

Determinants of the current accounts in central and east European EU member states and the role of German direct investment

Most of the eight new central and east European EU member states have posted large current account deficits over the past few years. This reflects the real transfer of resources that is typically associated with the economic catching-up process in these countries. Foreign direct investment plays a special role in this context. Not only does it have a direct impact on the balance of payments through the transfer of capital; in the long term, the ongoing operations of subsidiaries also influence foreign trade and profit distributions and hence the current account of the host country. The increased integration into the international division of labour arising from foreign direct investment should generally promote the sustainability of the foreign trade positions of the new EU member states. However, the net effect on the balance of trade depends strongly on the motivation of foreign investors and the sectors to which the subsidiaries belong. In this respect, it can be shown that it is, above all, foreign direct investment in technology-intensive sectors which has a positive impact on the balance sheet performance of the recipient country.

Current account deficits and monetary integration

While marked current account deficits may be a normal side effect of economic catching-

*Monetary
integration
calls for
sustainable
current
accounts...*

up processes, they may also pose a major obstacle to the future monetary integration of the central and east European economies into the euro area, especially in the event of imbalanced developments. Exchange rate adjustments that might hamper the convergence process cannot be ruled out *a priori*, particularly if there are marked current account imbalances.¹

*... within
ERM II...*

Fundamentally, therefore, the sustainability of the external economic position of member states should be examined at each stage towards deeper monetary integration. For example, the Baltic economies, upon accession to the European Exchange Rate Mechanism (ERM II), rightly undertook to make a substantial reduction in their current account deficits, even though participation in ERM II is not tied to the same strict economic requirements as accession to monetary union.²

*... and the
euro area*

Following accession to monetary union, exchange rate adjustments are, by definition, impossible. In order to prevent tensions within the single currency area and the resultant adjustments to the real economy, Article 121 (1) of the EC Treaty stipulates that the European Central Bank and the European Commission shall also take into account the status and development of current accounts when carrying out convergence assessments.

Development and structure of the current accounts in the central and east European EU member states

The current accounts in the central and east European economies of the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia have shown significant fluctuations throughout the period since 1994. While, at the start of this period, the current account deficits were still generally moderate or the current accounts were even in surplus in some cases, the balances became increasingly negative in the mid-1990s as economic activity increased and trade relations were intensified. The Russia crisis in 1998 and the subsequent general economic downturn brought about a temporary slight reduction in deficits. However, there was a renewed sharp rise in deficits at the start of the new millennium. According to estimates, the current account situation in the majority of countries studied was only set to ease again somewhat in 2005.

*Present large
current account
deficits...*

In the past two years, four out of the eight new central and east European EU member states posted a deficit of over 6% of gross domestic product (GDP). On an average of this period, the negative balances in relation to GDP were highest in the Baltic economies. While Lithuania has reduced its deficits considerably from just under 12% to below 9% over the past few years, Estonia and Latvia's

¹ See Deutsche Bundesbank, Developments in the external economic relations of the EU accession countries in central and eastern Europe, December 2002 *Monthly Report*, pp 49-67.

² See the ECB press releases of 27 June 2004 and 29 April 2005.

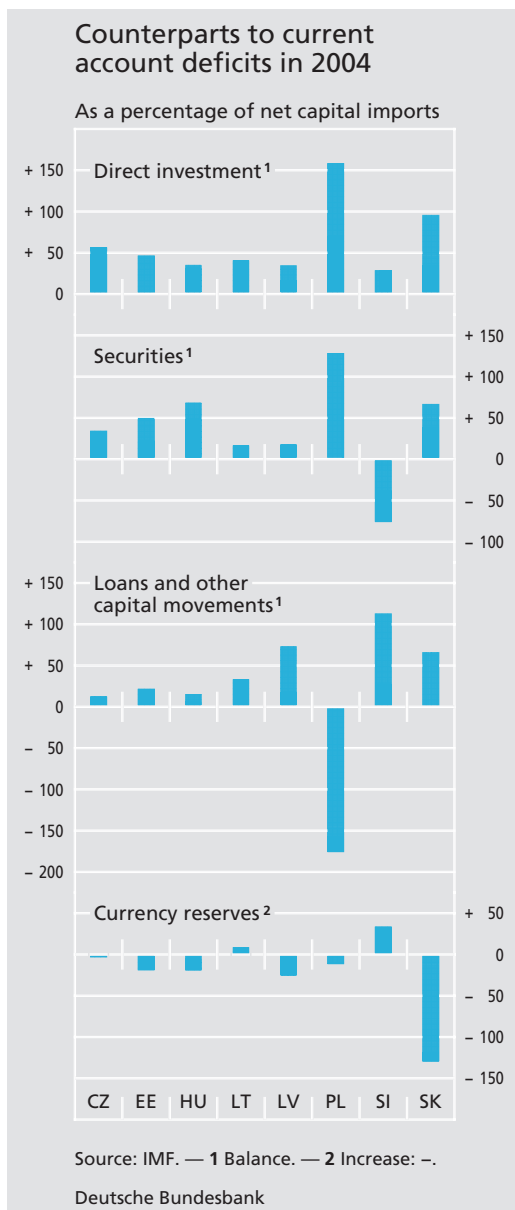
Current accounts of the central and east European EU member states (EU-8)

Balances as a percentage of national GDP



Source: Eurostat.

Deutsche Bundesbank



deficits were still above 10% of GDP in 2005.³

Whether the existing current account balances represent sustainable external positions cannot be determined solely by the size of the deficits. Instead, account also has to be taken of further indicators such as the composition of capital inflows, the development

of currency reserves, the stability of the financial sector, and existing foreign debt.

A more detailed examination of the counterparts of the current account in the central and east European economies reveals a marked rise in foreign direct investment in the mid-1990s. In Poland, this trend has even continued up to the present. In all the other countries, however, the relative importance of direct investment when compared with other capital inflows has decreased during the past few years. As a mirror image of this, loans from abroad, as at the start of the transformation process, have again accounted for an increasing share of the total inflow of funds. Portfolio investments have likewise become more important over the past few years and now constitute a major item in capital movements, above all, in the larger economies under study.

Viewed in isolation, unfavourable developments in the financing structure, such as the trend decline in the importance of foreign direct investment, might increase the risk of short-term and abrupt capital movements. However, this is offset by the fact that the build-up of reserve assets in the countries concerned is continuing at a rapid pace. Capital inflows therefore remain greater than the financing requirements of the current account. Taken by itself, this bolsters the sustainability of the current accounts. Hence, growing currency reserves help to create confidence in the national currency and increase

Favourable financial structure to date

Ongoing build-up of currency reserves

³ The figures given for 2005 are estimates.

... not yet in themselves a cause for concern

Financial indicators of the central and east European member states in 2004

As a percentage

| Item | Czech Republic (CZ) | Estonia (EE) | Hungary (HU) | Lithuania (LT) | Latvia (LV) | Poland (PL) | Slovenia (SI) | Slovakia (SK) |
|---|---------------------|--------------|--------------|----------------|-------------|-------------|---------------|---------------|
| Overall return on credit institutions' capital ¹ | 1.29 | 2.02 | 1.89 | 0.94 | 1.51 | 1.32 | 0.62 | 1.03 |
| Foreign ownership of bank assets ² | 96.2 | 98.5 | 62.5 | 92.3 | 48.1 | 67.3 | 19.3 | 92.9 |
| Growth of loans ³ | 1.7 | 28.2 | 11.7 | 32.0 | 40.4 | 3.3 | 19.4 | 6.9 |
| Gross reserves to imports ⁴ | 4.4 | 2.0 | 2.8 | 3.3 | 2.8 | 4.4 | 6.1 | 5.5 |
| Foreign debt to gross domestic product | 42.3 | 89.1 | 70.4 | 47.0 | 80.0 | 52.3 | 65.1 | 57.7 |

Sources: European Bank for Reconstruction and Development, Eurostat, European Central Bank. — ¹ After taxes and extraordinary items. — ² Total assets of banks in foreign ownership as a percentage of the banking sector's total assets. — ³ Total

loans to residents granted by money-creating credit and financial institutions (consolidated). — ⁴ Gross reserves excluding gold in import months of goods and services.

Deutsche Bundesbank

the potential for defending the exchange rates in ERM II.

Stability of financial sector improved but high credit growth recently

The stability of the financial sector in the central and east European EU member states has generally improved over the past few years.⁴ Alongside improved financial supervision, this is also due to the large foreign holdings in the national credit institutions. In some countries, the level of foreign shareholders amounts to almost 100%. However, the sharp rise in lending recently could point to certain signs of overheating, which experience has shown to harbour risks when combined with large current account deficits.

Foreign debt largely non-critical

Foreign debt does not currently pose a serious problem for most of the central and east European economies. It is only in Estonia,

Hungary and Latvia that foreign debt is comparatively high and significantly above the threshold of 60% of GDP which is often regarded as critical.⁵ The ongoing development in these countries therefore has to be monitored closely. Foreign debt is slightly above 60% of GDP in Slovenia, too. Given a current account that is almost in balance, this appears to be less of a problem, however.

⁴ See European Central Bank (2005), EU Banking Sector Stability, Frankfurt am Main, and European Central Bank (2005), Banking Structures in the New EU Member States, Frankfurt am Main.

⁵ For an analysis of debt ratios, see, for example, International Monetary Fund and International Development Association (2004), Debt Sustainability in Low-Income Countries: Further Considerations on an Operational Framework and Policy Implications, Washington DC. The critical thresholds are derived from the institutional strength and the quality of economic policy in the individual national economies. A foreign debt threshold of 60% of GDP may be assumed for new EU member states with a good economic performance.

Besides the external financing aspect, the causes of current account developments are also relevant for assessing the sustainability of current account balances. These causes are the focus of the studies presented here, which aim to point out the risks that exist and to indicate the extent to which a reduction in the prevailing current account deficits can be expected in the new EU member states in the medium term.

The current account as a reflection of an economy's savings and investment decisions

Savings-investment gap as domestic counterpart to current account

The domestic counterparts to the current account form the starting point of the investigations. To this end, the development of the current account is interpreted as the result of the aggregated savings and investment decisions of an economy. By definition, the current account balance corresponds to the difference between domestic saving and home investment. The determinants of private saving thus constitute key explanatory variables of a country's current account balance.

Borrowing by "catching up" economies in expectation of rising incomes

The "stage of development hypothesis" assumes that the saving ratio is influenced by the relative income level of a national economy. The national per capita income in relation to the per capita income of a given benchmark country indicates an economy's stage of development. If consumption smoothing over time is assumed, households in economies that are catching up will initially borrow from abroad in the expectation that incomes will rise. As the standard of living

converges, the saving ratio is likely to rise accordingly, however, thus allowing a reduction in external debt over the longer term. Econometric analyses of the determinants of current account balances in the eight new central and east European EU member states do indeed show that the comparatively low per capita income of these countries has a negative impact on their saving ratio. (See comments on page 21 for more details.)

The real exchange rate also represents a major determinant of the current account. A previously anticipated real appreciation, through the associated gains in purchasing power, has an impact on intertemporal consumption decisions similar to that of an increase in per capita income. By contrast, an unforeseen long-term appreciation is accompanied by a positive wealth effect, which has a negative impact on the saving ratio.⁶ Owing to these opposing transmission channels, the effect of the real exchange rate on the current account can ultimately only be calculated empirically.

Ambivalent influence of real exchange rate on savings decisions

According to the results of the econometric analyses presented here, the ongoing rise in the real exchange rate has tended to increase the current account deficits in the new EU member states. This suggests that the external purchasing power gains associated with a real appreciation were only used for additional consumption once the gains actually occurred rather than being anticipated as com-

⁶ The impact of the real exchange rate on saving and consumption decisions considered here is independent of potential changes in price competitiveness. See explanatory notes on pages 26-27.

Empirical studies on the determinants of current accounts in the new EU member states of central and eastern Europe

As part of a panel analysis, major determinants of the current account balances in the new EU member states of central and eastern Europe (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia) were examined on the basis of quarterly data for the years 1994 to 2004. The starting point for this was the following regression equation for the current account balance or savings-investment gap.

$$CAGDP_{i,t} = \gamma_0 + \gamma_1 RELGDP_{i,t} + \gamma_2 FINGDP_{i,t} + \gamma_3 INVGD P_{i,t} + \gamma_4 REER_{i,t} + \gamma_5 RIR_{i,t} + \gamma_6 M2GDP_{i,t} + \varepsilon_{i,t}$$

CAGDP denotes the ratio of the current account balance to gross domestic product, while RELGDP is defined as a logarithm of relative per capita income in relation to Germany. The government budget balance (FINGDP) and investments (INVGDP) are measured as ratios to gross domestic product and are thus comparable between the countries. The logarithm of the real effective exchange rate (REER) rises in the event of a currency appreciation and falls in the event of a depreciation. The real interest rate (RIR) and the money stock in relation to gross domestic product (M2GDP) were included in the study as financial market variables.

Positive signs are expected for γ_1 , γ_2 and γ_5 and a negative sign for γ_3 . According to theoretical considerations, the relationship between the real exchange rate and the current account (γ_4) is *a priori* just as indeterminate as the net effect of a growing financial sector (γ_6). The absolute values of γ_2 and γ_3 should lie between zero and one since the associated variables, as components of the savings-investment decision, do have a direct influence on the current account but can be at least partially offset by adjustments to private saving. Panel unit root tests confirm the stationarity of the variables.¹

Two estimation methods are compared. A feasible generalised least squares estimate (FGLS) takes account of fixed country effects, panel-specific autoregressive terms, a heteroscedastic error structure and a contemporary correlation between the countries. By contrast, an instrument variable estimator² (IV) allows an explicit modelling of the dynamics by means of a lagged endogenous variable. In this way, the Nickell bias, which arises in the static estimate when calculating the autoregressive terms, can be avoided. Furthermore, selecting the appropriate instruments means that any endogeneity, ie repercussions which the current

Macroeconomic determinants of the current account

| Determinant | FGLS estimate | IV estimate |
|-------------|------------------------|------------------------|
| CAGDP (- 1) | - | 0.4608*** (2.75) |
| RELGDP | 0.02700*** (5.40) | 0.0147*** (2.75) |
| FINGDP | 0.0831** (2.20) | 0.1420*** (2.75) |
| INVGDP | -0.2375*** (- 6.93) | -0.2891*** (- 6.66) |
| REER | -0.0381* (- 1.94) | -0.0264 (- 1.15) |
| RIR | 0.0009** (2.09) | 0.0014*** (2.71) |
| M2GDP | 0.0062 (1.02) | 0.0138*** (3.19) |

*** (**) [*] means significant on the 1% (5%) [10%] level; t-values in parentheses

account has on the independent variables, is accommodated in the model. These advantages of the dynamic estimator contrast with it being less efficient than the static model. The table shows the results of the FGLS estimate and dynamic IV estimator.

The static and dynamic estimators produce comparable results, ie the results are quite robust with respect to the estimation method. All the variables display the expected sign. The current account deficits are largely due to the convergence process. This is suggested by the significance in the estimate of the low per capita income and investment. The real exchange rate has a negative impact on the current account. The positive wealth effect of a real appreciation evidently depresses private savings. However, the development of the financial markets boosts net saving. With the exception of the money stock in the FGLS estimator and the real exchange rate in the IV estimator, the parameters are significant. The Wald test confirms the significance of the variables overall and the "adjusted R²" is 0.5.

¹ For details of the tests carried out and further details of the estimates, see S Herrmann and A Jochem, Determinants of current account developments in the central and east European EU member states – consequences for the enlargement of the euro area, Discussion Paper of the

Research Centre of the Deutsche Bundesbank, Series 1, Economic Studies, No 32/2005. — ² See T W Anderson and C Hsiao (1981), Estimation of Dynamic Models with Error Components, Journal of the American Statistical Association, Vol 76, pp 598-606.

ponents of future income developments right at the start of the transformation process.⁷

Good investor access to the international capital markets...

Furthermore, the investment ratio is used to explain the domestic saving ratio. A strong correlation between the two variables is expected if, for instance, access to the international capital markets is restricted. Other reasons for a marked correlation and/or investor's preference for domestic markets are discussed in the literature under the subject of "home bias".⁸

... combined with a strong demand for investment is hampering reduction in current account deficits

The empirical studies clearly show that, in the period under review, between 5 and 8 percentage points of the current account deficits of the new EU member states were due to the economies' dynamic investment activity. The real convergence process is thus likely to contribute to the reduction of the current account deficits through a longer-term slowing of capital accumulation as well.

Development of financial markets...

The conditions in the financial markets and the effectiveness of the financial sector also exert an influence on an economy's investment and saving. A significant incentive to save is provided by the level of the real interest rate, which implies a positive correlation with the current account balance. A commonly used variable for the size and development of the financial sector is the ratio of the money stock M2 to GDP.⁹ The thinking behind this is that a sophisticated banking system offers increased investment options, thereby enhancing the attractiveness of saving. On the other hand, it also makes consumer borrowing easier. The nature of the relationship between this variable and the size

of the current account balance is therefore *a priori* indeterminate.

According to the estimates performed in this respect, the impact of financial market developments on the size of the current account balances has been minor up to now. However, an ongoing improvement in financial intermediation seems, on balance, to be having a positive effect on saving. The incentives provided by more efficient investment options evidently outweigh easier access to consumer credit.

... so far without any notable impulses for the current account

Finally, fiscal policy should also be incorporated into the analysis as a further macroeconomic factor influencing the private saving ratio. Within the scope of the intertemporal current account approach,¹⁰ Ricardian equivalence is assumed to apply, according to which an increase in public borrowing is fully offset by an adjustment of private saving so that high public sector deficits ultimately have no impact on aggregate domestic saving.

Validity of "Ricardian equivalence"...

However, the relevant empirical studies contradict this assumption. Rather, they suggest that the fiscal policy of the new EU member states has contributed to the – in some cases –

... cannot be confirmed empirically

⁷ This comes as no surprise in view of the nominal depreciations, some of them sharp, of the central and east European currencies at the start of the transformation process. See Deutsche Bundesbank, *Monthly Report*, October 2002, pp 7-59.

⁸ For a comprehensive overview of the literature on "home bias", see K Lewis (1999), *Trying to Explain the Home Bias in Equities and Consumption*, *Journal of Economic Literature*, Vol 37, pp 571-608.

⁹ The money stock definition is that of the IMF.

¹⁰ This is based, among other things, on work by J Sachs (1981), *The Current Account and Macroeconomic Adjustment in the 1970s*, *Brookings Papers on Economic Activity*, Vol 1, pp 201-268.

high current account deficits. The estimates confirm what is known as the “twin deficit hypothesis”, which states that government budget deficits are a burden on an economy’s current account position. While this effect is not particularly significant in the countries under review, that does not alter the nature of the relationship observed here. The expansionary stance of fiscal policy in some instances is not without risks. It can, for example, crowd out private investment in the capital markets. Furthermore, in the case of public expenditure, there is the risk of it not being amortised over the long term.

*“Normal” level
of current
account
deficits...*

The values estimated for the new EU member states in a panel analysis may be interpreted as a kind of benchmark, or as the “normal” level of the current account position that is compatible with the current stage of development of the economies.¹¹ The deviations resulting from a comparison of these values with the actual current account balances enable statements to be made, albeit with some qualifications, on the sustainability of the existing current account deficits.¹² It is apparent that the size of these deviations has decreased in almost all the countries during the period under review. This means that the significance of exogenous disruptions and of other factors not included in the analysis has evidently become less over time.

*...exceeded
by Hungary
and Estonia*

In most years during the reference period, Hungary posted current account deficits which are larger than is consistent with the “degree of maturity” of the economy. Much the same applies to Estonia, where the residuals of the estimates have risen markedly

over the past three years. Deficits of this kind, which are inconsistent with the state of the real convergence process, point to a possible need for adjustment. This is all the more the case as the current account deficits of the cited countries are among the highest in the new EU member states. The picture looks better for Hungary, however, if the relationship between direct investment and foreign trade is taken into account (see page 31).

On the whole, the results of the study support the assumption that developments in the current accounts of the economies of central and east Europe do not point primarily to existing problems of competitiveness but are instead closely linked to the economic catching-up process and buoyant investment activity. It may therefore be expected that an increasing convergence of per capita incomes and a further expansion of the financial markets will help to reduce the current account deficits.

*Risks based
on possible
setbacks in the
convergence
process*

Despite the progress towards convergence already achieved and increasing convergence in the standards of living in the period under review, it has not been possible so far to ascertain any significant and steady reduction in the current account deficits. This is likely to be due, not least, to the ongoing appreciation of the real exchange rate, which likewise reflects the economic catching-up pro-

¹¹ See explanatory notes on page 21.

¹² See also W Doisy and M Hervé (2003), *Les Déficit Courants des PECO: Quelles Implications pour leur Entrée dans l’Union Européenne et la Zone Euro?*, *Economie Internationale*, Vol 93, pp 59-88, and M Bussière, M Fratzscher and G Müller (2004), *Current Account Dynamics in OECD and EU Acceding Countries – an Inter-temporal Approach*, ECB Working Paper, No 311.

cess and counters the positive impact of income convergence on private saving.

Long-term effects of foreign direct investment on the trade balances of the new EU member states

Direct investment has sustained impact on current accounts

The major importance of investment with regard to the size of the current account deficits in the new EU member states could be related to the particular role played by foreign direct investment. Not only does foreign direct investment affect the balance of payments immediately at the time of the inflow of capital; in the long term, the subsidiaries' cross-border flows of trade and income also have a sustained impact on the current accounts of the host countries. The direction of the effect essentially depends on the purpose of foreign investment and the on-site availability of necessary raw materials and semi-finished products.

Long-term relationship between direct investment and foreign trade

Accordingly, in addition to the saving and investment decisions examined, the scale and structure of accumulated capital inflows from abroad are also important for the long-term outlook of the current account in a given country's economic catching-up process. The core issue here is whether the imports and exports of the host country act as a complement to or a substitute for stocks of foreign direct investment. Transfers of income between the parent and subsidiary are heavily dependent on other factors, such as the underlying tax conditions and the economic situation. The following studies are therefore confined to the relationship between foreign

direct investment and the balance of trade of the new central and east European EU member states.

Since the start of the economic transformation process in the early 1990s, the eight new EU member states in central and eastern Europe have been attracting a growing amount of foreign direct investment. Although foreign trade has also been increasing steadily during this period, it has failed to match the mostly two-digit growth rates posted by stocks of direct investment. Towards the end of 2004, the level of foreign direct investment in the region amounted to two-thirds of annual exports and imports, compared with less than one-quarter ten years earlier.

The increase in foreign trade over time and the simultaneous build-up of foreign corporate ownership do not in themselves permit any conclusions to be drawn about possible causal relationships between these factors. Theoretical considerations give reason to assume that the outsourcing of production primarily to reduce wage costs, or to exploit other locational advantages, has a positive effect on the balance of trade of the host country in the longer term. If, however, the motive of the foreign parent company is to gain access to the market, the subsidiary often acts purely as a marketing company and hence primarily stimulates imports from the country of origin. Finally, horizontal direct investment consists in establishing parallel production sites. Typically, these serve to circumvent trade barriers or to reduce transport costs. This kind of foreign investment therefore

Strong growth in direct investment and foreign trade

Complementarity versus substitutability

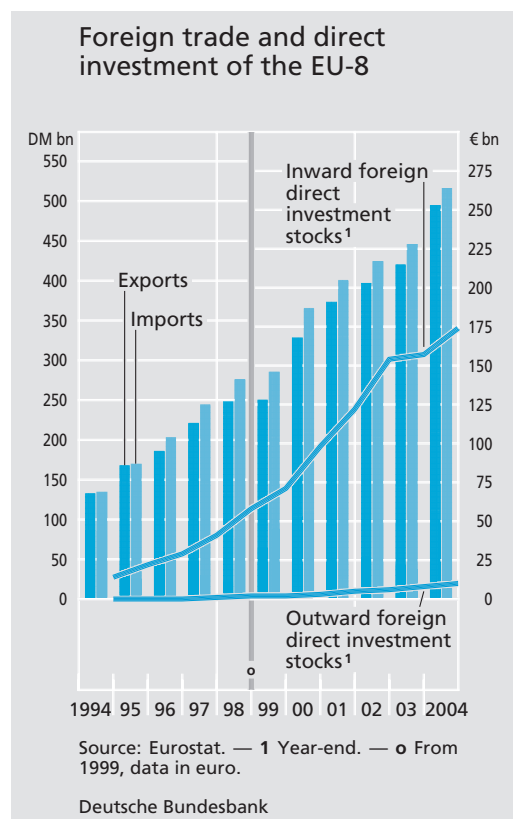
tends to act as a substitute for foreign trade. There is therefore no clear relationship that can be derived *a priori* between direct investment and foreign trade, which means that this question can only be answered empirically.

Direct investment promotes exports and imports

Initially, it is apparent that both exports and imports behave in a manner which is complementary to the stock of foreign direct investment (see explanatory notes on pages 26-27). The positive impact of direct investment stocks on the exports of the host country would suggest that the subsidiaries supply intermediate goods or finished products to the group's parent company or that the foreign subsidiaries are used as a platform for exports to third countries. Cross-sectoral relationships between different enterprises and industry sectors could also play a part and could have a positive impact on the competitiveness of the location. Such spillover effects arise, for instance, from transfers of technology or from the emergence of regions with a specific economic profile.

Imports are likewise boosted by the presence of foreign enterprises. This may be due to the subsidiaries obtaining intermediate goods from their home country or acting as sales companies with a prime focus on the goods produced by the parent company being marketed abroad. Finally, it is possible that some of the foreign-based branches of multinational companies are equipped with capital goods from domestic production.

The overall impact of foreign direct investment on the trade balances of the eight new



EU member states in central and eastern Europe cannot be determined clearly at the macro level in empirical terms either. Generally, however, the presence of foreign enterprises leads to greater integration of the host countries into the international division of labour, which is reflected in an increased exchange of goods and services with other countries. The long-term nature of these business relationships should *a priori* boost the sustainability of existing current account deficits.

Net effect on balance of trade unclear

These results are consistent with a number of other empirical studies using macroeconomic data, which, as a rule, have likewise been unable to ascertain that direct investment has any clear impact on the trade balances of the

Empirical studies of direct investment and the trade balance

The empirical study on the impact of direct investment on foreign trade is based on a panel of the eight new central and east European EU member states. The observation period runs from 1994 to 2004. In a first step, the relationships are analysed at the aggregated level. The regression equations for exports and imports are

$$EXP_{i,t} = \alpha_0 + \alpha_1 GDP_{i,t} + \alpha_2 REER_{i,t} + \alpha_3 FDI_IN_{i,t-1} + \alpha_4 FDI_OUT_{i,t-1} + \varepsilon_{i,t}$$

$$IMP_{i,t} = \beta_0 + \beta_1 GDP_{i,t} + \beta_2 REER_{i,t} + \beta_3 FDI_IN_{i,t-1} + \beta_4 FDI_OUT_{i,t-1} + \eta_{i,t}$$

EXP and IMP denote real exports and imports of goods and services. GDP stands for the real gross domestic product of the country under review and serves as a measure of the size of the economy. The real effective exchange rate (REER) indicates price competitiveness. The real effective exchange rate rises with an appreciation of the domestic currency and falls with a depreciation. The converse development applies to price competitiveness. FDI_IN denotes the stocks of foreign direct investment in the country under review while FDI_OUT stands for that country's direct investment abroad. Both are calculated at constant exchange rates and prices.¹ All variables are captured as logarithms.

A positive sign is expected for α_1 , β_1 and β_2 and a negative sign for α_2 . The signs for α_3 , α_4 , β_3 and β_4 are *a priori* uncertain and can only be determined empirically. Unit root tests indicate that the individual time series are integrated from grade 1. An examination of the residuals as part of the two-stage Engle-Granger procedure produces compelling evidence for the existence of a cointegration relationship.² Additionally, in order to take account of a possible endogeneity, the two regressions were estimated by means of a dynamic OLS procedure (DOLS). Furthermore, fixed country and time effects were incorporated and the variance-covariance matrix was adjusted using White's procedure in order to correct for distortions caused by heteroscedasticity. The results are shown in the table on the page opposite.

Gross domestic product has a significantly positive impact on exports and imports. Contrary to expectations, an appreciation of the real exchange rate is associated not just with higher imports but also with higher exports. This could be due to the fact that the economic catching-up process tends to bring about a real appreciation of the domestic currency without impairing price competitiveness.³ Foreign direct investment is basically a complement to the foreign trade of these central and east European economies. With respect to direct investment abroad by the new EU member states, however, this effect is significant only for exports, which is probably due, not least, to the small scale of such investments.

1 Direct investment stocks are equivalent to the capital stock at the end of the previous year. — 2 For details of the tests carried out and of the estimation procedures, see S Herrmann and A Jochem, Trade balances of the central and east European EU member states and the role of foreign direct investment, Discussion Paper of the Research Centre of the Deutsche Bundesbank, Series 1, Economic Studies, No 41/2005. — 3 This phenomenon is closely linked to what is known as

At the sectoral level, the examination of which is confined to the bilateral relations between Germany (suffix D) and the new EU member states in central and eastern Europe (suffix i), a study is made initially on the impact of direct investment in the three sectors of manufacturing (FDI_VG), agriculture and raw materials (FDI_PS) and services (FDI_DL) on trade in industrial goods. Instead of GDP, industrial output (IND) now serves as a measure of the importance of manufacturing, while price competitiveness is measured by the relative unit labour costs in manufacturing (ULC).

The sectoral regressions are also estimated by means of a dynamic OLS procedure (DOLS) incorporating fixed effects, with panel-corrected standard deviations allowing for the contemporaneous correlation, which is more prominent here. In order to correct for heteroscedasticity, the observations were weighted sectorally according to their variance. Serial correlation was taken into account by incorporating autoregressive terms. The regression equations are

$$EXP_{i,VG,t} = \gamma_0 + \gamma_1 IND_{i,t} + \gamma_2 IND_{D,t} + \gamma_3 ULC_{i,t} + \gamma_4 FDI_VG_{i,t-1} + \gamma_5 FDI_PS_{i,t-1} + \gamma_6 FDI_DL_{i,t-1} + u_{i,t}$$

$$IMP_{i,VG,t} = \delta_0 + \delta_1 IND_{i,t} + \delta_2 IND_{D,t} + \delta_3 ULC_{i,t} + \delta_4 FDI_VG_{i,t-1} + \delta_5 FDI_PS_{i,t-1} + \delta_6 FDI_DL_{i,t-1} + v_{i,t}$$

At the sectoral level, too, the size of the economies is crucially important for the size of trade flows. With increasing price competitiveness (declining relative unit labour costs), exports can be expanded, while imports decline. Direct investment again shows a complementary relationship with foreign trade, with the exception of direct investment in the services sector, which stimulates only imports – not exports – of industrial goods.

Finally, a distinction was made within manufacturing between technology-intensive and less technology-intensive sectors.⁴ The aim is to identify the direct trade effects of direct investment in a given sector (FDI_SEC) separately from the indirect effects arising from direct investment in the other hi-tech sectors (FDI_HIGH) and low-tech sectors (FDI_LOW). In line with the earlier estimates, the following regression equations are used.

$$EXP_{i,k,t} = \lambda_0 + \lambda_1 IND_{i,t} + \lambda_2 IND_{D,t} + \lambda_3 ULC_{i,t} + \lambda_4 FDI_SEC_{i,k,t-1} + \lambda_5 FDI_HIGH_{i,t-1} + \lambda_6 FDI_LOW_{i,t-1} + w_{i,k,t}$$

$$IMP_{i,k,t} = \mu_0 + \mu_1 IND_{i,t} + \mu_2 IND_{D,t} + \mu_3 ULC_{i,t} + \mu_4 FDI_SEC_{i,k,t-1} + \mu_5 FDI_HIGH_{i,t-1} + \mu_6 FDI_LOW_{i,t-1} + z_{i,k,t}$$

Trade in hi-tech sector goods is strongly influenced not only by direct investment in the relevant sector but also by direct investment in other technology-intensive sectors. At the cross-sector level, however,

the Balassa-Samuelson effect. For details of real appreciation in the new EU member states, see, for example, C Fischer, Real currency appreciation in accession countries: Balassa-Samuelson and investment demand, Discussion Paper of the Economic Research Centre of the Deutsche Bundesbank, No 19/02. — 4 The sector formation for direct investment is based on the NACE, Rev 1 classification. The sectors manufacturing of food products, beverages and tobacco (Classes 15

only exports are boosted, while imports are curbed by the presence of foreign enterprises in the hi-tech sector. The spillover effects of direct investment in sectors with less demanding production technology are considerably smaller, although they, too, have a positive impact on the balance of trade for hi-tech goods.

The close correlation between direct investment and foreign trade that was observed for hi-tech sectors cannot be confirmed for trade in simple production technology. The relevant parameters are largely insignificant. Only imports are boosted by direct investment in the same sector and curbed by spill-over effects from the hi-tech sector.

Results of estimates regarding the relationship between direct investment and exports and imports at the aggregated and sectoral levels

| Item | Aggregated | | Manufacturing | | Hi-tech | | Low-tech | |
|------------------|--------------------|---------------------|----------------------|--------------------|-------------------|----------------------|-------------------|----------------------|
| | EXP | IMP | EXP_VG | IMP_VG | EXP_High | IMP_High | EXP_Low | IMP_Low |
| GDP | 0.654*** (7.58) | 0.663*** (14.29) | – | – | – | – | – | – |
| IND _i | – | – | 0.413 (1.18) | 0.508** (2.30) | –0.627 (–0.46) | 1.078*** (2.75) | –0.149 (–0.36) | 1.637*** (4.53) |
| IND _D | – | – | 1.017** (1.98) | 1.749*** (3.02) | 0.966 (1.33) | 1.734*** (3.39) | 0.681 (1.53) | 1.532** (5.36) |
| REER | 1.663** (2.23) | 2.44*** (2.82) | – | – | – | – | – | – |
| ULC | – | – | –0.415*** (–3.02) | 1.481*** (5.41) | 0.816 (0.74) | –0.644** (–2.25) | 0.140 (0.61) | 0.264 (1.69) |
| FDI_IN | 0.165* (1.74) | 0.197*** (4.73) | – | – | – | – | – | – |
| FDI_OUT | 0.053** (2.20) | 0.038 (1.43) | – | – | – | – | – | – |
| FDI_VG | – | – | 0.057* (1.85) | 0.062* (1.73) | – | – | – | – |
| FDI_PS | – | – | 0.028** (2.53) | 0.024*** (2.61) | – | – | – | – |
| FDI_DL | – | – | –0.008 (–0.27) | 0.028* (1.66) | – | – | – | – |
| FDI_SEC | – | – | – | – | 0.063** (2.17) | 0.028* (1.72) | 0.010 (0.51) | 0.020* (1.68) |
| FDI_HIGH | – | – | – | – | 0.109** (2.44) | –0.093*** (–3.06) | 0.025 (0.82) | –0.070*** (–2.82) |
| FDI_LOW | – | – | – | – | 0.062* (1.94) | 0.033 (1.07) | –0.010 (–0.61) | 0.011 (1.28) |

*** (**) [*] means significant on the 1% (5%) [10%] level; t-values in parentheses.

and 16), textiles, apparel and leather, etc (Classes 17-19), wood and paper processing including other industry branches (Classes 20-22, 36 and 37) and the chemicals industry (Classes 24-26) have been classified as less technology-intensive. By contrast, the metal industry (Classes 27 and 28), machinery and equipment (Class 29), information and communications technology (Classes 30-33) and the manufactur-

ing of transport equipment (Classes 34 and 35) are ranked as technology-intensive. The foreign trade data compiled according to the SITC, Rev 3, are allocated to these sectors accordingly. Overall, there are 32 cross-section observations (four sectors multiplied by eight countries) for each panel, with an unchanged 11 temporal observations.

new EU member states.¹³ Making more nuanced statements regarding the interplay of direct investment and foreign trade in the new central and east European EU member states calls for an analysis of data with a greater degree of disaggregation. Such an approach would be more likely to permit an assessment of the effects of structural changes during the catching-up process as well as an evaluation of their impact on the current account.¹⁴

Important role of German direct investment...

Owing to limited data availability, sectoral studies are unable to include all foreign direct investment in the countries under review and their external trade relations. However, the Bundesbank's direct investment microdatabase (MIDI), in conjunction with the foreign trade statistics of the Federal Statistical Office, does permit a detailed analysis of these countries' bilateral relations with Germany. As German firms are playing a major role in the establishment of subsidiaries in the eight central and east European EU member states, the analysis of German direct investment should allow significant conclusions to be drawn concerning the general importance of the foreign presence in the region.

... particularly in the manufacturing sector

A further limitation to the sectoral studies presented here is posed by the focus on cross-border trading of industrial goods. Trade in agricultural products and raw materials is largely dependent on other factors, such as the availability of natural resources. And the exchange of services is subject to a number of special factors which render a comparison with the rest of foreign trade unproductive and call for separate treatment.¹⁵

By far the largest amount of German direct investment in the eight new EU member states in central and eastern Europe has been in the manufacture of transport equipment and in the chemicals industry.¹⁶ In 2003, the most recent year for which relevant data are currently available, these two sectors accounted for €5 billion and just under €4 billion respectively in the group of countries under review, which is equivalent to one-third and one-quarter of German direct investment stocks in manufacturing. The information and communications sector (ICT) has also shown a steady growth in German subsidiaries abroad. However, the valued stock at the end of 2003 was less than half of the corresponding book value in the two leading sectors.

Manufacture of transport equipment and chemicals industry most important sectors for German direct investment

With a trading volume of some €20 billion each, transport equipment and ICT goods rank first with respect to trade flows, too, closely followed by machinery and equipment. Interestingly, the initial trade balance deficits vis-à-vis Germany have fallen over time in all of these sectors. In the ICT sector and in the manufacture of transport equip-

Manufacture of transport equipment, ICT and machinery and equipment leading the way in foreign trade

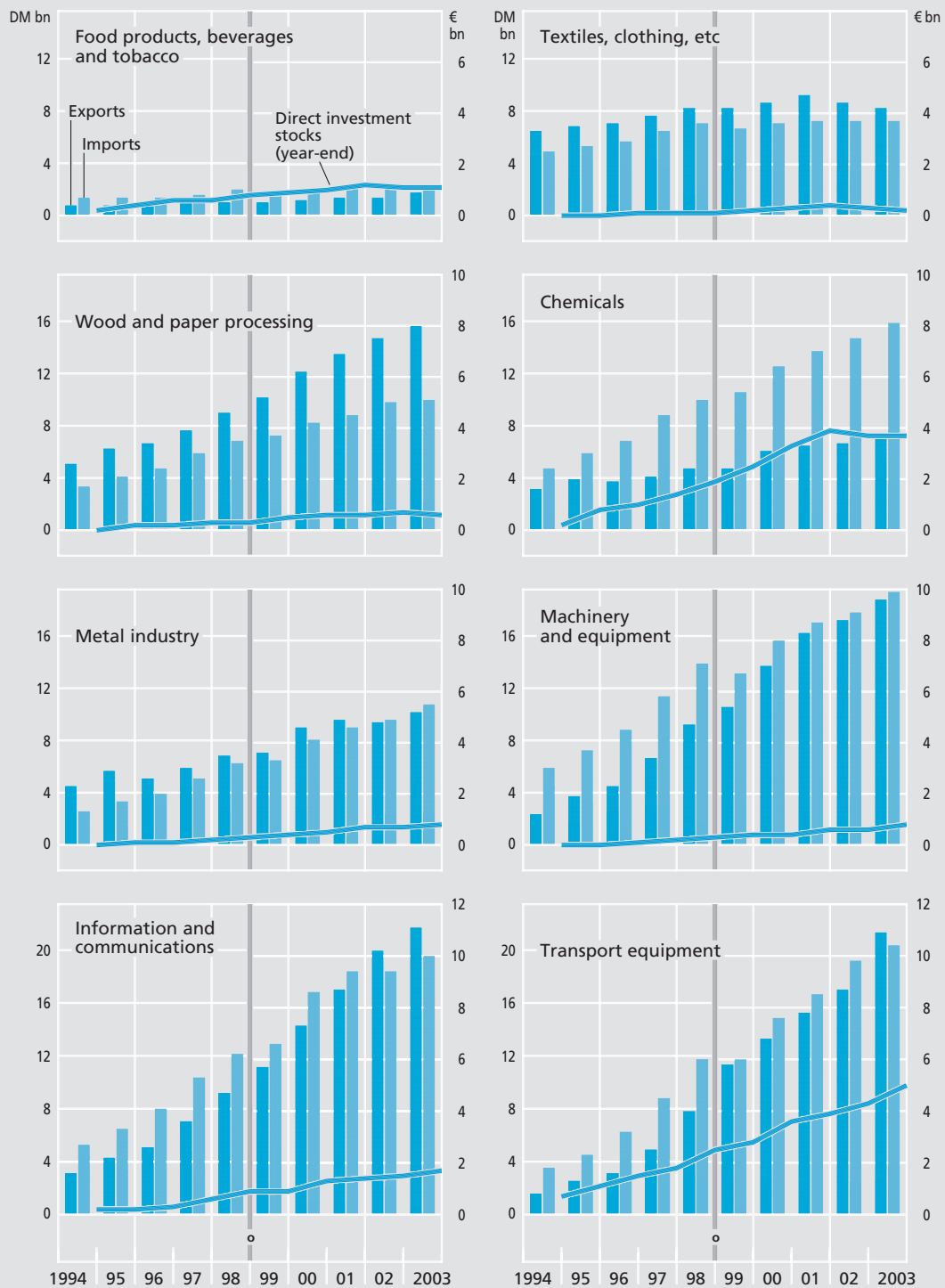
¹³ See, for example, D Holland and O Pommerantz (2003), FDI Penetration and Net Trade in the EU Accession Countries, National Institute of Economic and Social Research, Discussion Paper, No 226. The separate investigation of an export and import equation promises to deliver more accurate results than estimating the trade balance in one step.

¹⁴ The use of sectoral data also reduces the simultaneity problem which limits the informative value of empirical estimates. See R Lipsey and M Weiss (1984), Foreign Production and Exports of Individual Firms, Review of Economics and Statistics, Vol 66, pp 304-308.

¹⁵ See C Buch and A Lipponer (2004), FDI versus cross-border financial services: The globalisation of German banks, Research Centre of the Deutsche Bundesbank, Discussion Paper (Series 1), Economic Studies No 05/2004.

¹⁶ The sectoral breakdown is based on investment target sectors.

EU-8: Direct investment by and foreign trade with Germany by industry sector



Source: Federal Statistical Office and Bundesbank calculations. — ◦ From 1999, data in euro.

Deutsche Bundesbank

ment, the eight central and east European countries have now even become net exporters. In the chemicals industry, however, the trade balance deficit vis-à-vis Germany has steadily expanded. By contrast, in other sectors, namely the textile, wood and paper industries, the countries under review have been posting trade surpluses ever since they started opening up to foreign trade.

Indeterminate influence of direct investment on the trade balance in manufacturing

Looking first of all at the impact of direct investment in manufacturing, agriculture and raw materials, and services on trade in industrial goods, it is apparent that the relationships with both the exports and imports of the host country are generally complementary.¹⁷ It is only in the services sector that the trade effects of foreign subsidiaries are confined to stimulating imports. This is probably due to the fact that sales companies play a dominant role in this sector. The relationship between the trade balance and direct investment within the manufacturing sector is indeterminate, as it is when viewed as an aggregate, since both exports and imports are strengthened. The same is also true of the indirect impact of direct investment in agriculture and raw materials on trade in industrial goods.

Distinction between hi-tech and low-tech sectors...

As has already been shown, however, the manufacturing sector itself does not represent a homogeneous group but comprises a number of very different branches of industry. Activities range from the manufacture of textiles, which is relatively undemanding from a technological viewpoint, to highly complex production processes in information and communications technology. As the level of

technology rises, the links between the various sectors resulting from the shared use of human capital, knowledge transfer and increasing product diversification generally also grow, so that greater cross-sectoral trade effects may also be expected from direct investment in hi-tech sectors.

The distinction made in the empirical studies presented here between a group with hi-tech sectors and a group of "low-tech" sectors represents a compromise between the requirement for an adequate size and sufficient homogeneity of the sectors, although the classification of the various branches of industry according to the input of technology into the production process is undoubtedly open to question when applied to individual enterprises. Broadly speaking, however, it seems reasonable to allocate the metalworking industry, the manufacture of machinery and equipment, information and communications technology and the manufacture of transport equipment to the group with more hi-tech production processes. On the other hand, the manufacture of food products, beverages, tobacco, apparel and leather, wood and paper processing and the chemicals industry have been ranked as less technology-intensive.¹⁸

... as a compromise between group size and homogeneity

¹⁷ While, for the reasons cited, only the manufacturing sector is used for exports and imports, this model specification also takes account of the agriculture and services sectors in the case of direct investment in order to capture cross-sectoral relationships.

¹⁸ The classification of sectors is generally similar to the method used by the European Central Bank, although this study makes a distinction between only two sectors, ie a hi-tech sector and a low-tech sector. See European Central Bank (2005), Competitiveness and the Export Performance of the Euro Area, Occasional Paper Series, No 30.

Positive impact of direct investment in hi-tech sector on trade balance...

From the perspective of the host countries, further direct trade-enhancing effects can be noted in the hi-tech sector arising from direct investment within a single branch of industry. Positive spillover effects on the exports of other industry sectors are an equally important factor. Such effects may be explained by technology transfers or the accumulation of human capital by pioneering companies, which makes the location attractive for other companies to export themselves. On the other hand, the imports of technology-intensive sectors are negatively influenced by direct investment in other hi-tech branches. Here, too, agglomeration effects may be a factor if, for instance, the establishment of suppliers means that intermediate goods which used to be imported can be manufactured locally.

...but impact of direct investment in low-tech sector, if anything, negligible

The close relationship between direct investment and foreign trade observed for the manufacturing sector as a whole and for the hi-tech sector in particular cannot be confirmed for the cross-border trading of goods with less technologically demanding production processes. The estimated parameters are, in the main, insignificant and do not reveal any systematic impact on exports and imports. In the case of the central and east European countries examined, foreign trade with Germany in these product areas is evidently determined largely by other factors.

Overall, German direct investment in the hi-tech sector clearly has a positive impact on the trade balances of the central and eastern European countries studied. This positive effect is due, in particular, to indirect spillover

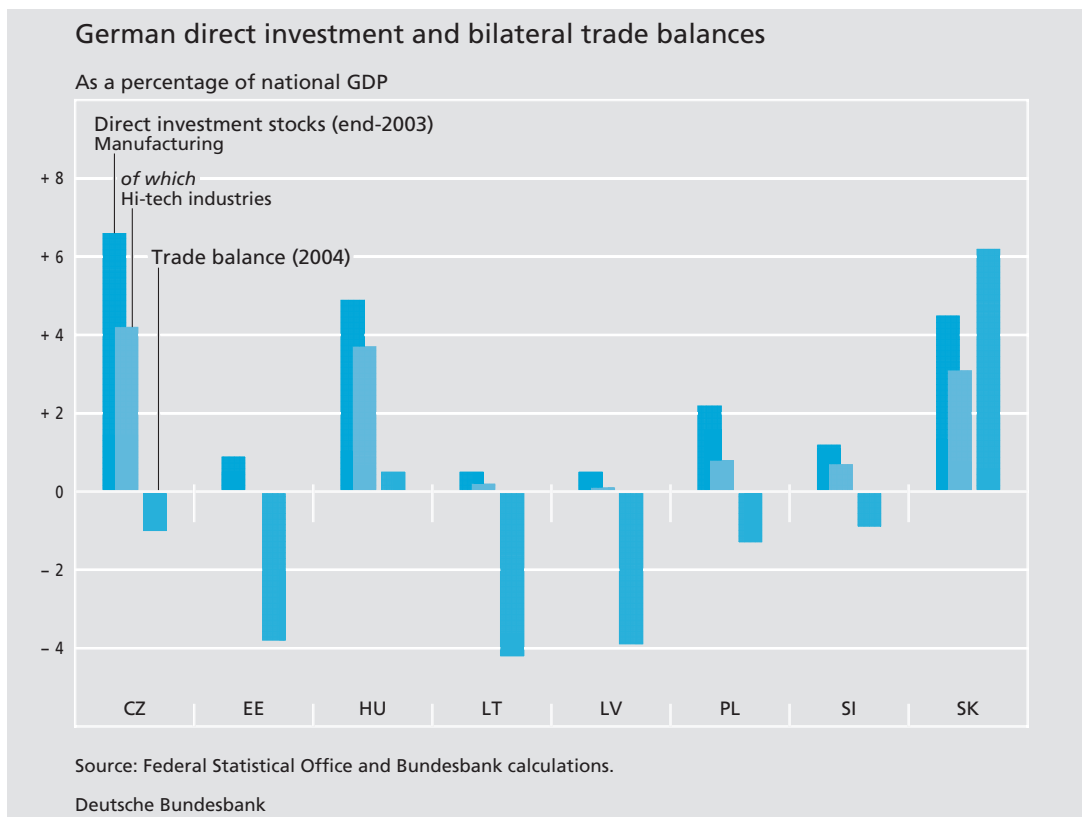
effects among the individual industry sectors which boost exports while tending to reduce imports. By contrast, direct investment in less technology-intensive sectors is of secondary importance for the development of the trade balance.

The described relationships between direct investment and external trade in the new EU member states clearly show that the presence of foreign companies is a major factor for the sustainability and long-term balancing of existing current account deficits. This is especially true of those countries registering significant capital inflows in sectors with technologically demanding production processes.

A comparison of German direct investment and bilateral trade balances confirms that economies in which technology-intensive sectors have a comparatively strong position have only low deficits in their trade in goods with Germany or, in fact, post surpluses. These countries are the Czech Republic, Slovakia, Hungary and Slovenia. On the other hand, in the Baltic economies, which have large trade balance deficits vis-à-vis Germany, direct investment in the hi-tech sector is of almost negligible importance. In this respect, they can hardly expect any positive impulses for reducing their trade balance deficits in the future either. Direct investment from other countries is on a scale quite similar to that of German foreign subsidiaries in terms of the technological intensity of the production processes. What has been said above therefore also applies to the outlook for the overall trade balances in the countries under review.

Presence of foreign companies is an important factor for the sustainability of the external economic situation

Positive impact of direct investment in the Czech Republic, Slovakia, Hungary and Slovenia



By way of qualification, it should be pointed out, however, that the present study highlights only one, albeit important aspect in assessing the sustainability of current account balances.

Summary

The current account deficits in the new EU member states of central and eastern Europe are primarily due to factors associated with the economic catching-up process. As real convergence progresses, the external economic situation of most of these countries should gradually ease. Nevertheless, the rising external debt is not without risks. Problems could occur, above all, if setbacks in the convergence process were to disappoint the re-

turn expectations of foreign investors. Furthermore, a real appreciation of the central and east European currencies accompanying the economic catching-up process will hamper a reduction in current account deficits by influencing saving and consumption decisions.

The Eurosystem requirement for a sufficient degree of real convergence to be achieved prior to accession to European monetary union is therefore also justified given the effects on the current account situation. Joining the euro area too early would make it difficult to set an adequate conversion rate. With imperfect price flexibility, a misvaluation could expand the current account positions in Europe and give rise to matching adjustment costs.

The structure and scale of foreign direct investment are of special importance for the longer-term outlook of external economic developments. From the German perspective, the manufacture of transport equipment and the chemicals industry, in particular, are strongly represented in the new EU member states. Direct investment influences the balance of payments not just in the year of the capital transfer but also in the long term, because the current business activity of the enterprises concerned has an impact on inter-

national trade relations. At both the aggregated and sectoral levels, the empirical studies confirm a complementary relationship between foreign direct investment and the foreign trade of the recipient country. In other words, both the exports and imports of the host country are stimulated by the presence of foreign enterprises. Above all, foreign investment in technology-intensive sectors makes a valuable contribution to the sustainability of the host country's foreign trade position.