the cumulated loss in output relative to the historical trend.

Although the conduct of fiscal policy remains a national responsibility even after joining the EU and becoming a member state with a derogation, and even later, as a euro area member state, the Treaty sets forth as a fundamental regulation that member states should avoid an excessive budget deficit. The device used to control and ensure that excessive deficit is avoided is the excessive deficit procedure, also referred to above in the discussion of the fiscal criterion. This aforementioned

¹²⁵ The country risk and liquidity premium is approximately 50 basis points today and rose to 130 basis points at the time of the Russian crisis.

¹²⁶ The effect on nominal rates of joining the euro is discussed in Chapter IV.3.

Box V-2

Principal requirements of the Stability and Growth Pact

The Stability and Growth Pact (SGP) provides that the member states, in order to be able at any time to maintain the budget deficit within the reference values defined in the Treaty Protocol, should aim to achieve a government position of close to balance or in surplus. This will enable them to increase their budgetary expenditures at the time of a cyclical slump so that the reference value is respected. Euro area participants should adopt stability programmes and non-participating member states should adopt convergence programmes in an effort to achieve the above goal. The SGP outlines sanctions to be imposed if a country does not continuously comply with the objectives laid down in the convergence and stability programmes through a fault of its own. While in an extreme case euro area member states may incur financial sanctions, non-participating member states are only sanctioned via moral suasion if there is any deviation from the provisions of the Pact.

fundamental requirement of the Treaty is supplemented by other additional requirements set forth in the **Stability and Growth Pact**¹²⁷ (see Box V-2).

There is no specific fiscal policy requirement for the pre-accession period. Nevertheless, in a 2002 publication entitled 'Public Finance in EMU', the European Commission suggests that, as new member states will also be liable to the 3% government deficit criterion after accession, they should embark on fiscal adjustment well before entry into the EU. This way they will be able to avoid high welfare losses usually associated with delaying consolidation until the last moment.¹²⁸

Following accession to the EU, Hungary will have to adopt a medium-term convergence programme reflecting the SGP requirements and updated on an annual basis, in order

¹²⁷ Formally, the Stability and Growth Pact comprises the 17 June 1997 resolution of the European Council and Council Regulations (EC) No 1467/97 of 7 July 1997 on speeding up and clarifying the implementation of the excessive deficit procedure, and No 1466/97 of 7 July 1997 on the strengthening of the surveillance of budgetary positions and the surveillance and coordination of economic policies.

¹²⁸ European Commission (2002) 126. o.

to present, among other things, our fiscal consolidation timetable for the following four years. Experience so far¹²⁹ suggests that by the end of the first four-year convergence programme adopted after accession, even if not seeking a balanced budget, Hungary should aim to maintain a fiscal position offering a sufficient 'contingency margin' to ensure compliance with the 3% limit in case of unforeseen fiscal developments. Accordingly, the Maastricht criterion on fiscal policy should be fulfilled before the end of the first convergence programme after accession if Hungary is to avoid an excessive deficit procedure.

All in all, *no fiscal considerations call for postponing monetary union entry until after 2010*, as the fiscal criterion has to be met independently of monetary union membership. By contrast, compliance with the fiscal criterion may be of crucial importance with regard to which year Hungary joins the euro area under the 'rapid accession scenario'. As noted above, depending on how the ERM II membership requirement is interpreted, the first opportunity to join will be in the period between 2006 and 2008. Accordingly, if it aspires to join at the earliest possible date, Hungary will have to comply with the fiscal criterion in one of the years between 2004 and 2006. However, this will call for considerable budgetary adjustment relative to the current situation. As there is no information available on the prospective fiscal position¹³⁰, let us give a numerical representation of a hypothetical fiscal path followed with the intention of a 2007 entry, assuming that the required adjustment will take place in equal portions distributed over a period of several years.¹³¹

The table below is based on the assumption that, in an effort to qualify for membership in 2007, Hungary wishes to comply with the 3% deficit criterion in the fiscal year 2005. The limit cannot be exceeded even if the business cycle is unfavourable. A 2.7% target can provide sufficient leeway in meeting the criterion even if GDP growth is 1-1.5%

¹²⁹ In the first stability and convergence programme, prepared at the end of 1998, member countries envisaged an adjustment of 1.5% of GDP on average between 1999 and 2002. Greece, the only country aspiring to join the euro area, set a target of a 0.2% surplus in 2002, following a deficit of -4.6% in 1997. Austria projected the highest deficit at the end of the first convergence programme, amounting to 1.1% of GDP.

¹³⁰ Information on the prospective long-term fiscal path will be presented in the PEP programme submitted to the Brussels Commission in August 2002.

¹³¹ In respect of countries that joined the euro area earlier and were subject to serious fiscal tightening, the reference year generally fell to the first half of the election cycle. However, in countries where fiscal adjustment took several years to be implemented, such as Spain and Greece, tightening took place during the final two years of the election cycles.

below trend.¹³² Under this scenario, the government-sector deficit as a proportion of GDP, computed in terms of the ESA 95 standard, should be reduced by 3.8 percentage points in the period between 2002 and 2005. The primary balance computed excluding EU funds should improve by approximately 2.3%, while the remaining roughly 1.5% deficit reduction will arise from changes in the interest balance and net EU funds. As assuming even-paced adjustment, this implies an annual tightening of 0.8%, the downward effect on GDP growth will be also distributed over time.

Table V-1

Projections for government sector¹³³ ESA deficit and the primary balance as a percentage of GDP

	2001 preliminary	2002 assumptions*	2003 hypothetical path	2004 hypothetical path	2005 hypothetical path
1. ESA deficit (1=2+3+4)	-4.1	-6.5	-5.3	-4.4	-2.7
2. Interest balance	-4.2	-4.2	-3.8	-3.6	-3.5
2. ESA central bank contribution	0.0	0.0	0.0	0.0	0.0
4. ESA primary balance	0.1	-2.3	-1.5	-0.8	0.8
5. Net EU funds	0.3	0.3	0.3	0.3	1.1
6. Primary balance excluding EU funds (6=4-5)	-0.2	-2.6	-1.8	-1.1	-0.3
7. Change in primary balance excluding EU funds		-2.4	0.8	0.8	0.8

* As the effect of prospective measures cannot be quantified as yet, the projected ESA deficit is shown within the limits suggested by government specialists and analysts. Hence, this is not the National Bank's projection, all the less so because the Bank's projection is based on changes in the SNA primary balance, an indicator constructed using a different methodology.

It is also clear from the table that government interest expenses will decrease at the fastest pace in 2003, when they are still largely determined by former arrangements,

¹³² The explanation for the apparently tight 'reserve' is that the cyclical sensitivity of the balance currently amounts to merely 15%, and is not expected to exceed 20% within a few years. For more on this, see Chapter III.2.4.

¹³³ The term government sector is used here because current Hungarian terminology does not include the State Privatisation and Holding Company (ÁPV Rt.) and the Hungarian Development Bank (MFB Rt) as constituents of general government.

and debts are expected to be gradually re-priced later. Firmness in measures aimed at complying with the fiscal criteria may further speed up interest rate convergence. As a result of the further reduction in interest expenses, the size of the adjustment required in the primary balance may decrease, while more favourable monetary conditions may contribute to offsetting the negative effect on growth of fiscal adjustment.

In contrast with the interest expenses, access to EU funds¹³⁴ cannot be expected, even under favourable circumstances, to exert further downward pressure on the size of the required adjustment. This is because only some payments make a predictable effect on the deficit, with the contributions increasing it and the agricultural subsidies decreasing it. By contrast, transfers that can be obtained in the framework of the structural actions depend on our absorption ability, and they do not automatically improve the deficit, as the subsidies are countered by expenditures and there is also need for co-financing. If these combined do not exceed the financing of the previous period for similar purposes (for instance environmental protection), the deficit may lessen, but if they cover additional expenditures, the deficit will remain unchanged. Inasmuch as Hungary's absorption capacity proves to be significantly better than projected by the Bank on the basis of estimates by the European Parliament and the Ministry of Foreign Affairs, Hungary would gain access to more EU funds, but due to excess expenditures financed by these funds, there would be no reduction in the government sector deficit.

The size of the fiscal adjustment required from Hungary can be viewed as being average relative to earlier euro-area entrants. Of the 11 countries joining the euro area in the first wave, only two countries – Luxembourg and Ireland – complied with the 3% deficit limit two years prior to the reference period. The first-round joiners were able to reduce the ESA deficit from 5% to 2.6% on average in the course of the two years, 0.4% of which was accounted for by a reduction in the interest burden. Greece implemented even more significant adjustment prior to joining the euro, as its ESA-based financing requirement, in excess of 10% of GDP in 1995, was brought down to

¹³⁴ As far as contributions are concerned, Hungary is assumed to meet the average EU contribution level from the first year. In respect of agricultural support, we use an estimate for Hungary's share in the EU's offer to the ten countries. In respect of structural actions, the calculations use the estimates of the Ministry of Foreign Affairs, which only minimally fall short of the estimates by the European Parliament.

1.6% in 1999. The effect of a drop in the interest burden accounted for 4.5% of this improvement between 1995 and 1999. The adjustment proved to be permanent in most cases, with only Austria and Belgium experiencing some relapse during the two years following the reference period.

V.2.2. Reducing inflation

The inflation criterion requires that domestic inflation should not exceed by more than 1.5% the average rate of the three EU member countries with the lowest inflation in terms of the average rate in the year preceding the preparation of the convergence report. The rate of inflation to be complied with changes constantly, with the lowest rate since 1997 being 1.9% and the highest so far 3.3% in April 2002. In that month, the annual rate of inflation in Hungary amounted to 6.1%, which means that inflation has to be lowered by another 3-4% in order to meet the criterion.

The examination of the convergence criteria will not be confined to checking whether the prescribed values are met, but it will also examine whether the favourable indicators achieved are sustainable. A reduced inflation rate can be regarded as sustainable if *market participants also incorporate a permanently lower expected rate of future inflation into their expectations*. As the yield curve will reflect domestic inflation expectations less and less reliably as Hungary approaches monetary union, *nominal wage growth* may become the most significant test of inflation expectations.

A monetary policy issue of crucial significance concerns the date and costs of meeting the disinflation target as required by the Maastricht criterion. The central bank's current inflation targets are $4.5\% \pm 1\%$ at end-2002 and $3.5\% \pm 1\%$ at end-2003. Provided that inflation follows its set path, meeting the reference value will require another 1-2% reduction after 2003, which, in view of the speed of disinflation so far, could be met during the reference year between 2004 and 2006. However, the economy may be hit by unforeseen shocks and the inflationary pressure they exerted could only be offset at the price of an excessive growth sacrifice. Therefore, the Monetary Council may temporarily tolerate a rise in inflation. In other words, unforeseen events bearing on the course of the economy may cause a delay in achieving the inflation reference value.

Meeting the inflation criterion may require that the inflation differential relative to the euro area be temporarily reduced below the equilibrium inflation differential (0.8-2.2%, see Chapter II.2). This may be a source of extra costs compared with a strategy aiming for joining the euro at a much later date. This inflation differential will, however, disappear only in the long term as the economy catches up. Indeed, postponing entry into the euro area by four or five years may push up rather than lower the costs. This is because if the disinflation process is reversed or remains flat at a high level for a longer period of time, expectations may become rigid and less susceptible to the announced disinflation programme. This, in turn, may push up the costs of disinflation. From the point of view of disinflation costs, the optimum strategy seems to be based on a steady decline in inflation, leading to a drop in the existing inflation differential within a couple of years.

The extra costs incurred if inflation is brought below the equilibrium level could be offset in the light of the fact that the disinflation process as a whole could probably entail a smaller sacrifice if it is implemented in the context of the preparations for joining the euro. The cost of disinflation in terms of a loss in economic growth depends on several factors, such as:

- the credibility of the announced disinflation programme and its influence on inflation expectations,
- the fiscal and monetary policy mix leading to a lower path for inflation,
- the extent to which economic agents view desired monetary stability as sustainable, and finally
- the cyclical position of the economy.

In view of the above factors it seems expedient for the government and monetary-policy decision-makers to co-operate in implementing the disinflation programme in an effort to meet the requirements for the euro area membership. The credibility of the disinflation programme is greatly enhanced by the fact that euro area membership is not one of many economic policy objectives in the context of an 'ordinary anti-inflationary programme'. Indeed, it is a matter of national interest with a bearing on the country's future well-being, with implications going beyond the direct economic effects. Therefore, economic agents are likely to hold it more

probable that economic policy will stick to its intended path. Credibility is also enhanced by the work of the European Commission and the ECB in monitoring and evaluating the implementation of the convergence programme.

Meeting the accession criteria also promotes the creation of an appropriate fiscal and monetary policy mix. In a small open economy, interest rate moves by monetary policy make their impact primarily via the appreciation or depreciation of the exchange rate. Thus, a greater emphasis on fiscal policy usually helps to reduce output costs and has a favourable influence on the sustainability and credibility of the programme through its effect on the balance of payments. From a monetary policy perspective, joining ERM II will enhance the credibility of a disinflation strategy based on the exchange rate. At the same time, if the target is credible, monetary conditions will become increasingly deterministic, and interest rates will converge to euro rates at more and more shorter sections of the yield curve, while exchange rate changes will be significantly influenced by the expected conversion rate. Therefore, as the date of accession grows nearer, disinflation via fiscal policy must be given increasingly greater emphasis. It is beneficial in this respect if Hungary wants to meet the inflation criterion after the EU accession. This is because complying with the requirements of the Stability and Growth Pact will likely prescribe some fiscal tightening, independent of disinflation.

As shown by the experience of earlier EU entrants, in addition to fiscal and monetary policies, wages policy may also play a key role in disinflation (see Box V-3).

Box V-3

Role of wage agreements in disinflation

In the majority of EU countries, the moderation of wage demands has been of crucial importance in meeting the inflation convergence criterion. During the years preceding the examination of the convergence criteria, most member countries reached wage agreements for a duration of several (two or three) years. This was the case even in countries which had a different tradition. The success of keeping wage inflation within institutional limits was primarily due to a country announcing its intention to join monetary union.

As shown in the table below, even though nominal wage increases in most countries exceeded the extent of the inflation compensation in the pre-convergence-report years, real wage increases remained permanently below the rate of productivity growth. Of the euro area member countries, only Italy and Portugal produced higher real wage growth than productivity growth in the period before joining the euro area as a compensation for the exceptionally low rate of wage increases in both countries in the mid-1990s.

Table V-2
Nominal and real wage growth (annual %)

	Nominal wage growth				Real wage growth				Productivity growth			
	1994	1995	1996	1997	1994	1995	1996	1997	1994	1995	1996	1997
Austria	3.5	2.9	1.1	0.6	0.6	0.6	-0.2	-0.6	2.3	1.5	2.6	0.8
Belgium	4.0	2.4	1.6	2.9	2.2	0.6	0.4	1.5	3.4	1.9	0.8	2.6
Finland	3.1	3.9	2.7	1.7	1.1	-0.2	0.9	-0.3	5.2	2.2	2.6	2.9
France	2.1	2.6	2.7	2.5	0.4	0.9	1.2	1.2	2.4	1.2	1.3	1.8
Netherlands	2.8	1.9	1.4	2.2	0.4	0.0	0.3	0.2	3.6	0.8	0.5	0.7
Ireland	2.5	2.0	3.3	5.7	0.8	-1.0	0.9	1.2	2.6	4.5	4.1	6.1
Luxembourg	4.1	2.2	2.3	3.1	-1.2	1.5	0.6	-0.2	1.6	1.3	0.2	4.0
Germany	3.0	3.6	1.3	0.8	0.5	1.6	0.3	0.0	2.5	1.5	1.1	1.6
Italy	3.0	4.2	6.1	4.1	-0.4	-0.8	0.8	1.7	3.2	2.9	0.8	1.5
Portugal	5.6	7.2	4.9	3.7	-0.7	2.0	1.5	0.6	3.3	3.6	2.0	2.0
Spain	2.8	3.0	4.5	2.1	-1.2	-1.8	1.0	-0.1	2.8	0.9	1.2	0.7
Greece	10.9	12.9	8.8	13.6	-0.4	2.8	1.4	6.3	0.1	1.2	2.8	3.9
Denmark	1.5	3.8	4.1	3.5	-0.3	2.0	1.6	1.8	4.0	2.3	1.9	2.1
UK	3.4	2.6	1.8	4.4	1.9	0.1	-1.4	1.4	3.6	1.2	-0.1	1.4
Sweden	4.8	2.8	6.8	3.0	2.4	-0.7	5.3	1.8	4.9	2.3	1.6	2.6
EU15	3.1	3.3	2.8	2.7	0.4	0.3	0.3	0.8	2.9	1.7	1.0	1.6

Source: Eurostat.

In the course of wage negotiations in the majority of countries not only competitiveness/profitability considerations were recognised, but also compliance with conditions for prospective monetary union entry. In Belgium, for example, total wage growth, including compensation for inflation, was not allowed to deviate from the average rate of the three main trading partners.

The fact that wage negotiations in Italy were based on the average EU-level inflation rate implies that they used prospective average European wage growth as a standard. Less developed member states, such as Greece and Portugal, for instance, also sought to gradually narrow the real wage differential relative to the developed countries. In determining the rate of wage increases, these countries also took account of a certain percentage of productivity growth in addition to the inflation compensation. Only in two less developed member countries, (Ireland and Greece) wage bargainers also took into account explicitly compliance with the convergence criteria and the altered economic policy conditions following euro-area entry. As far as Portugal and Spain are concerned, there was no evidence of any change in the factors that were taken into account in the course of wage negotiations in an effort to attain monetary union membership. The cases of Finland, Ireland and Italy are of special interest from a Hungarian point of view. Traditionally corporatist Finland, for instance, could only make the dampening of wage demands acceptable by setting up a special budgetary fund to be used for compensation in the event of asymmetric shocks. Another objective was to preserve their centralised wage negotiation system, which was expected to facilitate adjustment to lower inflation.

However, the centralised wage negotiation system is not typical in the majority of the member countries. In Ireland and Italy, for instance, there were national wage agreements valid for several years in the 1990s, despite the fact that the organisation of trade union and employers representations is the least developed in these two countries within the euro area.¹³⁵ Ireland did not have a tradition of central agreements, and the increase in the 1990s in the role of national wage agreements in Italy paradoxically coincided with palpable institutional decentralisation of wage bargaining. It should be stressed, however, that the purpose of wage agreements at the national level is not to reinstate the institutional centralisation of negotiations, but to reach a social pact. In Ireland and Italy, trilateral social pacts, also including the government, enabled national guidelines for nominal wage growth to be defined. These guidelines were formulated as recommendations for private sector agents, and deviation from the agreement entailed no sanctions.

¹³⁵ The organisation level of interest representation within the EU is reviewed, among other authors, by Scheremet (2000).

In Ireland, the social pact was necessitated primarily by the limited adjustment opportunities due to the special ERM framework, while in Italy the foundation of the social pact was the need to comply with the convergence criteria. In order to reduce high unemployment in the late 1980s, Ireland needed to dampen real wage growth, which was only possible within the ERM by moderating nominal wage demands. The Irish social pact in essence meant that in exchange for lower nominal wage demands, the government promised tax cuts. The nearly decade-old success of the pact owes somewhat to Ireland's liberal immigration policy, which lessened the likelihood of labour market bottlenecks. By contrast, the success of the social pact in Italy was due not to government concessions but literally a common social endeavour. It became clear by late 1996 that short of major restrictions, Italy would be the only country besides Greece to be left outside the first wave of euro members against its wishes. Having recognised the danger of being left outside Europe, Italians came to fully accept fiscal and income policy restrictions, so much so that of all EU countries Italy showed the highest support for the single currency in 1999. Thus, the Italian social pact was brought about primarily by raising awareness about the political and emotional, rather than the economic, costs of postponing the entry to the euro area.

The government can directly influence wage growth only in the public sector, but the benchmark range for wage increases established at a trilateral wage policy co-ordination forum with the participation of the private sector may also affect inflation expectations formed by market participants.

It is also conducive to sustainability if Hungary can join the euro area as a result of disinflation, since membership in the single currency would mean irrevocable commitment to adopting the monetary policy of the euro area. Joining the euro will also indirectly enhance the sustainability of disinflation, and as successful convergence will also change the significance of the balance of payments constraint (for a more detailed discussion, see Chapter IV.4).¹³⁶

¹³⁶ Of the less developed EU members, only Portugal exhibited a significantly worsening current account deficit (1997: -5.7%, 1998: -7%, as a percentage of GDP) prior to entering to the euro area. However, due to the credibility of convergence, neither the exchange rate nor the interest rates showed signs of depreciation pressure.

In sum, it will be beneficial from the point of view of the costs of disinflation if disinflation policy can be linked to compliance with the criteria for monetary union participation. *Co-ordinated fiscal and monetary policies* will enhance credibility of the disinflation programme, having a favourable impact on inflation expectations and ultimately *reducing the costs of curbing inflation*. *Co-ordination of fiscal and monetary policies can be accomplished in the context of a credible government commitment to euro area entry, announced well in advance*. Therefore, the Bank believes that economic policy makers should publish their timetable for joining the euro area and the schedule and steps of the required adjustment as soon as possible.

V.2.3. Prospective costs of convergence in the light of international experience

In each EU member state, consumer price inflation declined at a steady pace in the 1990s. However, the output costs of disinflation varied considerably across countries and periods. The cumulated output cost for a particular disinflation period indicates the size of cumulated loss in growth, relative to trend growth, a country has to accommodate in exchange for permanently reducing its rate of inflation by one percentage point.¹³⁷ In the four less developed EU member states of greatest relevance to Hungary, output costs caused by disinflation vary both across countries and over time. Our calculations suggest that forced disinflation in Greece in the 1990s entailed the highest costs (GDP fell by 1.34 percentage points in exchange for a one-percentage-point drop in inflation). Spain also incurred similar costs due to disinflation in the period between 1977 and 1985 (GDP fell by 1.08 percentage point for every one percentage point drop in inflation). Ireland also paid an output price for stabilisation (between 1981 and 1987, 0.61 % point of GDP for 1% point disinflation). By contrast, curbing inflation did not entail any, or only negligible, output cost in Greece in the 1980s or Portugal and Spain in the 1990s.

The variation in disinflation costs can be explained by the composition of the stabilisation packages, their comprehensive nature and, ultimately, the credibility of the programmes. Disinflation was only successful in periods when economic

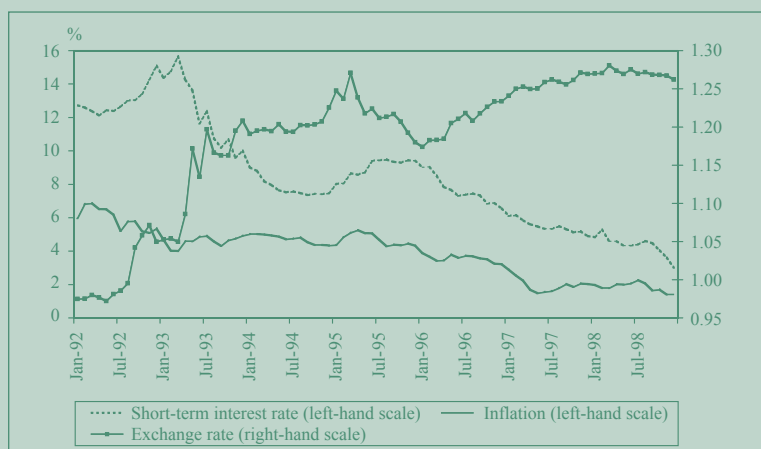
¹³⁷ For the methodology used here to calculate cumulated output costs, see Ball (1993).

policy tools also supported the restrictive monetary policy. In contrast to Ireland, Portugal and Spain, for example, where the exchange rate proved to be an effective nominal anchor from the very beginning of disinflation, Greece was unable to adopt a credible exchange rate policy until a few years after announcing an exchange rate target in the second half of the 1990s. Another major difference was that, unlike in the other countries, nearly the full burden of disinflation in Spain fell initially to monetary policy. Monetary and fiscal policies did not become co-ordinated until the mid-1990s. Furthermore, it should be noted that the prospect of monetary union participation significantly enhanced the credibility and social acceptability of fiscal adjustment. Apparently, the output cost of restrictions in Europe was considerably lower in the run-up to EMU than in the 1970s and 1980s.

In the assessment of the prospective costs of disinflation, Hungary can rely on the experience of the euro area member states which implemented simultaneous fiscal adjustment and disinflation immediately before the period of testing the criteria. Nearly all the current monetary union participants needed some degree of fiscal adjustment, but only Italy, Spain, Portugal and Greece had to reduce inflation in order to meet the criteria, and only Greece was required to make a major adjustment. The expected costs of disinflation can be estimated relying on the experience of this group of countries.

Chart V-2

Monetary conditions in Spain* in the disinflation period

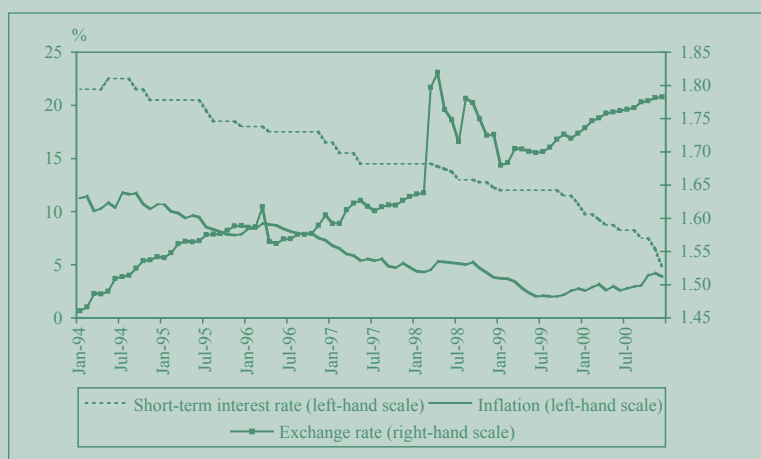


Source: IFS database.

* Three-month interbank rate, twelve-month CPI increase, 1991=1 nominal exchange rate, with higher values indicating a more depreciated exchange rate.

Chart V-3

Monetary conditions in Greece* in the disinflation period

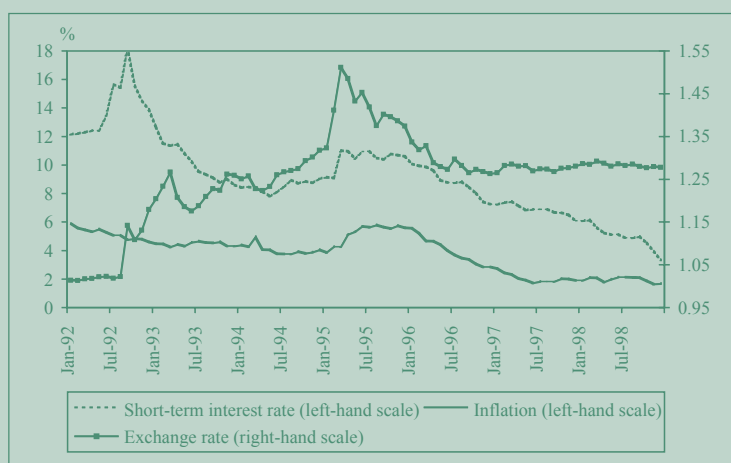


Source: IFS database.

* Central bank key rate, twelve-month CPI increase, 1991=1 nominal exchange rate, with higher values indicating a more depreciated exchange rate.

Chart V-4

Monetary conditions in Italy* in the disinflation period

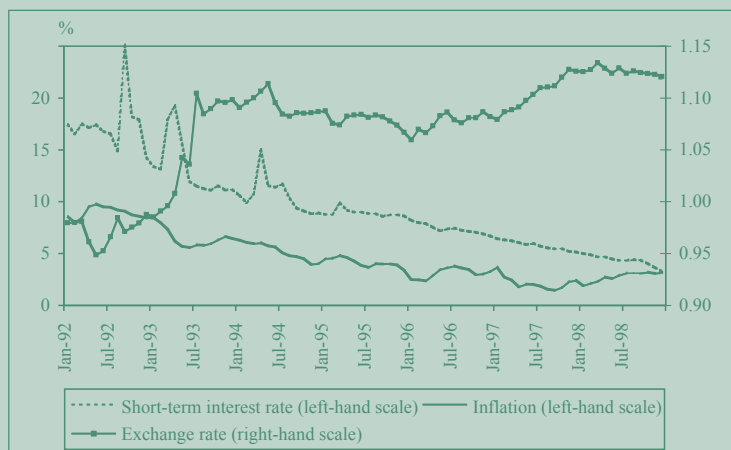


Source: IFS database.

* Three-month interbank rate, twelve-month CPI increase, 1991=1 nominal exchange rate, with higher values indicating a more depreciated exchange rate.

Chart V-5

Monetary conditions in Portugal* in the disinflation period



Source: IFS database.

* Three-month interbank rate, twelve-month CPI increase, 1991=1 nominal exchange rate, with higher values indicating a more depreciated exchange rate.

When looking at the experience of countries forced to implement disinflation in order to comply with the monetary union participation criteria, it should be emphasised that *none of the countries had to tighten monetary conditions in order to eliminate the inflation differential*. In the reference year and the preceding two years, nominal exchange rates had weakened in general, and key rates declined faster than inflation. The monetary developments were primarily the result of conversion speculation, as the level of nominal interest rates had been higher than the EU average in the countries under review and the exchange rate was more appreciated than the pegged central parity, expected to correspond to the prospective conversion rate.¹³⁸ By contrast, fiscal policy was tight in every country, except Portugal. *This economic policy mix facilitated disinflation in a way that did not lead to a decline in GDP growth*, with the exception of Italy, the country forced to undertake the most significant fiscal correction. Economic activity in these countries did not slow down significantly relative to the previous years, as the effect of fiscal tightening was offset by stronger private sector demand.

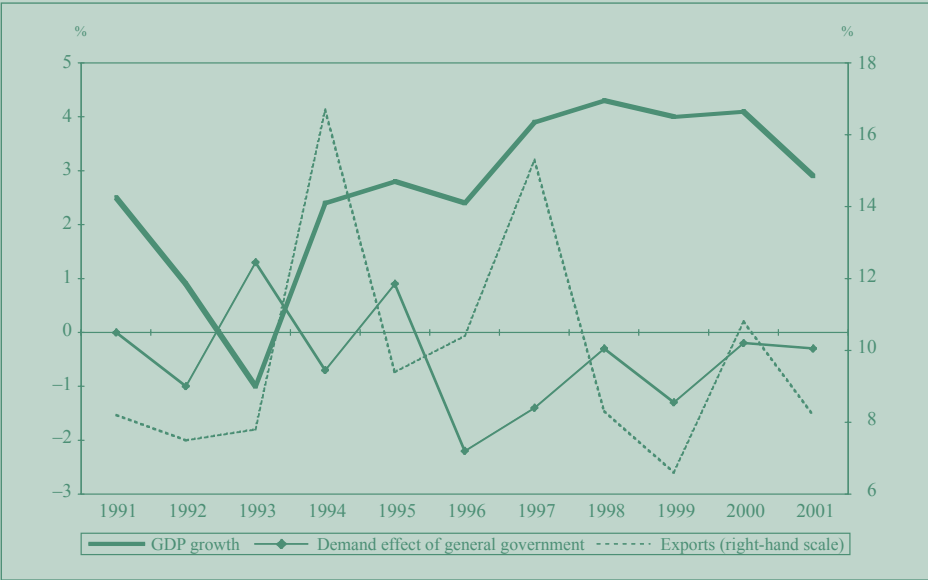
In countries with a similar inflation history to Hungary, the growth sacrifice required for reducing inflation to the level required by the Maastricht criteria was low. In the period from 1995 to 1997, Spain and Italy had below-potential GDP growth only in 1996 (by 0.5 and 0.6%, respectively), while GDP grew above potential in Portugal and Greece in the reference year and the preceding two years. It should be noted for the sake of completeness that due to the ERM crisis, these countries had grown below potential previously, with the widest output gaps recorded in 1994 and 1995 in most countries. Thus, it is possible that disinflation hampered economic recovery and the closing of the output gap.

This buoyant growth was due to several factors, including the global economic boom in the case of Portugal and Spain. After 1996, the European Union experienced an export-led economic boom, due to robust growth in the US and world-wide. External activity was not conducive to growth in the case of Greece in the reference period. Another crucial factor was the credibility

¹³⁸ Speculation on devaluation enabled the central banks to maintain high nominal rates at least at the short end of the yield curve. In order to dampen speculation, Greece and Ireland revalued the central parity by 3%.

effect. Fiscal adjustment demonstrated to market participants their governments' commitment and determination to joining the euro. The entry became increasingly more credible, as is reflected in the convergence of long-term yields at end-1996 and 1997. The drop in interest rates has a stimulating effect on demand. Furthermore, convergence credibility also had an at least as important effect on households' income prospects, with consumer spending picking up pace and the level of household indebtedness increasing over the period.

Chart V-6
GDP growth and its components in the period
of disinflation in Spain



Source: OECD database.

Chart V-7

GDP growth and its components in the period of disinflation in Greece



Source: OECD database.

Chart V-8

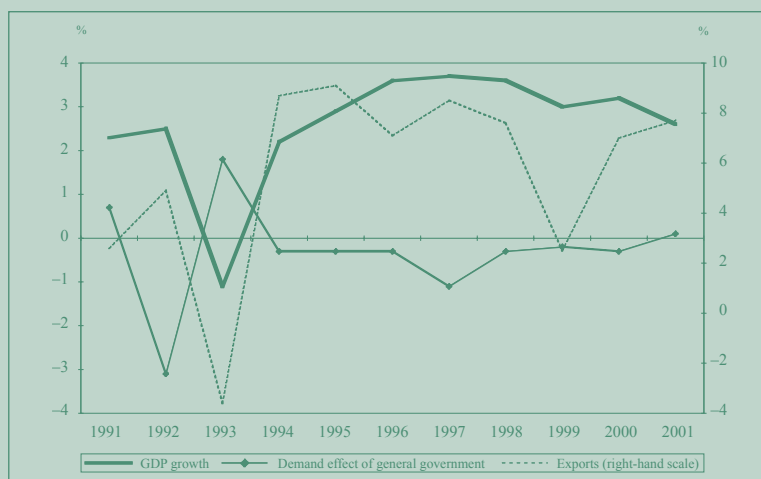
GDP growth and its components in the period of disinflation in Italy



Source: OECD database.

Chart V-9

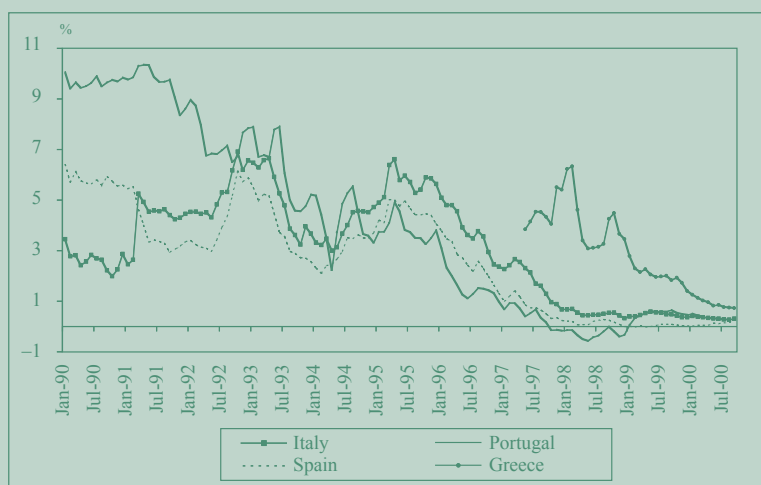
GDP growth and its components in the period of disinflation in Portugal



Source: OECD database.

Chart V-10

Spread between selected countries' government bond yields and ten-year German government bond yields



Source: OECD database.

VI. APPENDICES

VI.1. Effects of negative external demand shocks on Hungarian gross domestic product

As was mentioned earlier, devaluation of the exchange rate may be chosen as one of the tools of an optimal economic policy aimed at improving competitiveness in the event of the economy being hit by an asymmetric negative external demand shock. As the Hungarian and the European economies are deeply integrated with each other, the probability of a shock exclusively affecting one of the two regions is low. If, however, the importance of the sector affected by the impact is higher in one economy than in the other, then the shock may well grow in size to trigger asymmetric effects.

A decline in demand for goods in the member states of the Economic and Monetary Union produced by a given sector may not only have a negative effect on producers of the euro area but on Hungarian firms selling their output to the region as well. The drop in foreign demand¹³⁹ has a direct, medium-term impact on firms producing for exports and on the output of firms, normally selling both in the domestic market and abroad, directed to the external markets. But lower demand encourages foreign companies to stretch out their market presence beyond national borders. Consequently, competition in the domestic market intensifies. This is further aggravated by a part of the volume of goods sold until recently abroad now adding to supply in the domestic market. All this mars the competitive positions of Hungarian market participants previously selling their output domestically. At the same time, sub-contractors, treated as producers for the domestic market in statistical terms and selling their output to firms producing for exports, also may experience a decline in their existing orders. Thus, over the long term, a specific negative demand shock affecting the world or at least the euro

¹³⁹ Here, and in the following, the categories of decline and growth are not only satisfied by change in the absolute sense but by a change in the dynamics of change as well, provided that it is not indicated otherwise.

area may retard output growth and thus the production of value added as well, passing through the entire Hungarian vertical chain of a given sector. Through other linkages (for example, the fall in hours worked reduces household income, which, in turn, may curtail household consumption; or falling revenues of the central budget may cut state demand due to the drop in tax receipts, etc.), this process may spread across other sectors as well. On the whole, a decline in external demand may weaken the performance of an entire economy, through an extended and sophisticated system of interlinked factors.

Earlier, we defined those specified sectors which, due to their importance in the Hungarian economy being significantly higher than the EMU average, might be exposed to asymmetric shocks.¹⁴⁰ The real economic costs of a monetary policy forced into a passive role by accession to the euro area may be defined as the fall in value added of specified industries induced by a potential negative external demand shock. In the following, we attempt to estimate the size of this cost.

A decline in export demand may weaken the performance of the total economy over the long term. We attempt to estimate the spill-over effect on the basis of the negative external demand shock which took place in 1998–99.¹⁴¹ The decline in external demand in the second half of 1998 did not only affect the CEECs – there was also a disruption in growth in manufacturing output of the European Union in the period (see Chart VI-1). Therefore, when analysing the influence of this demand shock on the Hungarian economy, we cannot confine ourselves exclusively to examining a single region, the so-called ‘Eastern markets’.

¹⁴⁰ These are the following: manufacture of computers, manufacture of lighting equipment, manufacture of electrical equipment for engines and vehicles n.e.c., manufacture of electronic components, manufacture of television, radio receivers, sound or video recording, manufacture of road vehicles, manufacture of engines for motor vehicles and parts and accessories for such.

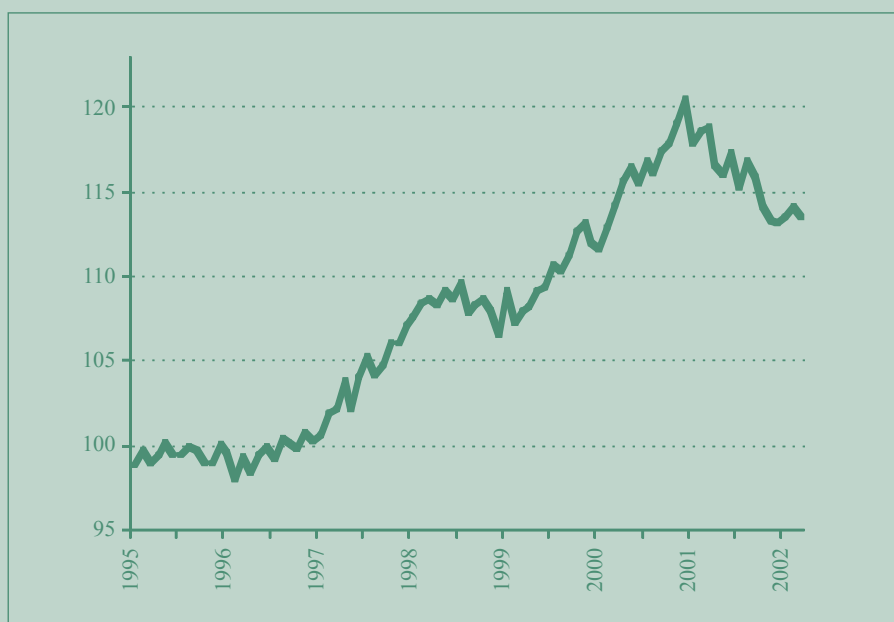
¹⁴¹ It would be legitimate to include the global recession starting in 2001 in the scope of observations. However, the extent of recession cannot be quantified yet and, therefore, conclusion cannot be drawn from such.

¹⁴² As the specified industries all belong to manufacturing, we concentrate our focus on this sector in the analysis.

Chart VI-1

Manufacturing output of the European Union, 1995–2002

Seasonally adjusted data; December 1994=100



Source: Eurostat.

In terms of year-on-year percentage changes, Hungarian manufacturing exports were some 6% lower than the potential at end-1998 and in the first half of 1999.¹⁴³ The slowdown in the rate of export growth also forced actual Hungarian GDP below the potential level. Slower economic growth resulted in a loss of nearly 2% of GDP, measured on the basis of year-on-year percentage changes. This rough calculation helps us to draw the general conclusion that a 1% fall in exports is associated with an around 0.3% drop in GDP.

¹⁴³ Here and elsewhere in the analysis, by potential we mean the time series as produced using the Hodrick-Prescott approach. Much longer time series would be required to applying the method reliably, therefore, we consider these calculations as experimental.

Chart VI-2

Hungarian manufacturing export sales, 1997–2002

Seasonally adjusted data; 1992=100



Sources: CSO; NBH calculations.

It is important to point out that the slowdown in export demand in 1998–99 did not or only slightly affect machinery and equipment comprising the majority of the specified industries (see Chart F–3).¹⁴⁴ The degrees to which the various sectors are integrated into the whole economy are different and, moreover, vary constantly over time. Therefore, caution is required when applying the multiplier effect, stemming from the empirical investigations presented above, to the various sectors, particularly machinery and equipment, and to later periods.

¹⁴⁴ Whereas machinery and equipment, which contributes some half of total industrial output, was not perceptibly affected by the recession in 1998–99, the sector was not left unaffected by last year's decline in demand for exports.

Chart VI-3

Comparison of economic growth in the European Union and export sales of Hungarian machinery and equipment

Time series of EU growth on year-on-year basis; time series of machinery and equipment adjusted for seasonal and working-day effects; 1992=100)

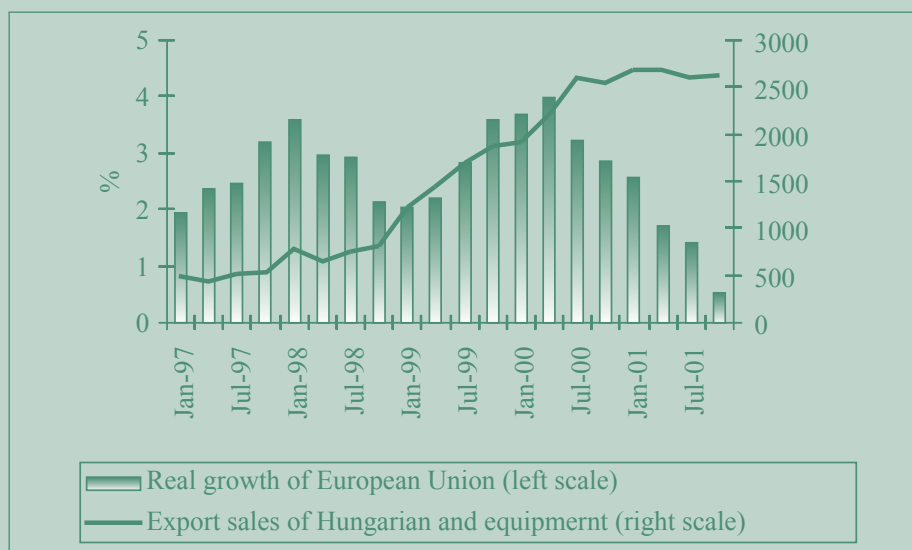


Table F-1**Effect on GDP of a fall in exports by specified industries¹⁴⁶**

Industries	Gross value added per exports as a per cent of GDP	Gross value added of the entire sector as per cent of GDP	Per cent fall in GDP as an effect of a 10% fall in exports*
Manufacture of road vehicles	2.1	2.3	0.68
Manufacture of computers	0.4	0.5	0.14
Manufacture of lighting equipment	0.4	0.5	0.14
Manufacture of electronic components	0.3	0.4	0.13
Manufacture of electrical equipment for engines and vehicles	0.3	0.3	0.08
Television, radio receivers etc.	0.2	0.3	0.09
Manufacturing firms, total	9.1	18.3**	

Notes: * Using the value deriving from the empirical observation of the multiplier effect.

** Data released by CSO differ because of the different database.

Source: APEH's database of corporate tax returns for 2000.

For example, when exports of road vehicle manufacturers suffer a decline of 10%, and the cyclical position of the European Union remains unchanged, Hungarian GDP may fall by some 0.7% over the long term relative to its earlier path. Assuming that exchange rate policy were able to handle such an export demand shock effectively, then, following Hungary's joining the euro area, the decline in GDP caused by the negative external shocks hitting the industries exposed to asymmetric and specific shocks would be accounted for as the real economic costs of giving up the independent monetary policy. But even this, the largest economic sector, only contributes 2.3% to total GDP; and adjustment of the exchange rate would also boost demand for goods produced by the competitive sector left unaffected by the asymmetric shock. For this reason, we maintain that an independent exchange rate policy is an inappropriate tool to handle negative external demand shocks hitting the specified industries.

¹⁴⁶ It deserves special mention that, within the specified industries, the proportion of firms producing in customs-free areas is very large. These firms are characterised by salient foreign trade volumes relative to gross value added. According to a 1999 survey, total GDP produced by firms located in customs-free zones was HUF 411 billion, while their exports exceeded HUF 2,400 billion, compared with imports amounting to HUF 2,070 billion.

VI.2. Identifying supply and demand shock using structural VAR estimates

The effect of a supply shock hitting an economy can be identified in two steps. After choosing the appropriate time series, mostly a real and a related nominal variable, the systematic relationship between the two must be estimated in the first step. Assuming first order integrated variables, this produces the estimation of the vector autoregression model as follows:

$$\begin{pmatrix} \Delta y_t \\ \Delta p_t \end{pmatrix} = \sum_{i=1}^q A_i \begin{pmatrix} \Delta y_{t-i} \\ \Delta p_{t-i} \end{pmatrix} + \begin{pmatrix} e_t^y \\ e_t^p \end{pmatrix} \quad (1)$$

where y and p denote the natural logarithm of the real quantity and the price relating to it, and e^y and e^p are the two random shocks affecting the two variables which may correlate with each other. A_1, \dots, A_q are the estimated coefficient matrixes. In the second step, we decompose the random terms by imposing structural restrictions, and the shocks calculated this way can now be readily interpreted in economic terms. In our assumption, the actual data generating process is as follows:

$$\begin{pmatrix} \Delta y_t \\ \Delta p_t \end{pmatrix} = \sum_{i=0}^{\infty} L^i B_i \begin{pmatrix} \varepsilon_t^d \\ \varepsilon_t^s \end{pmatrix} \quad (2)$$

where L is the lag operator, ε^d and ε^s are shocks affecting demand and supply respectively, and matrixes B_i represent the corresponding impulse response functions for output and the price level.

In case the stationarity assumptions are met, the estimated VAR model can be written in an infinite MA form similar to the structural model:

$$\begin{pmatrix} \Delta y_t \\ \Delta p_t \end{pmatrix} = \begin{pmatrix} e_t^y \\ e_t^p \end{pmatrix} + \sum_{i=1}^{\infty} L^i D_i \begin{pmatrix} e_t^y \\ e_t^p \end{pmatrix} \quad (3)$$

The relationship between the residues of the estimated model and the structural shocks can be written as $e=C\epsilon$. In addition to the orthonormality of the structural shocks, another condition is required for the exact identification of C . As our purpose is to segregate demand and supply shocks, it is the most straightforward and most frequently used restriction in such cases that *demand shocks do not alter the level of output over the long term*.¹⁴⁷

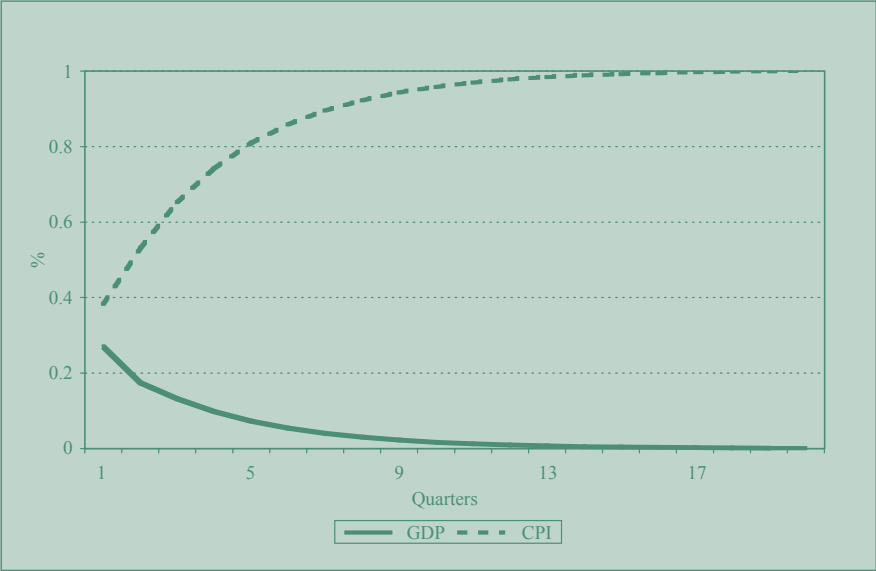
We performed the estimate using GDP and consumer price data in a quarterly breakdown, taking into account that GDP data for the accession countries examined are only available from 1992–93. Although the GDP deflator would be more suitable as a price variable, we chose the consumer prices, due to the better reliability of data.

The GDP time series used for the purposes of the estimate are at constant prices, as provided by OECD. The sources of consumer prices are the IFS database of IMF and the CSO in the case of Hungary. We seasonally adjusted all time series using the model-based approach of the TRAMO-SEATS software. There was a shift in German GDP in 1991 Q1 due to reunification, which we corrected by averaging the first difference between the logarithms of seasonally adjusted 1990 Q4 and 1991 Q2 for 1991 Q1. We used the logarithmic differences of the seasonally adjusted and corrected levels in the estimate. As a first step, we estimated two-variable VAR models for the sample covering the period 1980 Q1–2000 Q4 for developed countries. In defining the number of lags, we relied on the Akaike Information Criterion. In the case of a few countries, the impulse response functions proved to be counterintuitive; therefore, we reduced the number of lags according to the Schwarz Criterion in the

¹⁴⁷ In respect of the coefficient matrixes of the structural equation this means that $\sum_{i=0}^{\infty} b_{11,i} = 0$, i.e. the sum of elements on the upper left is zero.

case of these countries. Then, all impulse responses had the expected sign over the long term. The number of lags was 1–2 for each country, with the exceptions of Portugal and Luxembourg (6–6), Spain (4) and Ireland (3).

Chart VI-4
Hungarian impulse response functions (demand shock*)



* For the sake of better comparability, we normalised the shocks in order for the effect on consumer price levels to be 1 per cent on the 20-quarter horizon.

Chart VI-5

Hungarian impulse response functions (supply shock*)

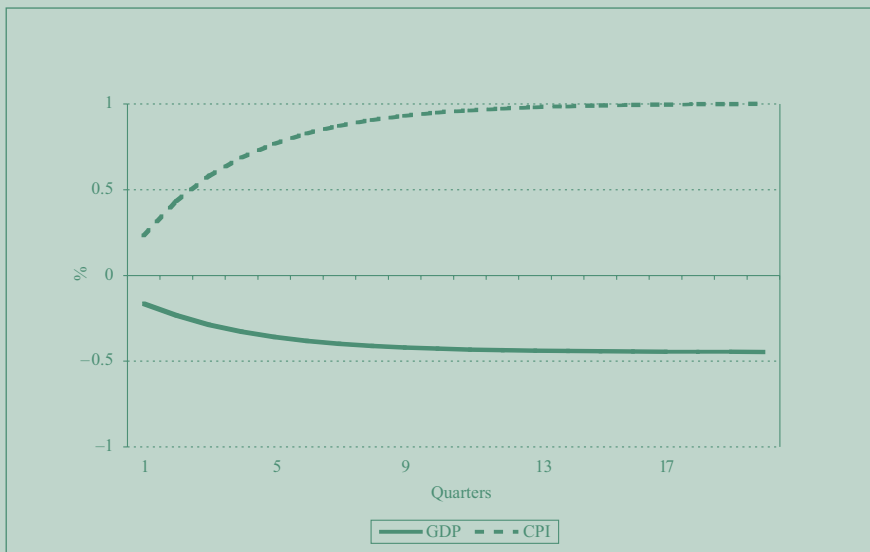
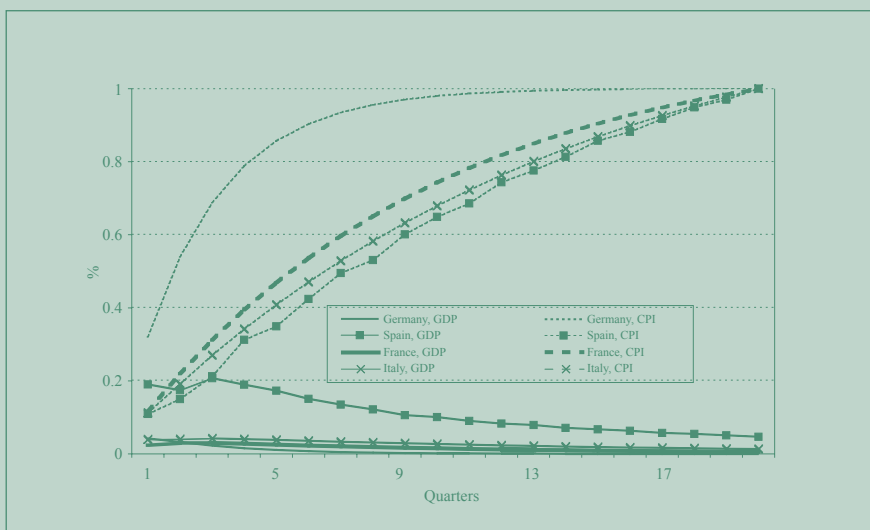


Chart VI-6

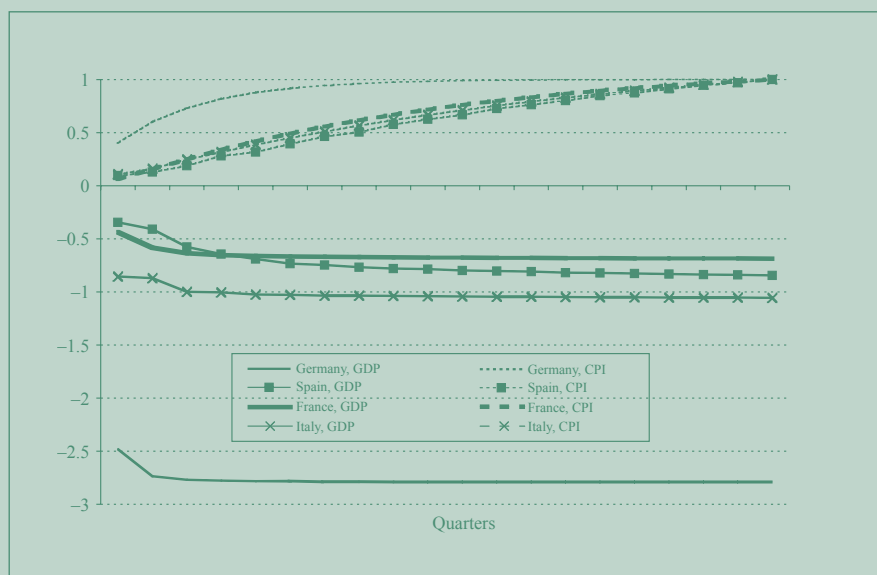
Impulse response functions (demand shock, * EMU members)



* For the sake of better comparability, we normalised the shocks in order for the effect on consumer price levels to be 1 per cent on the 20-quarter horizon.

Chart VI-7

Impulse response functions (supply shock,* EMU members)



* For the sake of better comparability, we normalised the shocks in order for the effect on consumer price levels to be 1 per cent on the 20-quarter horizon.

We derived the time series for supply and demand shocks which we called 'European' from the individual demand and supply shocks, using their first principal component. As a next step, we estimated the structural VAR models for the accession countries using the strategy described above, for the period 1992–2000, and related the demand and supply shocks obtained this way to the European. It is important to note that we did not use the shocks to accession countries in order to define the European first principal component.

Table VI-2**Variance explained by the first principal component (per cent)**

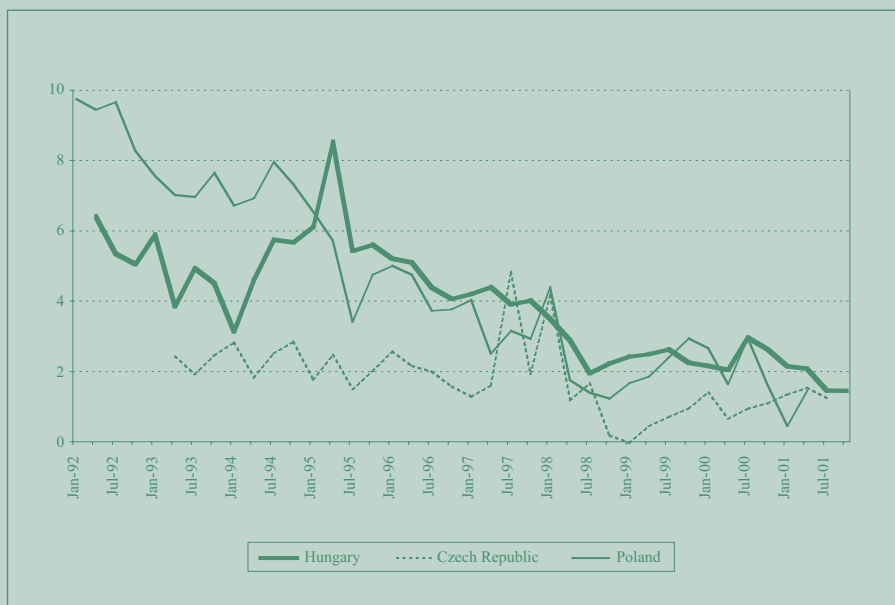
	Demand	Supply		Demand	Supply
Austria	18	2	Luxembourg	29	13
Belgium	44	40	Great Britannia	18	3
Denmark	7	20	Germany	39	20
Finland	12	26	Norway	7	0
France	15	45	Italy	16	30
Greece	3	13	Portugal	2	17
Netherlands	26	17	Spain	16	4
Ireland	26	0	Switzerland	42	5
Iceland	1	7	Sweden	5	32

We would like to place the emphasis on two factors in respect of the *interpretation and interpretability of our results*. First, due to the short time series for the accession countries, we used quarterly data in the calculations, and the correlation coefficients obtained only measure quarterly simultaneous co-movements. Averaging the demand and supply shocks for longer periods, the results may change significantly. For example, Hungary's supply correlation with the European component is 0.25 between 1996–2000, provided that the quarterly shocks are considered. This value, however, rises above 0.6 in the same period, if four-quarter moving averages are used, given that there is a high cross-correlation between the time series lagged by 1–2 periods.

Chart VI-8

Inflation in the accession countries

Quarterly growth rates, seasonally adjusted



The reliability of our results and those obtained by other authors using similar time series is considerably limited by the clearly observable trends in inflation of the accession countries, and particularly in that of Hungary and Poland (see Chart VI-8). However, the method outlined above builds on the stationarity of the first differences. Unit root and stationarity tests show a mixed picture, i.e. the presence of a unit root can neither be confirmed nor rejected at high significance level.

VI.3. The model used to estimate foreign trade expansion

In the section of our cost-benefit analysis, dealing with trade expansion, we used the gravity model derived by Anderson and van Wincoop (2000) (hereinafter: AW) to obtain the required estimate. The main features of the model are full specialisation (i.e. one country produces a single product) and the CES-type utility function, which AW employ to derive a simple equation for the volume of trade (x_{ij}) between countries i and j , as follows:

$$x_{ij} = \frac{y_i y_j}{y^w} \left(\frac{t_{ij}}{P_i P_j} \right)^{1-\sigma} \quad (1)$$

where y_i is the nominal GDP of country i -th, y^w is the world's total nominal output, σ is the elasticity of substitution between goods of the countries, t_{ij} is the mark-up reflected in prices due to trade barriers and P_i is the price index of country i , which positively correlates with the sum of bilateral trade barriers between i and all of its trading partners. The domestic price index P_i , therefore, can be expressed as the function of bilateral trade barriers t_{ij} .

Thus, the volume of trade between a pair of countries in the model depends on the size of the bilateral trade barrier *relative to the average of barriers to trade with all trading partners*.

Currency union between a pair of countries reduces the bilateral trade barrier. However, the effect of this on trade between the two countries depends on the extent of this reduction relative to the reduction in barriers to trade with all trading partners. In other words, if a country forms a currency union with another which has previously had a large importance in its foreign trade, then the expansion of trade within the new union will be relatively slight, given the not too large fall in bilateral barrier relative to that in the average multilateral trade barrier. This may be true even if the entry into currency union otherwise significantly reduces bilateral trade barriers within the union. It should be noted that this same situation applies to the case of Hungary's joining EMU, given that, even before entry into the currency union, EMU has already been by far the most important trading partner for Hungary.

However slim the expansion of bilateral trade may be, the reduction in trade barriers as a result of entry into the currency union has a positive effect on welfare, as less resources are wasted on account of barriers. This will be reflected in the fall in the domestic price index P_i . Demonstrably, in the case of the CES utility function the welfare gain is commensurate with $(1/P_i)^2$. The more member states trade with each other prior to establishing the currency union, the higher the gain in welfare will be after entry into the currency union. The welfare gain, therefore, will be the highest in currency unions where the expansion of trade is the slightest.

The model developed by AW has proved to be an excellent tool in the empirical examination of the effects of currency unions on trade and welfare. This examination can be performed in three steps. The first step is to estimate the size of bilateral trade barriers (t_{ij}). In practice, this is carried out with a large panel regression, where the observed trade barrier is regressed on factors which are presumably the determinants of trade barrier t_{ij} . Such variables are, for example, the distance between the two countries, their GDP, dummy variables for a shared border, common language, common colonial past, existence of a free-trade agreement, etc. The dummy variable relating to the existence of currency union is also among these explanatory variables. The estimation conducted this way is essentially little different from the estimate performed using a standard 'gravity' model.

The next step is to express price levels P_i from bilateral trade barriers t_{ij} . Calculation of these for all countries is carried out simultaneously, and it requires a complex numerical optimisation involving numerous computations.

The third step is to calculate price levels P_i simultaneously again, but this time we simulate the effects of a hypothesised currency union. Accordingly, trade barriers t_{ij} among members of the currency union will be lower, corresponding to the parameter of the currency union dummy variable obtained in the first step, i.e. in estimating the 'gravity' model.

Then, the effect of the currency union on trade and welfare can simply be calculated by substituting price levels P_i , obtained in steps one and two, into equation (1) and expression $(1/P_i)^2$, and by comparing them.

In order to estimate the effect of Hungary's joining EMU, we used the GAUSS code referred to in the article by Rose and van Wincoop (2000) and developed by the authors themselves, which functions using the three-step approach described

above.¹⁴⁸ We modified the programme to enable ourselves to not only calculate the effects of the currency union on trade and welfare for the average of the members, but for the individual countries as well. The reason for this approach is that it has a crucial economic policy importance for the newly acceding countries. The programme allows us to examine the effects of a hypothetical currency union of any composition. Thus, we were able to examine a number of highly important scenarios which were not discussed by the article by Rose and van Wincoop. In our cost-benefit analysis, the scenario 'Hungary joins EMU' played the central role. In addition to this, we also calculated, and published in the paper, the results of the scenario 'the Czech Republic, Poland and Hungary join EMU' as well.

VI.4. Description of the calibrated growth model

We attempted to measure the effect of a reduction in real interest rates and the release of current account and debt constraint by adapting the BMS model by Barro, Mankiw and Sala-i-Martin (1995). The key problem of the model is that convergence of small open economies is a slower process, and capital inflow is more moderate, than one would expect based on the equalisation of returns. One of the possible explanations for this is the adjustment cost of investment. However, the BMS model attempts to explain this phenomenon in a different manner, by postulating that there exists an upper limit to capital flows, accompanied by another one to the accumulation of debt by a country. From this it follows that returns only equalise over the longer term and amid slower capital flows relative to an ideal world.

The BMS model assumes that a country may accumulate debt only to the extent of its physical capital stock, as foreign creditors require a collateral for their debts, but they do not accept human capital, but rather physical capital, as a collateral. In the case of the parameters used by BMS, i.e. when the share parameter of physical capital is $\alpha=0.3$, the model would produce a more than 200% debt-to-GDP ratio, which cannot be seen in emerging markets and not even in developed countries. Therefore, we need to find a more stringent constraint than the amount of physical capital in order to enable ourselves to adapt the model to Hungary. In our view, it

¹⁴⁸ The programme is downloadable from Andrew Rose's web site:
<http://faculty.haas.berkeley.edu/arose/>

is not necessary to give a concrete interpretation of the issue of what kinds of capital goods could provide a collateral for debt. Simply we assume that there exists such a group of capital goods, and we define the share parameter α with the goal of enabling ourselves to reproduce the debt-to-GDP ratio observable empirically in the case of Hungary. Furthermore, we assume that the share parameter β represents all other physical and human capital goods, i.e. $\alpha + \beta$ is the share of the country's total capital stock.

The solution of the BMS model can be characterised basically by three indicators. One is λ , which measures the speed of economic convergence, i.e.

$$\log(y_{t+1}) - \log(y_t) = \lambda [\log(y^*) - \log(y_t)], \quad (1)$$

where y_t is per-capita GDP normalised by the level of technological development. This same indicator is denoted by y^* in developed countries (y^* is constant, which means that in developed countries per-capita GDP is on a balanced growth path determined by exogenous technological progress). As the model implies that countries with lower per-capita GDP converge to developed countries, i.e. y_t converges to y^* , therefore λ is positive. λ measures the extent of the reduction in the percentage difference between y^* and y_t over the next period. Barro and Sala-i-Martin (1995) also demonstrate on page 37 of their textbook that $\ln(2)/\lambda$ measures the so-called half-life of convergence. It shows how many years it takes for the actual difference between y^* and y_t to reduce to a half.¹⁴⁹

In the BMS model, the parameter λ is a function of the following parameters: α and β denote capital share parameters, n denotes the rate of growth of population, g denotes the measure of technological progress, δ denotes the rate of depreciation, ρ denotes the subjective discount factor of the representative consumer and θ denotes the marginal rate of intertemporal substitution.

Let us notice that the real interest rate does not play a role in defining λ . The real rate of interest is important from the perspective of the two other significant coefficients characterising the solution of the model. Let us denote capital goods available as a collateral for foreign debt by k_t and the rest by h_t . In equilibrium, the

¹⁴⁹ From this it clearly follows that in case of a constant half-life of convergence the distance reduces to one fourth in two periods and to one eighth in three periods.

foreign debt-to-GDP ratio is equal to the k_t/y_t ratio. This is determined by the formula as follows:

$$\frac{k_t}{y_t} = \frac{\alpha}{r + \delta} \quad (2)$$

where r is the real interest rate. With a given real interest rate, depreciation rate and debt-to-GDP ratio, the size of α can be determined from this formula. In the model, the connection between y and h is determined by the equation as follows:

$$y_t = Bh_t\varepsilon \quad (3)$$

where ε is the function of the capital share parameters, and

$$B = \left[\frac{a}{r + \delta} \right]^{\frac{\alpha}{1-\alpha}} \quad (4)$$

For the purposes of our calculation, we set most of the model parameters as in international literature and in BMS – $\alpha+\beta=0.8$, $g=0.02$, $\delta=0.05$, $\theta=2$, $\rho=0.02$. We chose the rate of growth of the population to be $n=0$, conforming with the Hungarian circumstances. We calculated the size of parameter a from the debt-to-GDP ratio according to the method as described in the previous paragraph. We considered two versions in the model. In the first, the fall in real interest rates is associated with a 60% debt-to-GDP ratio, i.e. the present value (this is debt taken in the broad sense, i.e. it not only includes debts but all claims as well); and we also considered a case in which the debt constraint eases, and the initial debt-to-GDP ratio is 80%. In the first version, $\alpha=0.087$ and $\alpha=0.116$ in the second version. Furthermore, we assumed that, in the initial position, Hungarian per-capita GDP is half of that in developed countries, i.e. $y_0=y^*/2$. This corresponds to the empirical values calculated on a purchasing power parity basis.

In the model, we captured the change in real interest rates using the approach as follows. The starting position is $t=0$, and the economy features a higher real interest rate. We assume that in the early phase of $t=1$ the real interest rate falls; then, on the

basis of formula (4), B increases and, as a result, y_1 also increases relative to y_0 , based on formula (3). Thereafter, B remains constant, and the evolution of y can be written using equation (1). Although from $t=1$ the growth rate of variables is determined by λ on the basis of equation (1), which does not depend on the real interest rate, this does not mean that the reduction in the real interest rate does not influence the average growth rate during the period examined. Explanation for this is that the effect of the reduction in the real interest rate can be captured in the period between $t=0$ and $t=1$. Consequently, the real interest rate influences the growth rate over the entire period between $t=0$ and T . The one-off jump between $t=0$ and $t=1$ can be explained by the fact that investment related to k_t is not associated with adjustment cost in the model.

As mentioned earlier, the reduction in the debt constraint can be captured by choosing $\alpha=0.116$ instead of $\alpha=0.087$ as a share parameter. An increase in the parameter raises λ in equation (1) and B in equation (4); consequently, the growth rate between $t=0$ and T will increase.

GLOSSARY

Copenhagen criteria	The conditions for membership in the European Union were defined by the Copenhagen European Council. Accordingly, candidates have to meet certain political, economic and legal criteria.
ECB	European Central Bank. The central institution of the Eurosystem and the ESCB. Its governing bodies also function as the decision-making bodies of the Eurosystem.
Ecofin	Council of Ministers for Economic and Financial Affairs. The supreme decision-making body of the European Union, in which the governments of the Member States are represented at the ministerial level. Its composition varies according to the agenda – ministers of the Member States responsible for the matters under consideration attend the Council meetings. Normally, the economic policy issues relevant to Economic and Monetary Union are discussed by Ecofin.
EMU	Economic and Monetary Union. An important stage of European monetary integration, as a result of which countries that meet the Maastricht criteria introduce a common currency and give up their independent exchange rate and monetary policies.
ERM II	Exchange Rate Mechanism II. A not compulsory exchange rate arrangement for currencies of EU Member States not participating in the euro area.
ESA 95	The statistical system of the Eurosystem which provides a description of the national economies of the Member States. It is consistent with the principles of the SNA, the internationally used accounting methodology. The ESA 95

provides a very detailed methodology of calculating general government sector deficit. One of the Maastricht criteria refers to this category as defined by ESA 95.

ESCB	European System of Central Banks. It consists of the European Central Bank and the national central banks (NCBs) of all Member States of the European Union. The ESCB provides a framework for monetary and exchange rate policy cooperation between the Eurosystem and the NCBs of the Member States which have not yet adopted the euro.
European Commission, EC	The independent administrative body of the European Union. It is responsible for the implementation of Community policies (e.g. common agricultural policy), administration of the Community budget and the arrangement for Community programmes. It is also a crucial part of the European legislation process – it submits proposals to the European Parliament and the Council, on which they have to make decisions.
Eurostat	The statistical office of the European Union.
Eurosystem	The central bank of the euro area. It is responsible for developing and implementing the common monetary policy. The central institution of the Eurosystem is the European Central Bank and its branches are the national central banks of euro area Member States.
Governing Council	The supreme decision-making body of the European Central Bank and the Eurosystem. The Governing Council defines the monetary policy guidelines for the euro area and the method of implementing them. It comprises the governors of the national central banks of the Member States that have adopted the euro and all the members of the Executive Board of the ECB.

HICP	Harmonised Indices of Consumer Prices. The purposes of examining of the inflation convergence criterion and assessing price stability have necessitated to construct national price indices on a comparable basis and harmonise the differences national definitions.
Maastricht criteria	The requirements of membership in Economic and Monetary Union were defined by the Maastricht Treaty. The convergence criteria refer to price stability, long-term interest rate convergence, sustainable budgetary position and exchange rate stability.
NIGEM model	The macroeconomic model developed by the London-based NIESR research institute. Its main areas of use are analyses of various world economic effects, real economic forecasts at regular intervals and economic policy simulations.
OCA	Optimum Currency Area. The OCA theory provides the theoretical conditions of exchange rate pegging between countries.
Opt-out	The right to stay out. An option either to participate in the stages of monetary integration (e.g. ERM II and EMU) or stay out. The Maastricht Treaty provided Great Britain and Denmark with an exclusive right to opt out. However, the EU ruled out this option in the case of new members.
SNA	A statistical system developed jointly by the UNO, the European Commission, the International Monetary Fund and the OECD and used world-wide. There are differences between this and the definition of 'SNA-based' general government deficit in the publications of the National Bank of Hungary. In many respects, this category of deficit is common with the genuine accounting method of the SNA, but actually it is an analytical-economic indicator.

Stability and
Growth Pact, SGP

The Pact clarifies the excessive deficit procedure defined in the Maastricht Treaty. Accordingly, (i) it requires that the government deficit must be kept below the reference value of 3% of GDP in periods of normal cyclical fluctuations, (ii) it defines the nature of sanctions that may be imposed in the event of a breach of the reference value, (iii) it establishes stringent deadlines for implementing the various steps of the excessive deficit procedure and (iv) it requires preparing stability programmes for the period after adoption of the euro.

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