

## Structural current account balances: longer-term trends and determinants

German reunification resulted in a reversal in the German current account position. Whereas sharply rising surpluses had been achieved at the end of the eighties, there have been deficits on current transactions with non-residents since 1991. It is true that current account deficits later tended to decline, but in the past two years these have increased strongly again. In the first 11 months of the year 2000 alone the deficit of € 25 billion on Germany's current transactions with non-residents exceeded the already relatively high level in the same period a year earlier by approximately € 10 billion. By far the greatest part of the downturn has been due to the considerable deterioration in the terms of trade resulting from the increase in oil prices and the weakness of the euro. Developments of this nature, which can sometimes give rise to significant distortions in external positions, have frequently produced short-term fluctuations in the German current account. That, together with the effects of movements in the different cyclical positions internationally, have obscured longer-term trends. The following article analyses the long-term interrelationships that determine Germany's current account.

### Summary of trends

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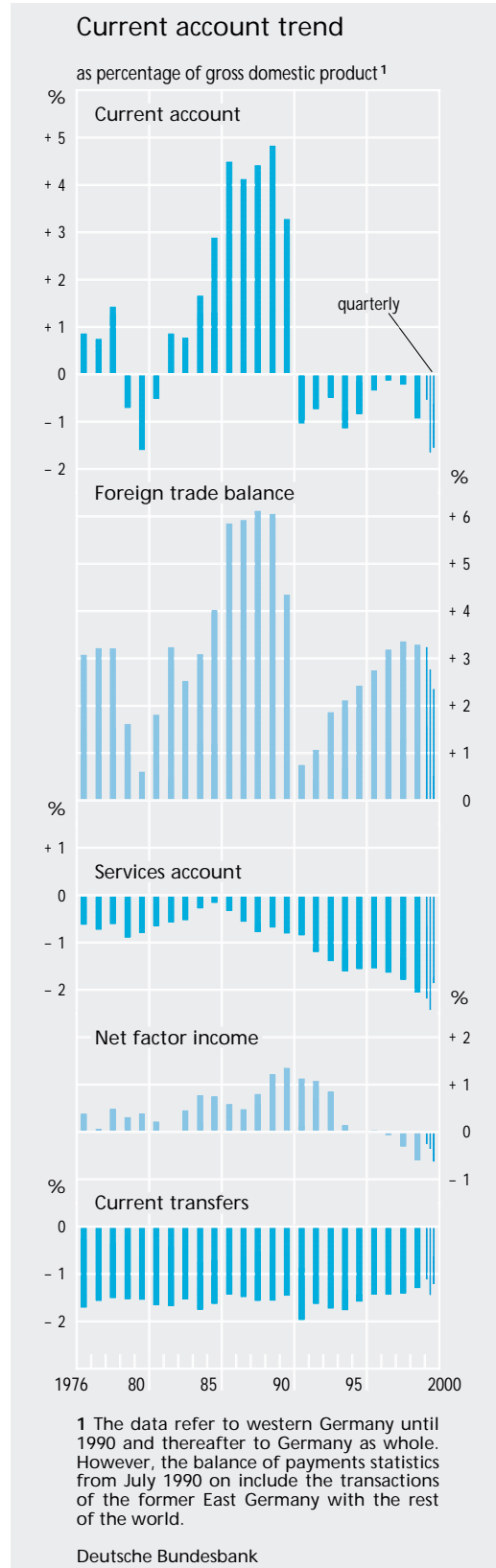
Germany's current account has seen a variety of trends since the mid-seventies. After more

*Current  
account and  
foreign trade  
since mid-  
seventies*

than two decades in which trade surpluses tended to rise the current account slipped deeply into deficit for the first time towards the end of the seventies and the beginning of the eighties. This development was ultimately the result of the combined effect of external burdens arising from the second oil crisis and delays in adjustments at home. Once the internal adjustments had been made, the economy was able to recover from the deficits incurred externally. Subsequently, the trend was again marked by rapidly growing surpluses, which reached an all-time high of 4.8% of gross domestic product (GDP) in 1989 before German reunification brought a dramatic reversal in the German current account. In 1991 the current account ran a deficit equivalent to 1% of GDP whereas a year earlier there had been a current account surplus amounting to 3.3% of GDP. More than five years then passed before the external adjustment processes that had been set in motion as a result of reunification came to an end. It was not long before German exporters were able to revive the success they had previously enjoyed in foreign markets even though the trade balance in terms of GDP did not regain the dimensions it had reached for western Germany in the second half of the eighties.

*Services*

The deficit on services rose at the same time, however. The rise was fuelled during the first few years after reunification by the growing net expenditure on foreign travel in particular. The desire of the east German population to "catch up" on foreign travel had resulted in a sudden rise in expenditure by German tourists abroad. More recently, not only this shift in



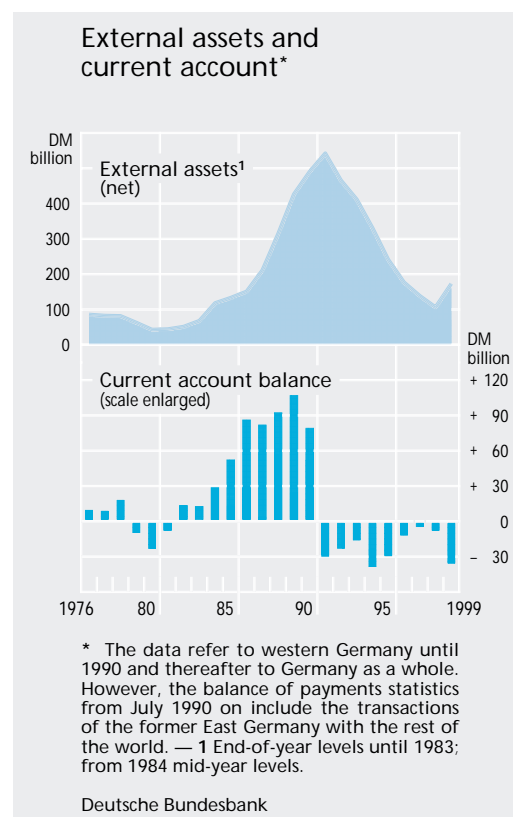
the level of expenditure but also growing deficits in other segments of the services account, which comprise a broad and varied range of categories, have emerged as detrimental factors. Increases here include net expenditure on IT services, commercial services, advertising and trade fairs as well as on communications.

*External assets and investment income*

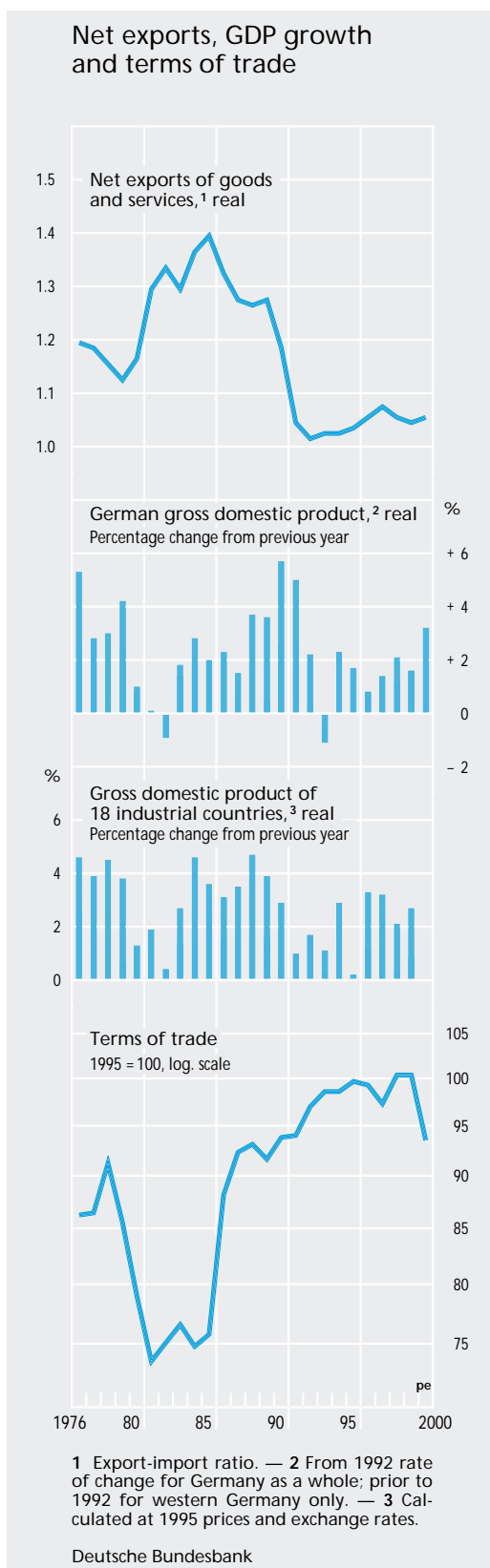
Owing to the change in Germany's external position, namely from being a net capital exporter prior to reunification to being a capital importer, the external assets which Germany had previously accumulated and the foreign investment income which these had generated also declined appreciably on balance. At the end of 1999 Germany's net external assets amounted to DM 193 billion at market prices compared with DM 548 billion in mid-1991 when the highest level so far recorded had been attained. At the same time net investment income dwindled continually from approximately DM 32 billion in 1992 until 1997 when for the first time interest payments and other investment income payments to non-residents exceeded the corresponding investment income generated abroad. In 1999 net investment income payments to non-residents amounted to just under DM 22 billion.

*Terms of trade*

Despite the – in some cases radical – changes in external relationships following reunification, an analysis based on a longer time horizon also indicates a certain continuity in the impact patterns which play a decisive role in determining these external economic relationships. For example, major fluctuations in the current account over the past 25 years



have often coincided with changes in the terms of trade. The rise in the prices of crude oil in 1979 and the fact that oil prices subsequently persisted at an unusually high level constituted a significant deterioration in the terms of trade, which in the second half of 1981 reached their lowest level for three decades. This deterioration was first moderated by the weakness of the US dollar towards the end of the seventies and then accentuated by its subsequent recovery. Large current account deficits were associated with this. Shifts in the terms of trade also resulted in substantial changes in the current account in the period after 1985 when the prices in the crude oil market fell sharply and the Deutsche Mark appreciated discernibly. These developments initially led to rising trade surpluses. By contrast, the recent weakness of the euro



and the extremely sharp increase in oil prices have resulted in the most pronounced deterioration in the terms of trade for about ten years. It is true that exchange rate movements have improved the price competitiveness of the German business sector and have further boosted exports which, in view of the favourable cyclical trends in major trading partner countries, had been recovering strongly in any case. At the same time, however, the price effects have also been leading to a discernible rise in the value of imported goods. The appreciable increase in the cost of energy imports accounted for a large part of this rise. Negative factors predominated with the result that smaller export surpluses were achieved.

Whereas in the short term it is the direct effects of price changes on foreign trade that count most, in the longer term changes in the terms of trade also give rise to volume adjustments which normally work in the opposite direction and determine the long-term trend. If, for example, there is a shift in the relative foreign trade prices to such an extent that imported goods become cheaper, there will tend to be greater demand for these goods and import volumes will increase. At the same time export goods will become more expensive for foreign customers, with the result that demand for these goods will decline and export volumes will diminish. Shifts of this kind in the terms of trade not only bring about these substitution effects but also changes in the income position which, in turn, spark off adjustments in saving and consumption patterns. As more imported goods can be purchased in exchange

*Short-term price effects and longer-term volume effects*

for home-produced goods, the real income position improves at home. The additional income can be used immediately to meet a greater demand for goods (income effect). However, it can also be used for consumption later with the result that consumption in the future may be substituted for consumption in the present, leading in the long term to an increase in demand at home. Which effects will eventually dominate also depends on how the market participants handle pricing and on the corresponding export and import elasticities. Generally speaking, it may be assumed that with an increasing time horizon the negative substitution effects will determine the trend.<sup>1</sup>

*Importance of growth differentials between home and foreign markets*

Growth in the respective markets, however, plays a particularly important role in determining the external trend. For example, surpluses on trade in goods and services tend to rise when growth in the export markets and therefore foreign demand increase at a faster pace than growth in domestic demand; and they decline when the growth differential shifts in favour of the home market.

### Absorption approach to the current account

*Simple absorption approach*

Theoretically speaking, the relationships outlined above can be summarised in a simple absorption approach. As a rule, this is based on trade in goods and services only, and factor income and current transfers are disregarded. Net exports (NX) – defined here as the ratio of real exports of goods and services to real imports of these – are considered.

Under the simple absorption approach these can be seen as a function of the domestic demand for goods and services (domestic absorption, A) and as a function of the demand for goods and services abroad (foreign absorption, A<sup>F</sup>) in conjunction with the terms of trade (P). The relationship can be expressed in logarithmic form as follows:

$$(1) \quad nx_t = \gamma p_t + \varepsilon a_t + \eta a_t^F$$

where  $nx$ ,  $p$ ,  $a$  and  $a^F$  are the logarithmic values of the corresponding variables. The coefficients  $\gamma$ ,  $\varepsilon$  and  $\eta$  can be interpreted as the respective elasticities. Given the considerations explained above, it can be assumed that  $\gamma$  – that is to say, the elasticity of net exports in relation to the terms of trade – is negative in the long term and that an improvement in the terms of trade over the longer term will therefore worsen the current account. It can also be assumed that the coefficient  $\varepsilon$  – that is to say, the elasticity of the export-import ratio in relation to changes in domestic absorption – is also negative. By contrast, the relationship with the growth in foreign absorption ( $\eta$ ) should be positive.

This approach explains the respective current account position by means of the development in the macroeconomic variables outlined. Intertemporal absorption approaches which are based on microeconomics are also used in an attempt to explain why deficits or surpluses occur in different periods. Attention is focused here on the role of the current account as an expression of resource allocation

*Intertemporal absorption approach*

<sup>1</sup> See Deutsche Bundesbank, Exchange rate and foreign trade, Monthly Report, January 1997, page 41 ff.

that is at once both cross-border and intertemporal. The occurrence of negative or positive current account balances is analysed in the light of long-term consumption and investment decisions and the associated build-up of assets or liabilities vis-à-vis non-residents.

*Current  
account,  
savings and  
investment*

The starting point is the consideration that – put simply – the current account balance of an economy corresponds to the difference between domestic savings and investment. If domestic savings are greater than the level of investment in a given period, this is reflected in a current account surplus when seen in foreign trading terms; and a “savings gap”, i.e. a surplus of investment over domestic savings, is accompanied by a current account deficit in foreign trading terms.

*Time prefer-  
ence, product-  
ivity and  
interest*

In the intertemporal model approach the positive or negative financial balances vis-à-vis non-residents are explained as the result of an economic utility maximisation calculation over a specified period. The rate of time preference and the productivity of an economy as well as the interest rate represent important variables. For example, an economy which is inclined to value consumption possibilities in the present higher than consumption possibilities in the future (high rate of time preference) will tend to prefer, all other things being equal, relatively low levels of savings and therefore larger current account deficits than an economy with a lower time preference. Only if productivity is sufficiently high, however, is it attractive for investors to finance the corresponding transfer of resources from abroad. The market interest rate

takes over the function of ensuring a trade-off between these two factors.

The theoretical basis of the intertemporal absorption approach to explaining international current account differences over time has been given detailed treatment in a number of papers over the years.<sup>2</sup> A central theme of these works consists in portraying on a micro-economic basis sustainable savings and investment relationships or optimal consumption paths taking due account of the relevant variables.

The intertemporal approach is applied with various objectives in empirical analyses of the current account.<sup>3</sup> For example, a number of works attempt to derive from it information on the sustainability of external positions in an effort to make a better assessment of the suitability of current account balances and corresponding exchange rate movements.<sup>4</sup> However, structural or balanced current account positions of that kind cannot be established without normative assumptions. That is particularly true of the intertemporal macro-economic utility functions and rates of time preferences that have to be assumed in the process. In the concrete empirical estimating

*Empirical  
approaches*

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<sup>2</sup> For a very comprehensive overview see Obstfeld, M., Rogoff, K., *Foundations of International Macroeconomics*, London 1998.

<sup>3</sup> See, for example, Baxter, M., *International Trade and Business Cycles* in G. Grossman, K. Rogoff (eds.), *Handbook of International Economics*, Vol. 3, Amsterdam 1995, pages 1801–1864; Glick, R., Rogoff, K., *Global versus country-specific productivity shocks and the current account* in *Journal of Monetary Economics*, 35, 1995, pages 159–192.

<sup>4</sup> See Isard, P., Faruquee, H. (eds.), *Exchange Rate Assessment, Extensions of the Macroeconomic Balance Approach*, International Monetary Fund Occasional Paper 167, Washington 1998.

approaches this mostly means taking account of saving ratios, interest rates and productivity levels as well as the terms of trade or real exchange rates. Judging from past experience, this gives rise to collinearity problems which also impair the informative value of the empirical tests.

The empirical analysis carried out here (a detailed account of which appears in the annex) has an objective similar to that of the intertemporal approaches mentioned above to establish structural current account deficits; however, it is based on the simple absorption approach, and its purpose is to obtain a reference variable from the data which makes it possible to distinguish more easily between temporary and permanent changes in the current account.

*Confirmation  
of the impact  
pattern*

The econometric analyses first confirm the theoretical considerations, described above, on the long-term interaction of the variables in the simple absorption approach. Over the long term an improvement in the terms of trade and an increase in domestic absorption, which, by way of approximation, was measured on the basis of the German GDP, will have a negative effect on the export-import ratio. By contrast, there is a positive relationship between the foreign absorption illustrated by the GDP of 18 industrial countries and net exports. The magnitude of the estimated elasticities seems plausible compared with values which were established in separate estimates of export and import functions on previous occasions.<sup>5</sup> A deterioration of 1% in the terms of trade would, if examined on its own, be reflected in a 0.7% improve-

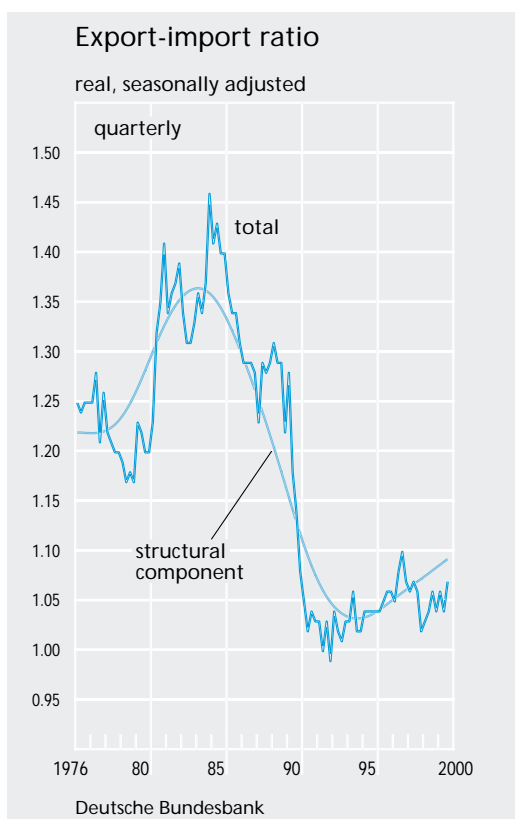
ment in the export-import ratio. Given the decidedly negative change in the terms of trade during the past two years (a deterioration of 11.7% in the terms of trade was recorded in November 2000 compared with the beginning of 1999), the short-term restraining effects of the deterioration in the terms of trade therefore predominate in the current data on lower net exports in 1999 and 2000. Another factor is the upturn in domestic growth, which has been working in the same direction. According to the estimates, a 1% increase in GDP would result in the long term in a deterioration of approximately 2.1% in the export-import ratio. This is counteracted by the positive forces emanating from the improvement in the world economy – the corresponding long-term elasticity of the export-import ratio has been estimated to be 1.6.

The long-term interactions in the current account trend are obscured by short-term disturbances and the adjustments that these cause. To estimate structural current account balances from the established function it is therefore necessary to eliminate the temporary fluctuations in the determinants of current transactions with non-residents that

*Structural  
current account  
balance*

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<sup>5</sup> See, for example, Deutsche Bundesbank, The indicator quality of different definitions of the real external value of the Deutsche Mark, Monthly Report, November 1998, page 49ff., Deutsche Bundesbank, Exchange rate and foreign trade, Monthly Report, January 1997, page 58. However, there are certain differences in the definition of the variables used in these articles and those used for the empirical analysis described in the annex.



have arisen for cyclical or other reasons.<sup>6</sup> The long-term trends in the terms of trade and in the German GDP and that of 18 major industrial countries that were established in this way can then be used along with the coefficients of the long-term relationship previously estimated in the empirical analysis to calculate structural current account positions even though these, as mentioned at the beginning, refer only to goods and services transactions in the narrower sense and exclude factor payments and unrequited transfer payments.

#### Results

The results are shown graphically in the chart above. Significant shifts have occurred in the structural component over time, for example, in connection with German reunification. The large surpluses achieved in the eighties can

no longer be used to the same extent as a measure of the longer-term external trends as they could previously. On the other hand, this representation also shows that the export-import ratio around the mid-nineties moved largely in line with the structural component and that the pronounced deterioration in the German current account during the past two years is likely to be of a temporary nature. At least the deviation of the present external position from the general downward trend indicates this. Owing to the methodology used, however, it is implicitly implied that the structural interactions identified in the past may still be valid at the current end of the time series.

#### Summary and conclusions

The changes in the relative prices of exports and imports and the growth rate differentials vis-à-vis the rest of the world are clearly reflected in the trend in the German current account. Despite radical changes in the underlying macroeconomic conditions associated with German reunification, this fundamental cause-and-effect pattern appears to have remained fairly stable over the past 25 years. The recent depreciation of the euro together with the very steep rise in oil prices have re-

<sup>6</sup> This is done here by means of non-parametric trend estimates. To be more precise, the German GDP, the rest-of-world GDP and the terms of trade were adjusted to eliminate transitory fluctuations using a Hodrick-Prescott filter ( $\lambda = 1600$ ). To take account of the inaccuracies of the two-sided HP filter at the data end-points the sample used for determining the trend components was supplemented by historical data up to the first quarter of 1970 and at the current end by data available as well as by forecasts and by extrapolating the time series up to the fourth quarter of 2006.



sulted in a serious deterioration in the terms of trade, the restraining effects of which on the current account in the short term are obscuring the positive stimuli that are being exerted by the favourable economic trend abroad. At all events, estimates of the structural current account balance show that the sizeable deficits in 1999 and 2000 are short-term deviations from the general trend like

the ones that have occurred every now and again over the past 25 years. There is therefore reason to expect that the current account deficits will again decline once these short-term effects have abated. The results of the analysis also show a tendency towards an improvement in the structural current account position.

## Annex

### Empirical analysis of the simple absorption approach: explanatory notes on the method and data used

#### Data

Real net exports (NX) were measured in terms of the ratio of real exports to real imports of goods and services,<sup>7</sup> domestic absorption (A) in terms of the real German GDP and foreign absorption (A<sup>F</sup>) in terms of the combined real GDP of the 18 most important industrial countries for the German business sector. The terms of trade (P) were calculated on the basis of the export and import prices of goods and services. The data used are the seasonally adjusted quarterly figures for the period from the first quarter of 1976 to the third quarter of 1999. Where necessary as a result of the data quality, a shift adjustment was carried out in the case of the German time series for the changeover to the new definition of "Germany" in connection with German reunification; this also enabled account to be taken of the data break that arose from the change to the new European System of Accounts (ESA 95).

The degree of integration of the variables was checked using ADF tests. The variables proved to be non-stationary in levels but stationary in first differences. Whether cointegration relationships exist between these variables was tested on the basis of a vector error correction model (VECM), which had the following general form:

*Estimate approach*

$$(2) \Delta z_t = \Pi z_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta z_{t-i} + u_t.$$

where  $z$  is a vector of the non-stationary endogenous variables  $nx$ ,  $p$ ,  $a$  and  $a^F$ .

The disturbance term  $u_t$  on the right-hand side of equation (2) was assumed to be independently and identically normally distributed. The second expression contains information on the short-term momentum. The optimum lag structure  $k$ , which was applied, was derived by means of an unrestricted vector autoregression and has the value 4. An impulse dummy variable was included in the short-term relationship in order to take account of

<sup>7</sup> Trade in goods was deflated on the basis of export and import prices, and services by using the ESA price indices of imports and exports of services.

## Estimation results

Cointegration relationship and short-term momentum in the VECM in the case of one cointegration vector and weak exogeneity of  $p$ ,  $a$  and  $a^F$

### Long-term relationship and error correction term (t-values in brackets)

$$\Delta nx_t = -0.686 (nx_{t-1} - (-0.706p_{t-1} - 2.094a_{t-1} + 1.560a^F_{t-1} - 0.966c))$$

(5.109)

### Short-term momentum (t-values in brackets)

$$\begin{aligned} & -0.056 \Delta nx_{t-1} + 0.235 \Delta nx_{t-2} + 0.055 \Delta nx_{t-3} \\ & (0.421) \quad (2.157) \quad (0.586) \\ & + 0.018 \Delta p_t - 0.371 \Delta p_{t-1} + 0.429 \Delta p_{t-2} + 0.221 \Delta p_{t-3} \\ & (0.107) \quad (1.709) \quad (1.979) \quad (1.132) \\ & - 0.106 \Delta a_t + 0.740 \Delta a_{t-1} + 0.033 \Delta a_{t-2} - 0.213 \Delta a_{t-3} \\ & (0.547) \quad (2.594) \quad (0.143) \quad (1.179) \\ & - 2.016 \Delta a^F_t + 3.715 \Delta a^F_{t-1} + 0.057 \Delta a^F_{t-2} + 0.538 \Delta a^F_{t-3} \\ & (1.508) \quad (2.021) \quad (0.030) \quad (0.400) \\ & - 0.133 \Delta d_t \\ & (3.579) \end{aligned}$$

### Test statistics <sup>1)</sup> (p-values in brackets)

$\bar{R}^2$	=	0.50
LM(1)	=	0.992 (0.32)
LM(4)	=	0.755 (0.38)
LB(22)	=	14.463 (0.70)
ARCH(4)	=	5.007 (0.29)
Normality	=	4.651 (0.10)

### LR test on the significance of the variables in the cointegration vector $\beta$

Restriction	$\beta(nx) = 0$	$\beta(p) = 0$	$\beta(a) = 0$	$\beta(a^F) = 0$	$\beta(c) = 0$
p-value	0.00	0.00	0.00	0.00	0.01

<sup>1)</sup>  $\bar{R}^2$ : adjusted coefficient of determination, LM(1), LM(4); test on a first or fourth-order autocorrelation based on Godfrey, LB(22): Ljung-Box test on autocorrelation of higher order; ARCH(4): test on autoregressive conditional heteroscedasticity with four lags, test on normality based on Shenton-Bowman; for information on the tests used see Hansen, H., Juselius, K., Cats in Rats, Illinois 1995, page 72 ff.

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the changeover to figures relating to the whole of Germany as a result of reunification.<sup>8</sup> The values of the dummy variable ( $d$ ) are 0.25 and 0.5 for the third and fourth quarters of 1990, respectively, and 1 starting from the first quarter of 1991; prior to these periods it had been set at zero. The first term on the right-hand side, the matrix  $\Pi$ , stands for the cointegration space spanned between the variables. The method chosen to estimate the model follows the approach developed by Johansen and Juselius.<sup>9</sup> A constant ( $c$ ) is assumed in the long-term relationship. The number of existing cointegration vectors was then tested and was found to be 1. It was therefore possible to break the matrix  $\Pi$  down into a vector  $\beta$  with the coefficients of the cointegration relationship and a vector  $\alpha$  with the loading coefficients. Restrictions to these vectors were set in later steps in order to identify the features of the long-term relationship more accurately. The domestic absorption, the external absorption and the terms of trade each proved to be slightly exogenous with respect to net exports (p-value: 0.84). The model was again estimated taking these restrictions into account in order to improve the statistical quality.

A long-term equilibrium relationship could be identified between the variables. With a significant error correction term of  $-0.686$  net exports adjust quite rapidly to this equilibrium described by the cointegration vector. By contrast, the other three variables did not prove to be endogenous to the model used and can be considered as explanatory

Results

<sup>8</sup> From July 1990 the balance of payments statistics include the transactions of the former East Germany with the rest of the world.

<sup>9</sup> See Johansen, S., Statistical Analysis of Cointegration Vectors in Journal of Economic Dynamics and Control, 12, 1988, pages 231–254; Johansen, S., Juselius, K., Testing Structural Hypotheses in a Multivariate Cointegration Analysis of the PPP and UIP for UK, Journal of Econometrics, 53, 1992, pages 211–244.

variables for net exports. To that extent, the estimated model provides empirical evidence for the theoretical considerations of the simple absorption approach.

The plus and minus signs in front of the estimated coefficients in the cointegration relationship are in line with the theoretical considerations cited at the beginning. The coefficients in the long-term relationship are significant in the case of an error probability of 5%. The results are also stable around the time of German reunification. A recursive esti-

mate was carried out from the first quarter of 1987 to ascertain if there had been a structural break. Only a few of the coefficients proved to be significant in the short-term momentum. As only the long-term equilibrium relationship is of interest when determining structural current account positions, the short-term momentum was not analysed more closely. Its sole purpose as far as the method used here is concerned was to provide a clearer definition of the coefficients of the cointegration relationship.