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□ Active export promotion requires a close exchange of information between state administration and private industry and its organisations. Cooperation of this sort, which allowed the state administration to formulate and, if necessary, revise, strategic goals for the development of industry and exports, was one of the conditions which led to East Asia's economic miracle. Despite all the scepticism regarding the transference of institutional structures from one cultural sphere to another, it does seem judicious for developing countries to complement measures of trade policy with new forms of coordination between state administration and private industry. Close collaboration in mixed-membership coordination bodies should contribute towards dismantling the mistrust which exists in many developing countries (and in Africa in particular) and help initiate a learning

process in which both sides can recognise their specific roles more clearly and fill them accordingly.

□ The increasingly perceptible and complicated environmental and health requirements which consumers and legislators in the OECD countries place on domestic and imported products pose a particular challenge within the new trading environment. It is to be expected that environmental requirements which have hitherto been placed on products alone will also be extended to include production processes in some form or another (seal of environmental approval, international standards for the burden placed by production processes on the environment). It is therefore increasingly important to support the adaptation of export production to environmental and health standards.

Daniel Gros*

Germany's Stake in Exchange Rate Stability

The position taken by politicians and important pressure groups in Germany concerning EMU will depend to a large extent on its labour market implications – and thus on the (perceived) impact of exchange rate variability on employment and unemployment.

Most economists would assume this impact to be minor.

The purpose of this paper is to show that this presumption might be wrong.

Why should Germany want EMU? It is often argued that it can only lose in economic terms: it is unlikely to gain in terms of price stability and the demand for its exports is rather inelastic so that exchange rate fluctuations should not have a strong impact on its economy. It has indeed been difficult to document a strong relationship between the amount of trade and exchange rate variability.¹ But this argument might be besides the point: German policy-makers presumably are concerned mostly with the performance of the economy at home. Trade matters only if it has an impact on the factors that are crucial for re-election, namely inflation and unemployment. The former is the responsibility of the Bundesbank,

but the government is held responsible for the state of the labour market, which can be decisive for elections. The position important pressure groups, such as trade unions, take concerning EMU will also depend more on its labour market implications than on the volume of trade.

German support for EMU should thus depend on the (perceived) impact of exchange rate variability on employment and unemployment. Given the factors mentioned above most economists would assume that it should be minor. The purpose of this paper is to

¹ For a recent survey see André Sapir, Khalid Sekkat and Axel A. Weber: The Impact of Exchange Rate Fluctuations on EC Trade, Centre for Economic Policy Research (CEPR), Working Document No. 1041, 1994.

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show that this presumption might be wrong. A simple causality type analysis shows that exchange rate variability does have a significant impact on unemployment and job creation in Germany. It bears emphasising that the results reported here suggest that short-term (month to month) variability of intra-European exchange rates of the DM has a negative impact on job creation and tends to increase unemployment. No similar effect was found for the level of the DM exchange rate.

The remainder of this brief paper just reports the results of some simple causality tests for the influence of the variability of the DM exchange rate (against the currencies of the 7 other original members of the ERM: B-LUX, DK, F, IRL, IT, NL) on two key labour market indicators: i) (changes in) unemployment and, ii) employment growth. Only European exchange rates are used because only their variability could be suppressed by EMU. These countries also represent the most likely early candidates for membership in EMU. The initial ERM countries were used because when the EMS was created politicians used to emphasise the gains from exchange-rate stability.

DM Volatility and the Labour Market

How could the impact of exchange rate variability on the German labour market be measured? The simplest way to obtain a preliminary answer is to use a standard causality test. This is done in this section using annual data. The exchange rate variability of the DM was measured by taking the standard deviation for each year of the 12 month-to-month changes in the logarithm of the nominal exchange rate of the DM against the currencies of the countries mentioned above. These 7 standard deviations were then aggregated in one composite measure of exchange rate variability (denoted by "exv" below) weighting them by the weights of the countries in the ECU (which correspond approximately to their weights in terms of GDP). The average of the standard deviations was used instead of taking the standard deviation of the average (or effective) exchange rate of the DM because there exists ample evidence that exporters price to market.² The uncertainty in each market should thus matter separately. Moreover, this

² See for example Rüdiger Dornbusch: Exchange Rates and Prices, in: American Economic Review, March 1987, Vol. 77, pp. 93-106; and Paul Krugman: Pricing to Market When the Exchange Rate Changes, NBER Working Paper No. 1926, May 1986.

³ For further details and a discussion of the longer run evolution of this variability measure see Daniel Gros and Niels Thygesen: European Monetary Integration, Longman, London 1992, chapter 4.

measure gives a rough indication of exchange rate variability at the European level.³ Nominal exchange rate variability was used because for monthly changes real and nominal variability are almost identical.

Since the unemployment rate in Germany was found to be non-stationary the analysis was performed using the changes in the unemployment rate, called "due". (Similar results were obtained using levels and a time trend.) The nature of the results can be seen by looking at the result from a simple OLS regression of "due" on its own past (two lags, due(-1) and due(-2)) and the measure of exchange rate variability during the previous year (exv(-1)) over the period 1971-1995. The result is shown in Table 1.

This result shows that exchange rate variability clearly has a significant impact on unemployment. Given that only one lag of exchange rate variability turned out to be important, the t-statistic can be used directly to check for the significance of the effect. The value of 3.7 is highly significant in the sense that there is only one chance in a thousand of finding this effect if it does not exist in reality. The point estimate implies that a reduction in the variability measure "exv" by one percentage point reduces unemployment after one year by 0.6%. Formally, one could argue that EMU, which would eliminate (intra-European) exchange rate variability, could reduce unemployment by about 1 percentage point if the starting level is the value of about 1.5 (% per month) for exv in 1995. Even compared to the German unemployment rate of 9% reached in 1995, this is still a significant contribution.

The regression result also suggests that unemployment has a strong dynamic element built in. The point estimate on the first lag implies that 60% of the first year impact of reducing exchange rate

Table 1
Exchange Rate Variability and Unemployment in Germany

The dependent variable is the change in the unemployment rate (DUE).

Independent Variables	Coefficient	T-Statistic
C	-0.45	-2.56
DUE(-1)	0.72	4.62
DUE(-2)	-0.52	-3.53
EXV(-1)	0.60	3.7
Adjusted R-squared	0.65	Mean of dependent var. 0.23
S.E. of regression	0.41	S.D. of dependent var. 0.70
Durbin-Watson statistic	1.71	F statistic 16.26

Source: Own calculations based on data from European Economy No. 59, Table 3. The range is 1971-1995.

Table 2
Exchange Rate Variability and Employment
Growth in Germany

The dependent variable is the rate of growth of the occupied population (OCC).

Independent Variables	Coefficient	T-Statistic
C	1.66	5.69
OCC(-1)	0.79	5.58
OCC(-2)	-0.54	-4.46
EXV(-1)	-1.3	-5.34

Adjusted R-squared	0.78	Mean of dependent var.	1.34
S.E. of regression	0.63		
Durbin-Watson statistic	2.05	F statistic	29.22

Source: Own calculations based on data from European Economy No. 59, Table 2. The range is 1971-1995.

variability persists in the second year in the sense that there will be another reduction in unemployment. However, since the coefficient on the third lag is negative this effect is partially overturned the following year so that the long-term impact is only slightly larger than the one obtained already during the first year.

A similar story emerges when the same test is performed on the rate of employment creation, called „occ“ (defined as the percentage change in the number of employed persons). A simple OLS regression of this variable on its own past and on exchange rate variability during the previous year (exv(-1)) gave the result shown in Table 2.

Exchange rate variability again has a significant impact on the German labour market since the t-statistic on exv(-1) is over 5, implying that the

likelihood of obtaining this result by chance is less than one in 1000. The point estimate implies that the increase in exchange rate variability in 1995, which increased the standard deviation of the DM rate from 0.6 in 1994 to about 1.5 in 1995 should lower, ceteris paribus, the rate of employment growth in 1996 by almost 1.5 percentage points; this would be equivalent to about half a million jobs lost.

Explanations

One might argue that these results say more about the limitations of causality tests than about the influence of exchange rate variability on unemployment. But these results are not just a statistical fluke. They are robust to changes in the observation period (whether longer or shorter) and robust to changes in the specification (in levels) and including a time trend the result is even stronger. There is also no reverse causality; as one would expect. If one could predict exchange rate variability one could predict an important element in option prices. The fact that exchange rate variability is a financial market indicator implies that one has to take the correlations uncovered here more seriously than most other correlations among macroeconomic variables. Some additional tests also suggest that it will not be easy simply to dismiss the phenomenon reported here.

The first objection to the result reported here is usually that the variability and the level of the exchange rate are linked so that the exchange rate variability measure could just pick up periods of an overvalued DM. However, this explanation does not work. Adding the real exchange rate of the DM

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Table 3
Employment, Exchange Rate Variability and the Level of the Exchange Rate

Dependent Variable is OCC
SMPL range is 1971-1995

Variable	Coefficient	T-Statistic
C	-1.06	-0.5
OCC(-1)	0.69	5.63
OCC(-2)	-0.54	-4.57
EXV(-1)	-1.55	-5.15
UCL(-1)	0.03	1.33
Adjusted R-squared	0.786874	S.D. of dependent var. 1.344036
S.E. of regression	0.570118	
Durbin-Watson statistic	2.380084	F statistic 23.15231

Note: UCL is the nominal exchange rate deflated by unit labour costs as reported in European Economy No. 59, Table 37.

Table 4
Employment, Exchange Rate Variability and Changes in the Exchange Rate

Dependent Variable is OCC
SMPL range is 1971-1995

Variable	Coefficient	T-Statistic
C	1.61	5.36
OCC(-1)	0.72	5.55
OCC(-2)	-0.53	-4.34
EXV(-1)	-1.26	-4.97
DUCL(-1)	-0.02	-0.77
Adjusted R-squared	0.774799	S.D. of dependent var. 1.344036
S.E. of regression	0.637817	
Durbin-Watson statistic	1.997723	F statistic 21.64284

Note: DUCL denotes the change in ULC defined above.

(measured by relative unit labour costs) does not change the result: neither the level, nor the change, of the real exchange rate has a significant impact on employment creation. And the point estimates and the t-statistics of the coefficients for the exchange rate variability measure are not affected by the inclusion of these variables. Tables 3 and 4 show the corresponding regression results.

Another explanation of why exchange rate variability could be linked to unemployment is that exchange rate variability goes up if the Bundesbank increases interest rates, because in the past other central banks usually had difficulties in following such a policy. The tightening of interest rates would then lead later to a recession, which would thus falsely be attributed to exchange rate variability. This explanation is not totally wrong. But it cannot overturn the results. Adding a lag of the short-term interest rate (the policy instrument of the Bundesbank) to the two equations used so far shows that the interest rate has a significant impact, but it does not displace exchange rate variability, which remains highly

significant. Tables 5 and 6 show the regression results.

A different explanation would be that the root cause for the link documented here is that movements in the US dollar affect intra-European exchange rates. However, the variability of the US dollar/DM exchange rate does not turn out to be significant if it is added to the explanatory variables. There seems to be no link between the (standard deviation of changes in the) dollar/DM rate and unemployment (or employment growth). Only intra-ERM exchange rates seem to matter for the German labour market. (The results of these regressions are available from the author on request.)

A further way to explain the puzzle would be to test what chain of effects could explain the relationship between exchange rate variability and employment. It does not seem to be the case that exchange rate variability affects growth directly. Preliminary tests showed that exchange rate variability (whether intra-ERM or the dollar/DM rate) does not affect GDP growth. However, the growth rate of investment appears to be related systematically to exchange rate variability (intra-ERM) during the previous year. The

Table 5
Employment, Exchange Rate Variability and Monetary Policy

Dependent Variable is OCC
SMPL range is 1971-1995

Variable	Coefficient	T-Statistic
C	2.35	6.04
OCC(-1)	0.694	6.15
OCC(-2)	-0.35	-2.63
EXV(-1)	-0.97	-3.71
INT(-1)	-0.16	-2.40
Adjusted R-squared	0.820069	S.D. of dependent var. 1.344036
S.E. of regression	0.570118	
Durbin-Watson statistic	2.057926	F statistic 28.34605

Note: INT represents the short-term interest rate as reported in European Economy No. 59, Table 53.

Table 6
Unemployment, Exchange Rate Variability and Monetary Policy

Dependent Variable is DUE
SMPL range is 1971-1995

Variable	Coefficient	T-Statistic
C	-1.15	-5.36
DUE(-1)	0.54	4.34
DUE(-2)	-0.25	-1.90
EXV(-1)	0.38	2.85
INT(-1)	0.13	4.14
Adjusted R-squared	0.805736	S.D. of dependent var. 0.705053
S.E. of regression	0.310755	
Durbin-Watson statistic	1.917798	F statistic 25.88579

Table 7
Investment, Exchange Rate Variability and the Level of the Exchange Rate

Dependent Variable is INV
SMPL range is 1971-1995

Variable	Coefficient	T-Statistic
C	-5.05	-0.42
INV(-1)	0.37	1.91
EXV(-2)	-5.13	-2.66
ULC(-1)	0.12	0.88
INT(-2)	-0.38	-2.34
Adjusted R-squared	0.431777	S.D. of dependent var. 4.762188
S.E. of regression	3.589764	
Durbin-Watson statistic	2.110093	F statistic 5.559238

Note: INV is the rate of growth of gross fixed capital formation at constant (1985) prices as reported in European Economy No. 59, Table 22.

Table 8
Investment, Exchange Rate Variability and Monetary Policy

Dependent Variable is INV
SMPL range is 1971-1995

Variable	Coefficient	T-Statistic
C	-5.53	3.06
INV(-1)	0.40	2.08
INV(-2)	-0.37	-2.29
EXV(-1)	-4.06	-2.71
INT(-1)	-0.13	4.14
Adjusted R-squared	0.437617	S.D. of dependent var. 4.762188
S.E. of regression	3.571270	
Durbin-Watson statistic	1.975068	F statistic 7.225180

regression results reported in tables 7 and 8 show that a one percentage point increase in the standard deviation of the DM exchange rates against ERM currencies leads to a fall in the growth rate of investment of about 4 percentage points. Taking into account interest rate movements, the real exchange rate of the DM or the dollar exchange rate again does not modify the thrust of the results.

These additional tests support the view that uncertainty has a negative impact on investment. According to this view, modelled formally by Dixit,⁴ investment constitutes the exercise of an option. The value of the option of waiting increases with uncertainty. This is why increased uncertainty might reduce (or rather delay) investment. Given the rigidities in the German labour market the decision to hire an additional worker is *de facto* also an invest-

⁴ Avinash Dixit: Entry and Exit Decisions under Uncertainty; in: Journal of Political Economy, 1989, Vol. 97, No.3, pp. 620-638.

⁵ Andrew K. Rose: Exchange rate volatility, monetary policy and capital mobility: empirical evidence on the holy trinity, NBER Working Paper No. 4630, 1994.

ment decision. From this point of view it is not surprising that exchange rate variability has such a strong impact on employment growth.

All in all these results suggest that the popular argument, often used by politicians and industrialists, that exchange rate variability increases the risk premium and leads to less investment contains more than a grain of truth after all.

Could exchange rate variability just be an indicator of underlying asymmetric shocks? This is not likely for the high frequency (monthly changes) measure of exchange rate variability used here. It has never been possible to explain the high degree of exchange rate variability that one observes in reality. Most of the fundamental factors (monetary policy, growth etc.) that ought to determine exchange rates, have a much lower variability and their movements are not related to the variability of exchange rates, as documented most recently in Rose⁵ who concludes: "It is not easy to find economically reasonable and statistically significant determinants of exchange rate volatility." It is thus difficult to argue that asymmetric shocks to fundamentals (that would have to occur monthly!) are the root cause of exchange rate variability and hence the root cause of the surprising impact of exchange rate volatility on employment and unemployment in Germany documented here.

Policy Implications

What are the policy implications of this analysis? The surprisingly strong negative impact of exchange rate variability on the German economy uncovered here suggests that EMU should bring substantial benefits for Germany and that it does make sense to construct a strong exchange rate mechanism (an ERM II) for the countries that cannot participate in EMU from the start. Germany does have a stake in exchange rate stability in Europe.

However, one should not jump too quickly to wider policy recommendations on the basis of this analysis. EMU implies much more than just suppressing all exchange rate variability and the unemployment problem in Germany will not be cured by EMU. Fundamental structural reforms in the labour market are needed to achieve that. What this analysis can achieve, however, is to shift the burden of proof. The opponents of EMU have to show either that the benefits of EMU can also be obtained through different arrangements or that EMU brings other disadvantages that outweigh the benefits identified here.