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German Unification and Its Impact on Net Savings

by Horst Siebert

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German Unification and Its Impact on Net Savings

- The obsolete capital stock in eastern Germany has to be rebuilt. This will increase the capital demand in Germany for the next few years. In addition to the increased demand for capital, government transfers need to be financed.
- The macroeconomic accounting identity requires that net savings of the private sector and the government budget balance be equal to the current account. The DM150 billion swing in the current account from a surplus to a deficit between 1989 and 1991 must therefore find its counterexpression in either net savings of the private sector or the budget deficit.
- If a narrow concept of the government budget deficit is used, there would be a government budget deficit of roughly 3–4 percent of GNP in the period 1991–1993, which is not too disturbing. In this case, however, net savings of the private sector, which would amount to 1–2 percent of GNP, appear to be relatively low because the sums not included in the government budget deficit then show up as negative savings in the business sector. A case in point is the Treuhand's deficit.
- If a broader concept of the government budget deficit is applied, there would be a budget deficit reaching 7–8 percent of GNP in 1992 and 1993. In that case, savings of the private sector are artificially blown up because capital transfers to firms, for instance, the infusion of new capital into Treuhand firms, are part of savings in the private sector.
- The need to rebuild the capital stock in eastern Germany produces pressure for a higher long-term interest rate in Germany; this implies that the mark appreciates, which has already occurred.
- Only if severe policy mistakes are made will a risk premium on the German currency be required, which would imply a depreciation.

I. Increased Capital Demand

German unification can be interpreted as an economic shock to post-wall Germany. In the long run, the factor endowment has changed. Qualified labor and land have been added to the western German economy, but at the same time eastern Germany has brought an obsolete capital stock into the marriage. In the short run, the change in the relative factor endowment implies an excess demand for capital derived from the investment opportunities in eastern Germany.

Obsolete capital stock. As in any transformation process with a rapid change of the price vector, a large part of the existing capital became obsolete. In the case of eastern Germany, the appreciation of the East German mark and the wage shock aggravated the destruction of the existing capital stock. Like the dinosaurs, the huge *Kombinate* were exposed to a cosmic change in their economic conditions [Long and Siebert, 1992]. The transition problem can be analyzed as a change in the firms' constraints: a sudden drop in the producer's price, a shift from monopoly to competition, the emergence of product quality as a key factor, a modification in the system of subsidies and of external protection, and competition for new capital in place of the former "soft budget constraint." As demand fell abruptly, the existing capital stock became largely obsolete. In some respects the transition can be compared with a huge oil shock, one that affects not just the price of one input but changes the most important constraints. Besides these economic aspects, the capital stock of eastern Germany was old. According to estimates, 76 percent of the equipment in industry was more than 5 years old and 54.9 percent more than 10 years old.

Capital requirements to rebuild the capital stock in eastern Germany. Assuming that eastern Germany will have the same capital stock per capita as western Germany after the transformation process has ended, the capital stock of the enterprise sector would be DM1,300 billion (Table A1).¹ This is a back-of-the-envelope calculation for accumulated investment which assumes that the existing capital stock is completely obsolete. Infrastructure capital in western Germany amounted to DM2,179 billion in 1991. This figure includes public buildings and equipment, roads, railroads, postal and communications infrastructure, and waterways. Using the infrastructure of western Germany as a frame of reference, infrastructure capital in eastern Germany would amount to DM545 billion. Assuming that one-third of the existing capital stock is still usable, and considering a ten-year period of adjustment, a rough calculation shows that private investment of DM90 billion and public investment of DM40 billion per year, i.e., DM130 billion per year, would be needed.² In contrast to this rough calculation, it can be expected that investment will follow a bell-shaped curve over time with investment cumulating in the years 1993–1995 or 1996 and falling afterwards. Capital demand will increase at first, and then will be lower.

Remark: I appreciate comments from Dietmar Gebert, Michael Heise, and Alfred Boss who prepared Tables 1 and 2.

¹ The total western German capital stock was DM12,687 billion in 1991, that of the enterprise sector DM5,201 billion.

² Calculations for public investment do not include environmental protection.

Relocation of investment. Part of the investment being undertaken in eastern Germany might have taken place in western Germany if Germany were not yet united. Thus, part of the eastern German investment may just have been shifted from western Germany. Such a reallocation of the capital stock should be expected as a normal process, but so far we do not have any indication of the magnitude of this effect. Eventually, investment in western Germany may also be stimulated once a growth process in eastern Germany comes about.

Governmental transfers and inherited debt. In addition to the increased demand for private capital, there is the need to finance governmental transfers to eastern Germany, which are running at DM150 billion per year. Moreover, German fiscal policy has to finance the interest payments on the additional debt burden, which can be calculated to be roughly DM30 billion [Siebert, 1993a].³ All in all, Germany will have to finance DM180 billion per year (6 percent of GNP).

II. The Swing in the Current Account and the Macroeconomic Accounting Identity

The short-run and medium-run changes in Germany's relative factor supplies and the increased demand for private capital as well as the public transfers to eastern Germany have an impact on net savings that Germany can supply to or withdraw from the world capital market.⁴

The accounting identity. The impact of Germany's increased demand for capital can be seen by the change in Germany's net capital export as measured by the balance in the current account. Let X denote exports, M imports, Tr international transfers, S savings of the private sector, I investment of the private sector, and $T - G$ the budget balance with T taxes and other government revenues and G expenditures. Then the macroeconomic accounting identity

$$(S - I) + (T - G) = X - M + Tr$$

indicates that the balance in the current account corresponds to an excess supply of or an excess demand for savings. A positive current account is equivalent to an excess supply of savings. The country does not completely absorb its production, and exports capital abroad. A negative current account implies an excess demand for savings. A country's savings are not sufficient to finance private investment and the budget deficit of the government. A country absorbs more than its production. It imports capital.

³ Note that part of the interest payment on the so-called inherited debt is already included in the calculation of the transfers.

⁴ One potential issue is whether unification has had an impact on the savings behavior of households. With respect to net household savings, this is not the case. The savings ratio, i.e., net household savings as a percentage of disposable income has remained relatively stable, reaching the same values as in the eighties. The net household savings ratio, which amounted to 12.6 in 1991 and 1992 for total Germany, was similar to the average of 12.3 in 1980–1989 [OECD 1993a, Table R12]. Eastern and western Germans have similar savings ratios.

Different concepts of the budget deficit. Some conceptual and statistical difficulties arise in calculating the different components of the accounting identity for post-wall Germany. The issue is to what extent a narrow concept of the governmental budget including the federal, regional, and local government, and the social security system, can be used or whether the shadow budget of the Treuhand, the Credit Processing Fund⁵ and the mortgages on housing⁶ must be included. In an economic interpretation, the wider concept must be applied. One reason is that the wider concept is relevant for capital market implications. The other reason is that any debt outside the official budget eventually must become part of the official budget. Thus, a long-run view requires that debt be integrated into the budget.

Statistical problems. One possible approach is to integrate debt into the budget right away. Such an approach, however, meets with severe data problems. With respect to the shadow budgets, debt taken over as of July 1, 1990 and the increase in debt since that date should be distinguished. In 1990, eastern Germans exchanged their own currency against the Deutsche mark at the rate of 1 : 1. This conversion rate represented a wealth transfer and affected eastern German savings positively. Firms' debts were converted at a rate of 2 : 1. In order to reach consistency between both sides of the account in the eastern German banking sector, i.e., the previous Staatsbank, the Credit Processing Fund took over the difference between the converted old savings and the converted old debt (DM30 billion). Note, however, that the exact figure for old debt only became known when the opening balance for GDR firms was eventually established. In addition, the Credit Processing Fund took over the debt of the previous eastern German government (DM27.6 billion). This increase in debt of roughly DM58 billion has to be added to the overall budget deficit of the government in the year 1990. If it is not added, the increased savings of eastern Germans resulting from the wealth transfer would represent a distorted picture of German savings.

The old debt of firms as of July 1, 1990 can be interpreted as negative savings in the period when debt is taken over, i.e., in 1990. But again, it only became known later, with the opening balance for all Treuhand firms, how high the debt was. Moreover, it only became apparent in the privatization process to what extent debt was eventually taken over by the Treuhand.

In addition to the stock variable of debt taken over, there was an increase in debt after July 1, 1990. Thus, the Treuhand had an annual operating deficit of DM4 billion in 1990, DM20 billion in 1991, and DM30 billion in 1992. The deficit of the Treuhand per period means that investment in Treuhand firms was financed by the Treuhand or that Treuhand firms incurred losses, i.e., they had negative savings. Similarly, debt increased in the Credit Processing Fund and in the public housing sector.

Ignoring debt temporarily. The alternative procedure is to temporarily neglect the debt in the shadow budget, both the level and the annual increase, and to integrate in one way or another the level of debt at some future date into the overall budget. This procedure is followed in practice. The level of debt (consisting of debt taken over as of July 1, 1990, and accumulated debt up to December 31, 1994) will be made explicit in a fund to be established in order to service the debt and eventually pay

⁵ The Credit Processing Fund (*Kreditabwicklungsfonds*) manages the liabilities of the former GDR and covers the differential conversion rates for the debt of socialist firms and for individual savings. This fund will have to be taken over by the federal government. It is estimated that a debt of DM140 billion will have been accumulated by the fund.

⁶ The debt of the public housing sector in eastern Germany is DM50 billion.

Table 1 — Savings, Investment, and External Balance for Germany (in billions of Deutsche marks and percent of GNP)

	S		I		S - I		T - G		Current account	
	bil. DM		bil. DM		bil. DM %		bil. DM %		bil. DM %	
Narrow concept of budget deficit ^a										
1960	46.6		50.9	-4.3	-1.4		9.1	3.0	4.8	1.6
1970	93.6		90.2	3.4	0.5		1.4	0.2	4.7	0.7
1980	139.5		125.3	14.2	1.0		-42.7	-2.9	-28.5	-1.9
1981	135.7		90.9	44.8	2.9		-56.6	-3.7	-11.7	-0.8
1982	133.0		69.8	63.2	4.0		-52.7	-3.3	10.5	0.7
1983	148.7		94.3	54.4	3.2		-42.6	-2.5	11.8	0.7
1984	155.7		100.1	55.6	3.2		-34.0	-1.9	21.6	1.2
1985	154.1		91.9	62.2	3.4		-21.1	-1.2	41.1	2.2
1986	204.0		99.0	105.0	5.4		-25.4	-1.3	79.6	4.1
1987	216.6		99.0	117.6	5.9		-37.8	-1.9	79.8	4.0
1988	254.5		122.9	131.6	6.2		-45.2	-2.1	86.3	4.1
1989	256.6		155.7	100.9	4.5		4.3	0.2	105.1	4.7
1990	318.8		188.6	130.2	5.1		-60.5	-2.4	69.8	2.7
1991	286.6		234.4	52.2	1.8		-93.6	-3.3	-41.4	-1.5
1992	293.3		255.3	38.0	1.3		-83.7	-2.8	-45.6	-1.5
1993	310.0		240.0	70.0	2.3		-125.0	-4.0	-55.0	-1.8
1994	334.0		274.0	60.0	1.9		-115.0	-3.5	-55.0	-1.7
1995	355.0		300.0	55.0	1.6		-100.0	-2.9	-45.0	-1.3
Broad concept of budget deficit ^b										
	Impact of shadow budgets on savings									
1990	398.5	79.9	188.6	209.9	8.3		-140.2	-5.5	69.8	2.7
1991	315.8	29.2	234.4	81.6	2.9		-122.8	-4.4	-41.4	-1.5
1992	428.9	135.6	255.3	173.6	5.7		-219.3	-7.3	-45.6	-1.5
1993	444.3	134.3	240.0	204.3	6.6		-259.3	-8.4	-55.0	-1.8
1994	376.0	42.0	274.0	102.0	3.1		-157.0	-4.8	-55.0	-1.7
1995	355.0	0	300.0	55.0	1.6		-100.0	-2.9	-45.0	-1.3

^aThe public sector does not include the Treuhandanstalt, Credit Processing Fund, and the formerly state-owned housing sector. — ^bThe public sector includes the Treuhandanstalt, Credit Processing Fund, and the formerly state-owned housing sector. Small discrepancies between the figures in this part of the table and the figures in Table 2 are due to rounding. — S = savings of private households and firms; I = private investment, T - G = budget deficit (-) or surplus. For 1980-89: West Germany. From July 1, 1990: united Germany (intra-German transactions eliminated).

^aThe public sector does not include the Treuhandanstalt, Credit Processing Fund, and the formerly state-owned housing sector. — ^bThe public sector includes the Treuhandanstalt, Credit Processing Fund, and the formerly state-owned housing sector. Small discrepancies between the figures in this part of the table and the figures in Table 2 are due to rounding. — S = savings of private households and firms; I = private investment, T - G = budget deficit (-) or surplus. For 1980-89: West Germany. From July 1, 1990: united Germany (intra-German transactions eliminated).

Source: Sachverständigenrat [1992, Table 45*]; Deutsche Bundesbank [1992; *Monatsberichte*, May 1993, national income and product accounting data].

off the inherited debts (*Erblastentilgungsfonds* or Fund for Inherited Debts), from January 1995 on. The level of debt is estimated at DM466 billion.⁷ It is realistic to expect a larger figure. The annuity of debt of roughly DM40 billion will increase the annual budget deficit.

Narrow concept of budget deficit. Official statistics follow the narrow concept of the public budget deficit, excluding the Treuhand and other shadow budgets. Thus, it is difficult to establish the real budget deficit per period. In the upper part of Table 1, this narrow concept of the budget deficit is applied. In this case, the GNP share of the public budget deficit is -3.3 for 1991 and -2.8 for 1992, which is not overwhelmingly high. Note however, that $S - I$ only accounts for 1-2 percent of GNP, a relatively low value. This is not surprising. In this approach, the deficit of Treuhand is part of private sector savings and reduces $S - I$.

Broad concept of budget deficit. Table 2 shows the development of debt in the shadow budgets taking into account the year in which the debt materializes. This information in the last row of this table was used to establish the broader concept of government debt in which shadow budgets of the Treuhand (including annual operating deficits and debt taken over in the privatization process), the debt of the Credit Processing Fund, and the debt of the public housing sector are included in the lower part of Table 1. Note that the data on debt based on Bundesbank calculations are on the low end.

Table 2 — Debt in Shadow Budgets (bil. DM)

	1990	1991	1992	1993	1994	1995
Treuhand						
Change in debt	14.1	25.3	67.4	83	40	—
Debt ^a	14.1	39.4	106.8	190	230 ^b	230
Credit Processing Fund						
Change in debt	27.6	-0.1	64.2	46.3	2	—
Debt ^a	27.6	27.5	91.7	138	140	140
Public Housing						
Change in debt	38	4	4	5	0	0
Debt ^a	38	42	46	51	51	51
Total change in debt	79.7	29.2	135.6	134.3	42	0

^aEnd of the year. — ^bDM45 billion will be taken over by the federal government in 1994.

Source: Deutsche Bundesbank [*Monatsberichte*, various issues]; Presse- und Informationsamt der Bundesregierung, *Bulletin*; own calculations and estimates.

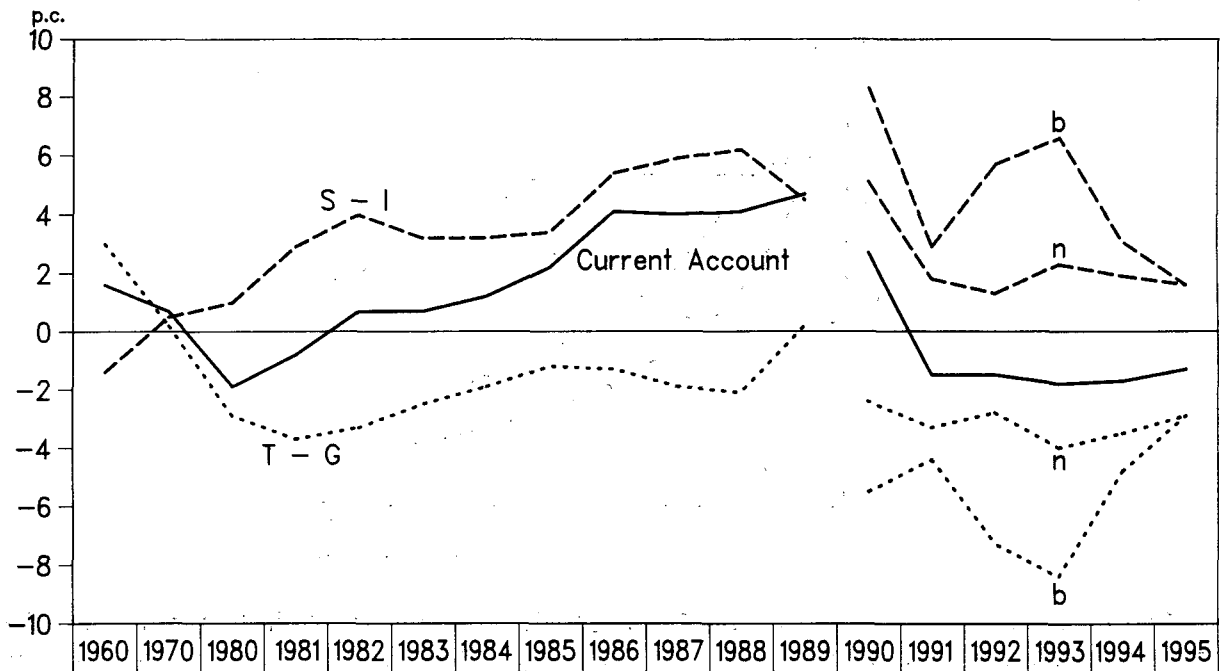
It is interesting to see that the inclusion of the shadow budget implies that the overall public budget deficit increases (DM219.3 billion in 1992 instead of DM83.7 billion) to 7.3 percent of GNP. While the data for investment remain unchanged, data for savings of the private sector increase considerably (DM428.9 billion instead of DM293.3 billion). This is due to the fact that savings of the private sector

⁷ Formally, DM20 billion for the housing sector will have been integrated into the federal budget before 1994, DM45 billion for the Treuhand will be integrated in 1994.

include savings of the business sector. Thus, capital transfers to firms, for instance the reduction of debt or the infusion of new capital by the Treuhand,⁸ are part of savings. The difference (DM135.6 billion) between the broader concept of savings and the narrower concept in 1992 is explained by the increase in debt of the Treuhand (DM67.4 billion), the Credit Processing Fund (DM64.2 billion), and public housing (DM4 billion) (see Table 2 for details and the total sum). Thus, the figure for savings is blown up artificially.

Graphical illustration. Figure 1 shows how Germany's external balance has changed after unification. Most impressive is the swing in the current account between 1989 and 1991, from a surplus of DM105 billion to DM40 billion, or from 4.7 percent of GNP to -1.5 percent (1991). The narrow concept of the budget deficit illustrates the impact of German unification in the guise of low net savings of roughly 1–2 percent (curve *n* in Figure 1). In the narrow concept of the budget deficit, the governmental budget deficit is not disturbing. In the broader concept, net savings are artificially blown up, and the budget deficit reaches 7–8 percent of GNP in the years 1992 and 1993 (curve *b* in Figure 1).

Figure 1 — Balances for the Current Account, Public Budget ($T - G$), and Net Private Savings ($S - I$) in Germany as Percent of GNP



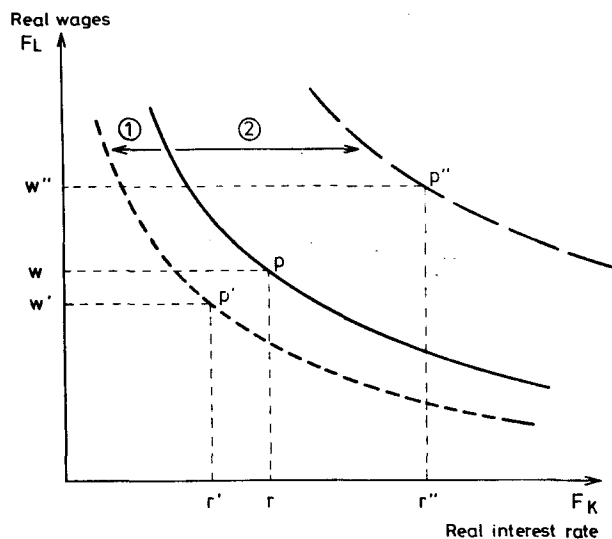
^a 1960 – 1989 western Germany. The letters b and n stand for the broad and narrow concept of the public budget (see text for details).

⁸ Note that the counterposition is represented by the increased debt in the shadow budget.

III. Interest Rate and Exchange Rate Effects

Shift in the factor price frontier. The long-run effects of integration, new investment opportunities and the incentives of the market system make German unification look like a “new frontier” in the sense of Hansen [1955], like creative destruction in the interpretation of Schumpeter [1934] or like a positive supply shock. Clearly, the potential marginal efficiency of capital in eastern Germany has increased, and the real interest rate will be driven up from the supply side. A similar effect comes from infrastructure capital, which can be expected to have a high marginal productivity in eastern Germany. The effect of this supply shock on the real interest rate can be viewed as an increase in the marginal productivity of capital or as a shift in the factor price frontier. This schedule describes the combination of maximum rewards to the factors of production, say capital and labor, given the state of technology (Figure 2). The transition to a market economy makes the existing capital stock obsolete, because the price vector of the economy is changed. This shifts the factor price frontier inward. Building up a new capital stock, and incorporating new technical knowledge in more recent vintages of the capital stock shifts the factor price frontier outward. Note that the initial inward move corresponds to the *J-curve* effect [Siebert, 1991a].

Figure 2 — The Factor Price Frontier



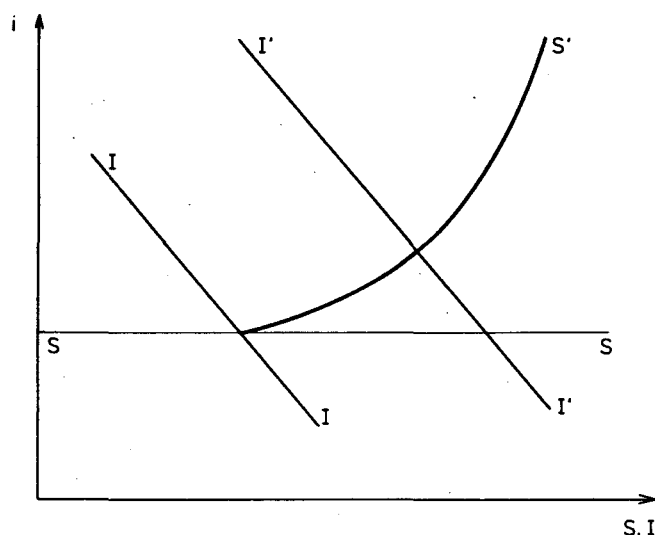
Capital demand for social consumption. The supply side effect on the marginal efficiency of capital or on the real interest rate is not the whole story. In addition, there is an increased capital demand on the part of the government. Part of this governmental capital demand arises for investment purposes, for instance, for building up the physical infrastructure in eastern Germany. These capital outlays will improve productivity, and thus government’s capital demand has to be interpreted similarly as private investment. The factor price frontier shifts outward. But a large part of the budget deficit — according to some estimates 70 percent — is linked to the social easing of the transformation process (labor market policies, unemployment benefits, subsidies to Treuhand firms). These policies increase the demand for capital without raising marginal productivity.

Supply of savings. The interest rate effect will be influenced by the availability of capital. In an open economy, capital inflows reduce the tendency of the interest rate to rise. If foreign savings were available at a constant price, there would be no interest rate effect (supply curve SS in Figure 3).

With gross savings in the world capital market estimated at more than \$3,000 billion⁹ and the swing in the German current account of less than \$100 billion (DM150 billion) representing less than 3 percent of the total supply of gross world savings, one would only expect minor changes in the German interest rate. Empirical studies, however, point out that there is a strong relationship, 0.8 and higher, between the investment share and saving share in the national income.¹⁰ This indicates that international capital mobility is far from perfect and that national investment is strongly linked to national savings. If capital mobility were perfect, the coefficient would be zero [see also Eichengreen, 1991].

There are some arguments pointing to a differentiation in the long-term interest rates between countries in the case of a major asymmetric shock. One explanation is that sizable real capital flows need large changes in the current account, which represent shifts in the trade of goods and services; but such large shifts do not occur abruptly. Moreover, sustained net capital inflows between 2–4 percent of GDP are rather unusual [Bosworth, 1993, p. 26]. Net real capital flows are different from portfolio flows. Another explanation is that capital markets are segmented. In addition, the interest rate may reflect a risk premium that is required by the international capital market. This risk premium depends on expectations relating to the success of economic policy and a country's ability to pay back a loan. Last but not least, the interest rate effect also depends on such aspects as the way of financing the infrastructure; for instance, whether it is financed privately, by bonds or by taxation. Thus, it seems realistic to consider a supply curve SS' for new capital.

Figure 3 — Supply of and Demand for Savings



⁹ Gross domestic capital formation in the OECD countries amounted to \$2.7 trillion in 1991, financed by consumption of fixed capital (\$1.7 trillion) and net savings (\$1.0 trillion) [OECD, 1993b, pp. 16–17].

¹⁰ Compare, for instance, Feldstein [1991] for the 1960s and 1970s.

Increase in the German interest rate. The nominal long-term German interest rate (on government bonds) increased in Germany from below 7 percent in the middle of 1989 to around 9 percent after the announcement of the monetary union on February 7, 1990. It has come down in 1993 to below 6.5 percent (Figure A1). There has also been a temporary increase in the real long-term interest rate, defined as the nominal interest rate adjusted for the consumer price level, to above 5 percent; in mid-1993, the real interest rate was down to 2.5 percent.

Impact on the world interest rate. One should expect that the impact of the reduced supply of German savings on the world interest rate should be negligible. Reduced net German excess savings of less than \$100 billion in a world capital market with more than \$3,000 billion in gross savings should not have a major impact on the world interest rate.

Deutsche mark appreciation. From the supply side, a Deutsche mark appreciation after reunification was to be expected. This appreciation has been motivated both from the capital account and the current account. With respect to the capital account, the mark appreciation has been due to a higher marginal efficiency of capital, i.e., higher rates of return in eastern Germany prompting a larger capital inflow (reduced capital outflow out of the mark area) and consequently raising demand for the mark. With respect to the trade account, the appreciation has been a vehicle to bring about a reduction in the overall German trade surplus. This reduction has been necessary because eastern Germany has a trade deficit, thus reducing the overall German trade surplus.

Asset market equilibrium and appreciation. Consider an asset market equilibrium with interest rate parity where i^{US} represents the international interest rate, i^G represents the German interest rate, w (i.e., \$/DM) is the actual exchange rate, and w^e is the expected exchange rate. Asset market equilibrium requires that

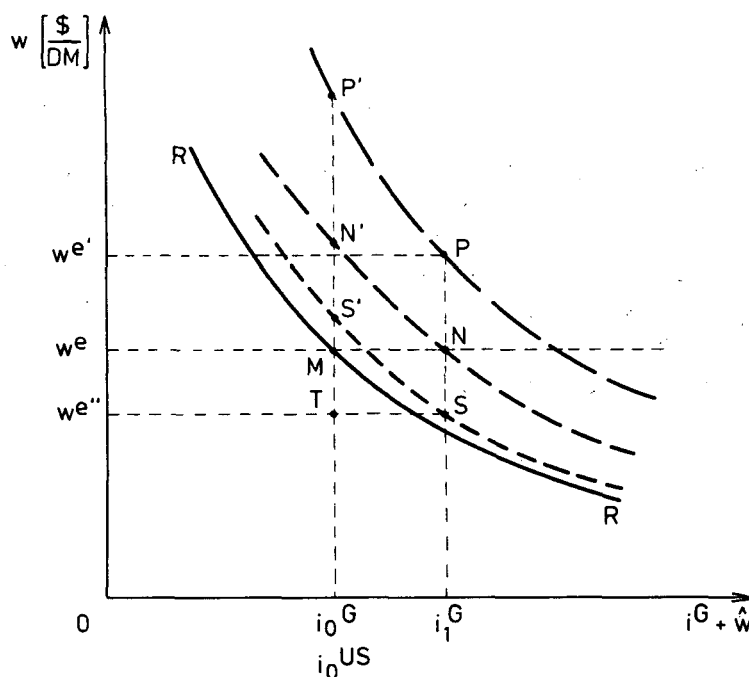
$$i^{US} = i^G + \hat{w},$$

where $\hat{w} = (w^e - w)/w$. An increase in the exchange rate, i.e., $\hat{w} > 0$, represents a mark appreciation and $w < 0$ represents a depreciation. Let the initial equilibrium be given at M , with i_0^{US} and i_0^G being equal for simplicity. The curve RR denotes the rate of return of investing in Germany (Figure 4).

A positive supply shock in Germany means that the rate of return increases (movement from M to N). If the US interest rate i_0^{US} remains fixed, the mark will appreciate (point N'). If, in addition, a mark appreciation is expected, i.e., $w^{e'}$ must be used instead of w^e , there is another upward shift in the RR -curve (point P). A new equilibrium will be at point P' for a given U.S. interest rate.

Intertemporal mechanics of debt. A somewhat different story of exchange rate expectations is told by the intertemporal mechanics of debt. According to this scenario, investment in eastern Germany will be financed through capital inflows, and Germany will accumulate foreign debt, as stressed by Wyplosz [1991]. In the long run, a current account surplus is required to repay the debt, necessitating a real exchange rate depreciation. According to this scenario, Germany would repeat what happened in the U.S. in the 1980s, when there was an investment boom financed by foreign debt, and a transitional appreciation that was corrected later on. The intertemporal mechanism of stocks is operating even if no foreign debt is accumulated: a reduced current account means a smaller stock of direct and portfolio investment abroad, which weakens the tendency toward appreciation. In such a context, a mark depreciation is expected in the long run ($w^{e''}$ instead of w^e in Figure 4); this is a counterforce to

Figure 4 — Asset Market Equilibrium



the interest rate effect pulling the RR -curve towards point S for given i_1^G or to the new equilibrium point S' . If the expectation of a depreciation is large enough, the new equilibrium can be located below point M .

Positive productivity effects from integration. The expectation of a mark depreciation, however, crucially depends on the assumption that western German productivity will simply be extended to a united Germany. It neglects the integration gains and the effect of new technology brought about by investment in eastern Germany. This might well change Germany's productivity [see Baldwin, 1992; Romer, 1986]. Indeed, eastern Germany now has the opportunity to incorporate more modern technology than western Germany and can thus enjoy the advantage of a latecomer. Moreover, economic integration can increase product variety and quality and thus stimulate exports, preventing a worsening in the terms of trade. Such a dynamic supply-side effect could, over time, counterbalance the effect of reduced German capital accumulation abroad and prevent a long-run depreciation.

Negative exchange rate expectations due to policy failure. Policies may change the outcome. If subsidies to firms in eastern Germany dominate the adjustment process, old inefficiencies will be perpetuated, limiting the increase in capital efficiency in eastern Germany. Economic policy also may not succeed in scaling down social transfers. Then subsidies and social transfers will burden the budget deficit and increase debt, or taxes will have to be raised. Then, depreciation expectations may dominate, and a mark depreciation or a higher German interest rate may be required.

The actual picture. The mark has appreciated against the dollar since 1989; the mark appreciated against the yen only in 1989, depreciating afterwards. Against the currencies of 17 other industrial countries, the mark has appreciated (Figure A2).¹¹

The asymmetric shock to the EMS. German unification has been a country-specific shock to the EMS mechanism. There is no doubt that higher interest rates in Germany negatively affect investment elsewhere. An asymmetric shock is the typical case in which flexible exchange rates are desirable, or in which a realignment of fixed rates is required. Thus, a long-run tendency for the mark to appreciate has put the EMS under pressure. Without realignment, the other EMS countries have experienced an increase in their interest rates, i.e., they have moved in the direction of *MN* in Figure 4. The mark appreciation has pulled up other European currencies against the dollar and the yen, thereby reducing the competitiveness of the EMS area vis-à-vis the rest of the world. The problem must be solved by a realignment as was shown by the turbulence in September 1992 and by the widening of the band in August 1993.

¹¹ Of course, the mark appreciation was not only caused by German unification. Other factors, for instance, in the U.S., might also imply a mark appreciation or, for instance, political instability in the CIS might imply a depreciation.

Appendix

Table A1 — Capital Stock and Investment in Eastern and Western Germany

	Western Germany 1991	Eastern Germany 1988	Eastern German capital stock after adjustment ^a
	bil. DM	bil. OM	bil. DM
1. Gross domestic product			
Total	2,599	346	
Enterprises (without housing)	1,974	—	
Goods-producing sectors (mining, manufacturing, construction, electricity, gas, and water)	1,000	200 ^b	
2. Gross investment			
Total	570	95	
Enterprises (without housing)	367	68	
Goods-producing sectors	142	46	
Housing	137	12 ^c	
3. Gross capital stock			
Total	12,687 ^d	1,635 ^d	3,172
Enterprises (without housing)	5,201 ^d	1,300 ^e	1,300
Goods-producing sectors	2,205 ^d	780 ^d	551
Housing	5,067 ^d	—	1,267
<i>for information:</i>			
Public infrastructure	2,179 ^f		545
4. Capital-output ratio			
Total	5.0	5.2	
Enterprises (without housing)	2.5	—	
Goods-producing sectors	2.2	3.9	

^aCalculated as 25 percent of the western German capital stock in 1991. — ^bIncluding goods-producing crafts. — ^cNew construction and modernization. — ^dEvaluated at replacement costs; yearly averages; excluding roads, waterways and civil engineering, including rail and postal services. — ^eCapital stock at 1986 prices. — ^fIncluding roads, waterways, sewage systems, as well as rail and telecommunications systems; for 1988.

Source: Staatliche Zentralverwaltung [1989]; Statistisches Bundesamt [*Fachserie 18*, various years; 1992, pp. 655–661]; own estimates.

Figure A1 — Nominal Long-Term Interest Rates in Various Countries, 1988–1993

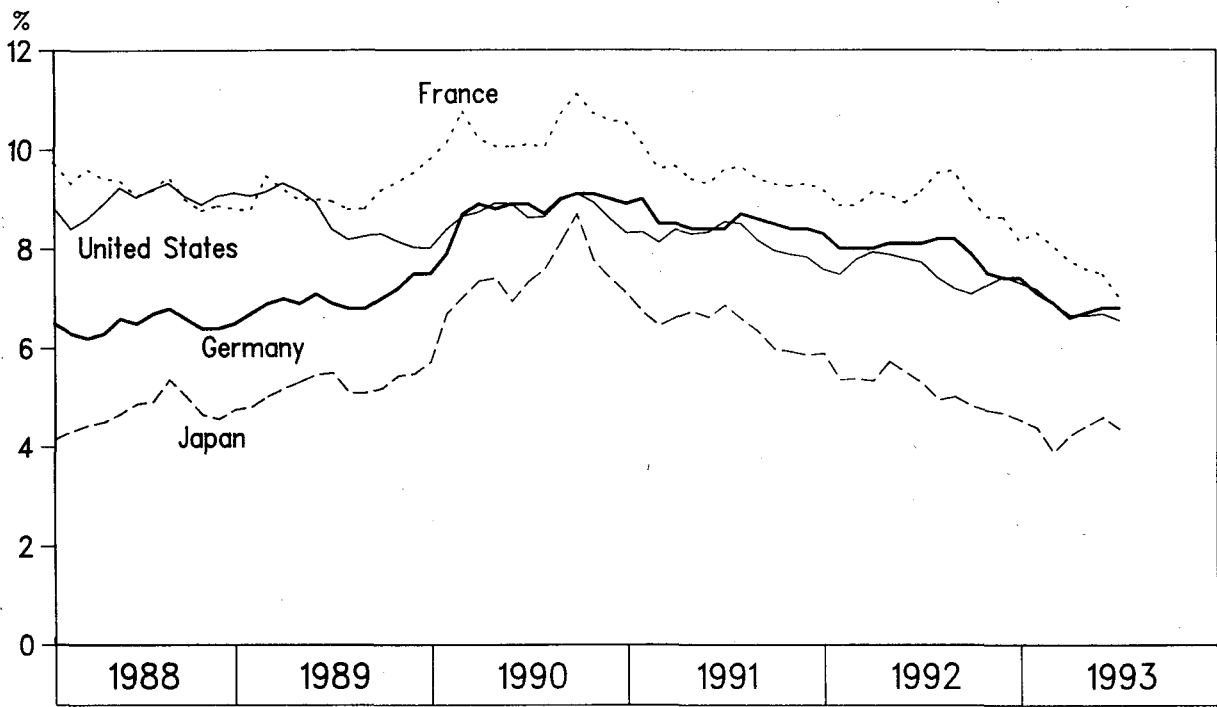
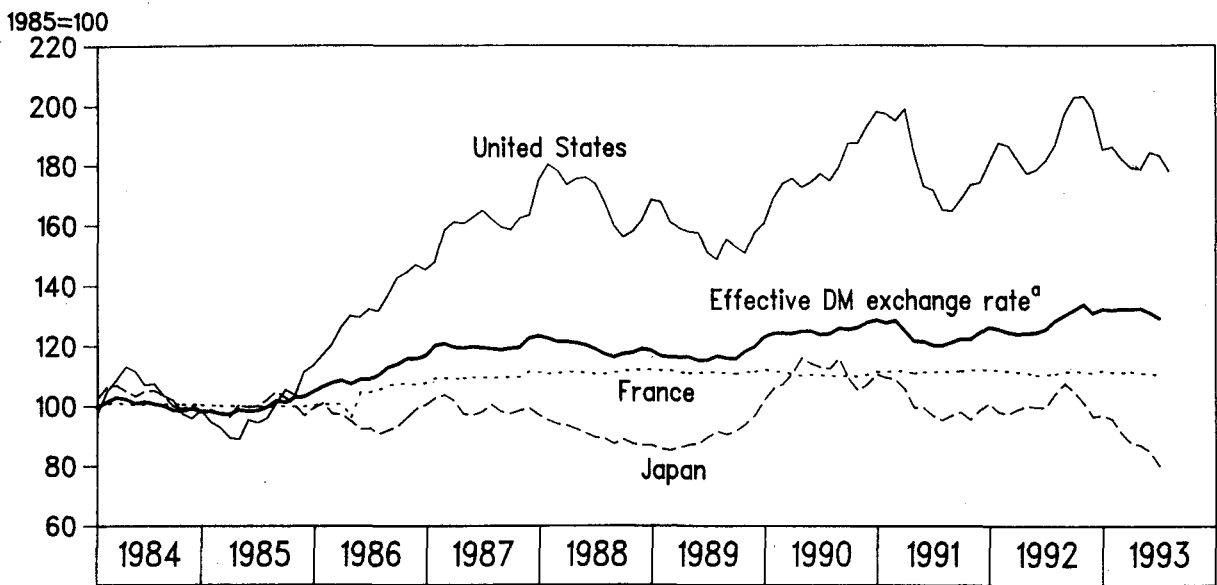


Figure A2 — Exchange Rates of the Deutsche Mark 1984–1993 (1985 = 100)



^a Against 17 industrial countries (United States, Canada, Japan, France, Italy, United Kingdom, Spain, Netherlands, Belgium, Denmark, Portugal, Ireland, Switzerland, Sweden, Austria, Finland, Norway), weighted with western German export shares (1984 – 1986).

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