The Impact of Monetary Instruments on Shock Absorption in EU-Countries

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1 Introduction

The main characteristic of the implementation of the European Monetary Union (EMU) is the transition from various national currencies to the Euro, the common European currency. A final fixing of the individual bilateral exchange rates of all European countries involved in the Monetary Union accompanies this step.
Regarding the microeconomic effects, a positive impact on trade is expected by the reduction of transaction and foreign currency management costs as well as by the elimination of the exchange rate uncertainty. Formerly, the latter influenced foreign trade.[1] At the same time, however, the autonomy of national economic policy is restricted by the loss of former national monetary policy instruments, which will now operate European-wide with the start of EMU. In addition to a unique interest rate policy inside EMU, there will be no longer an – even limited - flexibility of the nominal exchange rates. According to the theory of Optimal Currency Areas (OCA)[2], in a flexible or at least not irrevocably fixed exchange rate system[3] these are two potential instruments carrying some of the burden of macroeconomic adjustment. EMU supporters and sceptics give these aspects different values: while supporters hope to obtain growth and employment impulses through more monetary stability, sceptics are anxious, since in their opinion, the economic convergence[4] of the European states is yet not optimal and, additionally, alternative instruments do not yet function efficiently.

In order to be able to actually assess the overall effects of the fixing of the bilateral exchange rates and the „Europeanisation“ of monetary policy, the general adjustment requirements have to be evaluated. One way to gain insights into the process of convergence is by looking at the possible impacts of asymmetric shocks on the participating member states. This is important in order to know the extent to which new or modified smoothing instruments are needed. According to the European Commission

[1] For such a cost analysis, see Müller and Buscher (1999).
[2] For further details on the origin and the recent developments of the Theory of Optimal Currency Areas, see Blejer et al (1997).
[3] Although the EMS was formally an exchange rate system of an adjustable peg, the huge fluctuation bands made it more or less to a flexible exchange rate system. Although restricted in its movements, the nominal exchange rate could act as a market-based adjustment instrument in the defined limits. Additionally, adjustments of the official rates represented political corrections with the intention to buffer economic disturbances.
[4] To be precise, nominal convergence was achieved by and large in May 1998; but the argument refers to the degree of convergence in economic development, i.e. a synchronisation of business cycles, which is necessary for the functioning of one common monetary policy and which is only achieved when countries are not differently affected, i.e. asymmetrically, due to real shocks.

(1990), increasing sectoral diversification will decrease the probability of asymmetric shocks. If an increase in trade and economic integration leads to further intra-industrial trade and not to inter-industrial specialisation of the European countries, the adjustment of real economic structures should increase. Consequently a development of that kind would lower the probability of asymmetric shocks.[5]

Dohse and Krieger-Boden (1998) compare the results of existing empirical studies dealing with asymmetric shocks.[6] They find that - in spite of a group of EU-core countries - asymmetric shocks exist between the EU-countries which seem to have been smoothed by adjustments of price variables in the past. They state that in the case of a Monetary Union within the EU comprising more than the core countries, the probability of asymmetric shocks increases. Calculating coefficients of specialisation in manufacturing, Dohse and Krieger-Boden expect further sectoral specialisation of the EU-countries and they anticipate no decrease in the probability of common shocks which will affect the economies asymmetrically. This would result in a permanent need for adjustment instruments**.** Significant differences in the growth performance of the EU-states are also reported by Buscher (1999). Using the ANOVA-technique country-specific effects are significant for the EU-15 as well as for the EU-11. Only for the core countries – excluding Luxembourg - country-specific differences vanish.

Apart from such an examination of possible future adjustment requirements, the question if flexible bilateral exchange rates as well as national monetary policies[7] contributed to economic adjustments in the past has to be analysed in order to know if other adjustment instruments have to act to a greater extent. We therefore examine the extent to which macroeconomic disturbances were eliminated in the long run[8] by nominal exchange rate as well as interest rate changes. The aim of the study is to evaluate whether in the past these instruments were capable of smoothing the real effects of

[5] According to New Real Trade Theory inter-industrial specialisation is mostly present between developing and developed countries while trade between industrialised countries is marked by a high degree of intra-industrial diversification. However, Krugman (1990) expects higher specialisation of further increasing integration. In addition to lower transaction costs, increasing returns in a world of imperfect competition are supposed to induce this specialisation tendency. Therefore an increasing asymmetry of shocks might occur inside EMU, being most possible in those sectors which produce homogenous goods and which therefore profit the most by increasing returns of scale.

[6] Some important existing studies analysing the asymmetry of shocks are e.g.: Bayoumi and Eichengreen (1993), Bini Smaghi and Vori (1992), Blanchard and Katz (1992), Decressin and Fatás (1995) as well as De Grauwe and Vanherverbeke (1991).

[7] By independently setting short-term national nominal interest rates or by devaluating a currency, national policies were at least potentially able to cut or to loosen the link between the international economic developments.

[8] To distinguish from very short run fluctuations we use the term „long run‘‘ in the sense of macroeconomic effects over the business cycle but not in the sense of growth theory.

asymmetric, mostly sector-specific shocks or if other, mainly real adjustment instruments were used instead.[9]

As long as it can be shown that both instruments did not have any impact on the development of economic growth and employment, their loss does not imply the need of a more intensive use of new or existing alternative instruments, such as price and wage flexibility, labour mobility, capital mobility or federal transfers.[10] But if it turns out that one or both of the nominal instruments has had a strong impact on buffering asymmetric developments, the transition to a uniform European currency could cause problems. At least in the case of asymmetric shocks, it has to be ensured that after the start of EMU, other adjustment instruments will work effectively in order to prevent a deterioration on the labour markets.

In order to examine the aforementioned aspects econometrically, the convergence of a number of representative EU-states and Germany in their growth rates and unemployment rates are explained by changes of the nominal exchange rate and of money market interest rate differentials. For these analyses, Germany was chosen as the country of reference. This does not imply that Germany becomes a benchmark to which all other countries have to adjust in order to fulfil this definition of bilateral convergence. The buffering of shocks or disturbances, i.e. movements towards convergence, can also force Germany to adjust to the others' level. The choice of Germany as the reference country is rather motivated by the potential dominance of the German monetary policy variables within EU as discussed in Section 2.

In section 2 a description of long-term movements of bilateral nominal and real exchange rates and interest rates of EU-countries is given. This is to gain an impression of possible effects on growth, export and employment. Additionally, the same section gives an overview of the implication of theoretical models concerning the effects of exchange rate devaluations or appreciations as well as interest rate policy.

In section 3, an empirical analysis of the effects discussed is conducted for the period from 1974 to 1996, the time of more or less flexible exchange rates after the breakdown of the Bretton Woods System and before the finally unavoidable convergence of

[9] Although the short-term effects of the two nominal instruments are not in the focus of this study, it has to be mentioned that changes, especially in nominal exchange rates and possibly in interest rates, also can have positive effects in buffering shocks in the more short run regardless of their long-term impact.

[10] For further details on the functioning and the recent results on the shock absorbing capacity of these instruments, see Puhani (1999), Lauer (1999), Boockmann (1999), Müller and Heinemann (1999) as well as Büttner (1999).

nominal instruments in the two years before EMU. In Section 4, we summarise the results and draw some conclusions.

2 Monetary Variables before the Implementation of the European Monetary Union

The stability of the European currencies was one of the convergence criteria for the entry into the European Monetary Union. Since permanently volatile exchange rate fluctuations reflect, among others, high expectations of changes in interest and inflation rates, the exchange rate criterion is at the same time a measure for assessing price stability and the confidence of financial markets in consolidation efforts. However, the explanation of exchange rate and interest rate changes and the extent to which they move in consequence of a shock are not in the focus of this study. The paper instead investigates whether exchange rate and interest rate changes contributed to the buffering of shocks or, to the contrary, reinforced disturbing or diverging developments. Thus, we look at the reaction of the real variables on changes in the monetary instruments. First of all, it is important to note that such changes can either have been induced by a measure of economic policy[11] (e.g. adjustments of official rates in a system of fixed exchange rates) or by a – sometimes limited - market adjustment mechanism (in a more or less flexible exchange rate system). Independently of the nature of their changes, both variables are called adjustment instruments as well as policy instruments in the following.

The second important point is that the causality mentioned above (changes in real variables can have induced changes in the adjustment instruments) can in fact cause a problem of endogeneity in the regression equations in Section 3. For this reason, we use Instrumental Variable estimators in those cases in which adjustment instruments were of such a lag that they could have been influenced by the endogenous variables.

In order to get an impression of the development of representative EU-countries' exchange rates, we first have a look at their development in the past. Countries included in this study in addition to West Germany (BD) are France (FR), Italy (IT), the Netherlands (NL), Austria (AT) and Great Britain (UK). The choice is motivated by the aim to include both more stable and more volatile currencies, i.e. both core and peripheral

countries. Figure 1 shows the development of the exchange rate of the D-Mark in relation to each of the other European currencies since 1974. Quarterly averages were used in order to obtain the medium to long-term movements of exchange rates instead of short-term volatility. It is obvious that the nominal value of the D-Mark in relation to all these currencies[12] (with the exception of the Austrian Shilling) has increased over the period examined.

Apart from the nominal value, the real external value of the D-Mark reflecting the purchasing power of the German currency abroad needs to be reviewed as well. Combined with the nominal external values, Figure 1 also shows the bilateral real external values of the D-Mark in relation to the other EU member states examined in this study.[13]

If nationally diverging rates of inflation are offset by nominal exchange rate movements in the long run, as it is assumed by the purchasing power parity theory, the real exchange rate will remain unchanged and the purchasing power of the German currency abroad is maintained. Only with an increase in the real external value, the consumption value of one unit of German currency abroad rises, independently of its external value. In the same way, the power of one unit of a foreign currency to purchase foreign goods rises when the external value of the D-Mark falls.

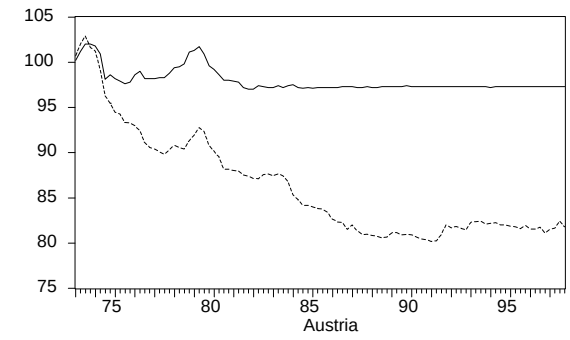
While the nominal external value of the D-Mark was still increasing between 1974 and 1997 and slightly falling in relation to the Austrian Shilling, the examination of the real values after being adjusted for consumer price differentials is completely different. It is clear that in real terms the external value of the D-Mark in relation to the Austrian Shilling has decreased in value. In relation to the Italian Lira, the French Franc and the British Pound, its real value hardly changed. On the contrary the real external value of the D-Mark in relation to the Dutch Guilder fell until the mid 1980s and has since then been rising again. Today it has therefore approximately the real value of the mid 1970s.

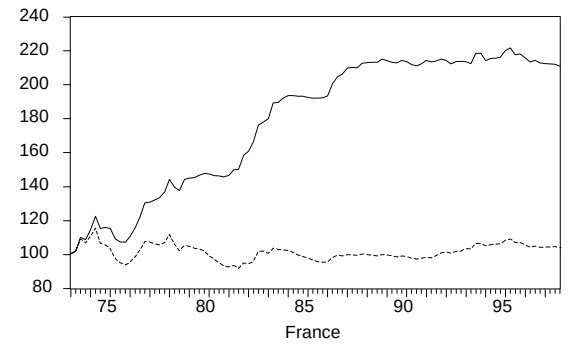
Figure 1: Nominal (solid line) and Real (dotted line) Bilateral External Value Indices against the Currencies of:

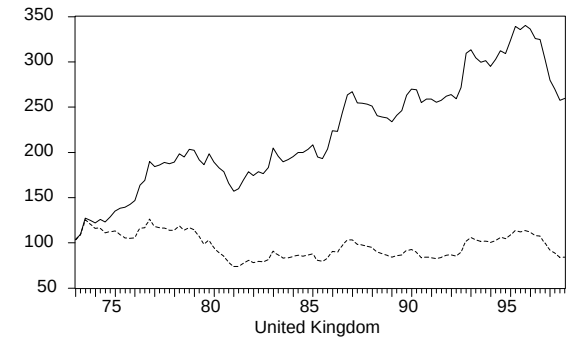
[11] Although international financial markets or monetary integration in EU restrict the flexibility of monetary variables, it is known that at least in the past some countries used more or less extensively this instrument for their national policy interests.

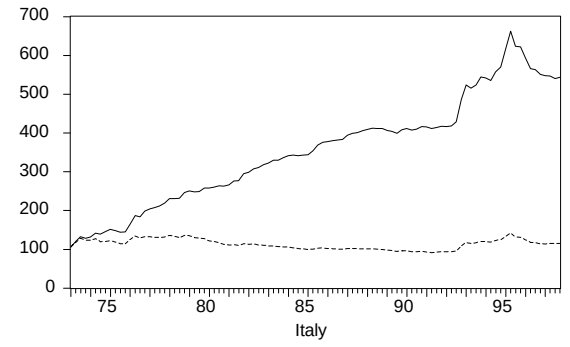
[12] The nominal external value of the D-Mark in the graphics presents the so-called quantity notation of the German currency, i.e. the amount of foreign currency which one receives in exchange for a unit of German currency.

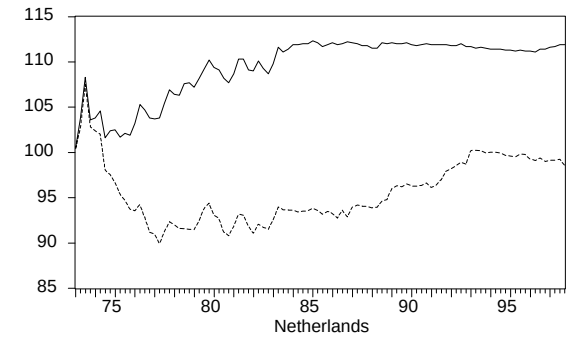
[13] Real external values have been created by a correction by inflation differentials what shows the relation between German goods prices and foreign goods prices expressed in German currency. The consumer price index hereby is a good deflator for international comparisons of the national economy's competitiveness according to the German Bundesbank (1994, 1998).











Nominal and real bilateral external value indices of the D-Mark (quantity notation). Base year is 1972, quarterly averages are used. Calculation of the real external values by deflating the level of nominal variables, using consumer price indices. Sources: External values: German Bundesbank, OECD; Consumer Price Indices: IMF; own calculations.

Regarding the impacts of exchange rate changes, it is this real change of the German Mark which influences the purchasing power in demanding import goods as well as the effective demand for German export goods. This in turn affects the level of German production and thus also the economic growth and demand for labour. It is the change in the real exchange relations which shows whether in international comparison German goods have become cheaper or more expensive.

Such a real change in the external value results either from a nominal depreciation or from a reduction of the relative country price levels. In both cases, the price competitiveness of the domestic economy improves. Theoretically, the contribution of a nominal depreciation is to induce, at least temporarily, a real depreciation. Hence, it induces a lowering of export prices in foreign currency. In case of a normal reaction of the cur-

rent account[14], this real depreciation leads to a rise in the total value of exports and to a decline of the total value of imports. As a consequence, domestic production and employment increase. This mechanism – according to the traditional view of international economics – is supposed to make a nominal devaluation act as a shock absorber.

Hence, the effect of a devaluation is expansionary, although in the short run devaluation can also have the opposite result. However, in the medium or in the long-term, according to a J-curve, its effect is clearly supposed to be expansionary. Therefore, a nominal devaluation can theoretically have a stabilising impact. By decreasing the relative export price, the national economic situation potentially improves due to an increase in national production.

However, under a single European currency, the country-specific export price levels could no longer be adjusted by changes of the nominal exchange rate brought about by the market or by politics. Only the change of competitiveness, determined by the real exchange rate which is achieved by relative changes in the price and wage level, which is one of the alternative adjustment instruments already mentioned above, is left.

But it is doubtful, whether this potentially expansionary effect of a nominal depreciation will be permanent. Often a nominal depreciation is not accompanied by a strongly contractive monetary policy, which is necessary to have a long-term lowering effect on import demand. Therefore, nominal depreciation often leads to an import of inflation. As a consequence, the desired and temporarily induced real depreciation is undermined[15] by a rise in the domestic price level.

The European Commission (1990) only stresses the short-term effect of the nominal exchange rate instrument. As prices and wages are sticky in the short run, the necessary increase in the national competitiveness actually can be obtained - more or less immediately - by a nominal devaluation. Since the goal of the depreciation is basically nothing less than a change in the wage and cost level relative to the one of foreign countries, a positive effect could also be achieved by a higher wage flexibility in the short run. Additionally, this higher flexibility would work even more efficiently in the long run. Without paying attention to the possible short-term benefit of the exchange

[14] The conditions of a normal reaction of the current account balance, i.e. a positive effect of a devaluation, are defined by the Robinson- and the Marshall-Lerner-condition and concern the price elasticity of export demand and export supply.

[15] Theoretical models dealing with possible contractionary effects of devaluation are e.g. Krugman and Taylor (1978), a survey is given by Lizondo and Montiel (1989).

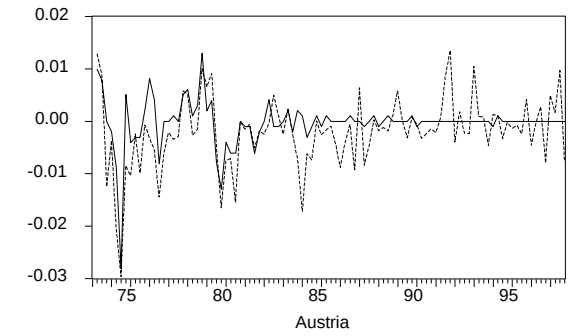
rate instrument, this study will concentrate on the potential long-term effect of this adjustment mechanism.

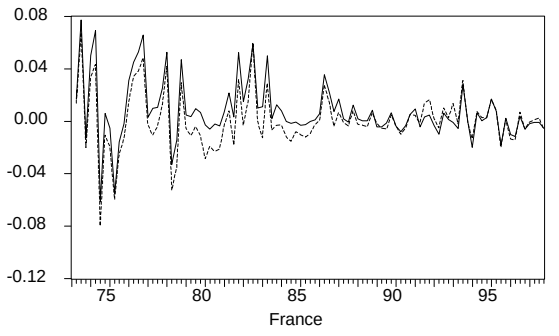
Figure 2 shows that in the past, bilateral exchange relations were subject to several appreciation and depreciation periods.[16] However, the nominal external value of the D-Mark has proven to be extremely stable against Austria and the Netherlands since 1984. The change in real external values compared to both countries' currencies during this period can therefore only result from changes in relative price levels. The nominal exchange rate, however, cannot prove to have been an adjustment instrument leading to greater real convergence in these countries of the so-called D-Mark-block. Before 1984, real as well as nominal changes in the external value existed instead.

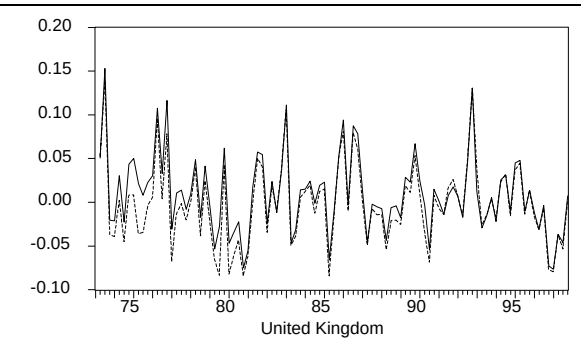
Regarding the external value against the British Pound, there has been no period of stable exchange rates, neither nominal nor real. From 1974 to 1997, the nominal as well as the real German-British exchange rate experienced the greatest fluctuations compared to the other four currencies. Italy and France instead have had greater stability since 1984, as it was also the case of the Netherlands and Austria. While the French currency has remained relatively stable in relation to the German Mark, the Italian Lira has again shown strong fluctuations since 1992. These different periods were taken into account in the estimates presented in section 3. Since 1988, almost simultaneous movements of nominal and real exchange rates can be detected. This means that nominal exchange rate changes have mainly altered the real exchange rate. The question whether this policy instrument has had an important stabilisation function will be tested in section 3.

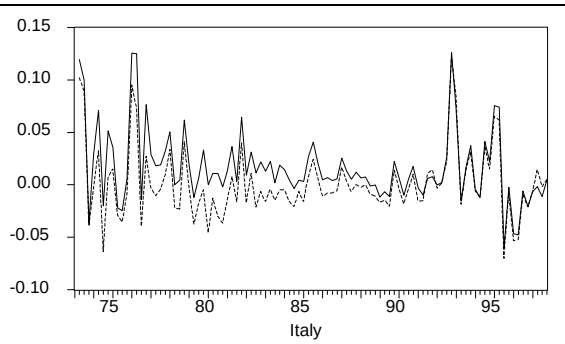
[16] Appreciation and depreciation is defined here as the positive or negative percentage change in the external value of the D-Mark against the other currencies.

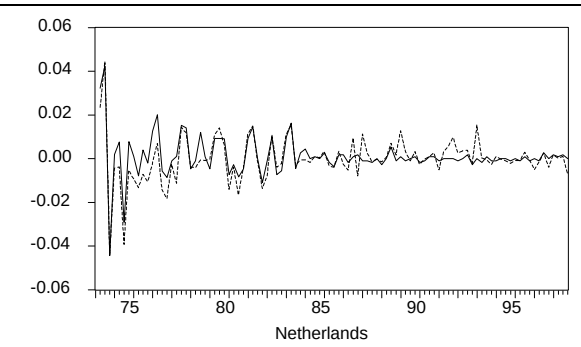
Figure 2: Nominal (solid line) and Real (dotted line) Depreciations and Appreciations, Percentage Change in the External Value of the German Mark against the Currencies of:









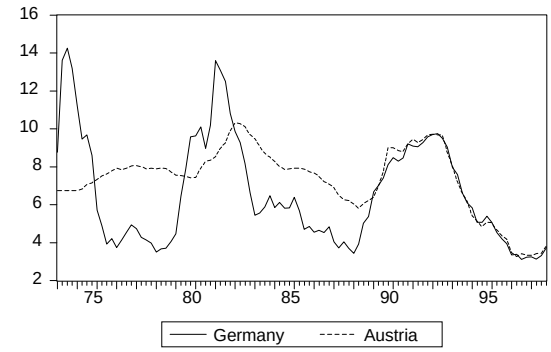


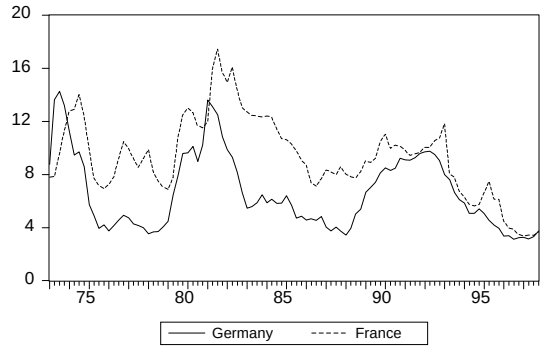
Nominal and real depreciations and appreciations of the exchange rates in relation to the preceding quarter.
Data source: German Bundesbank, OECD, own calculations.

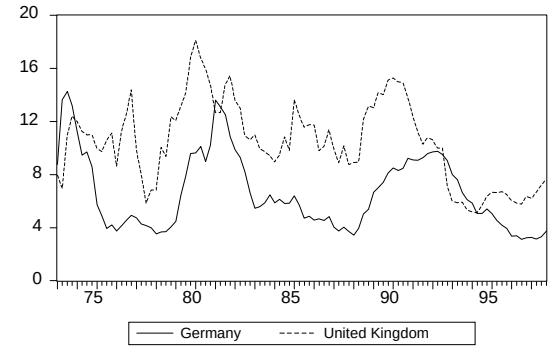
The nominal exchange rate is not the only monetary policy instrument that is lost in EMU. What is more, national interest rate policies are not able to act as a shock absorber any longer. Although long-term interest rates move closely together, there has not been such a close comovement in the money market rates across countries. Short-term rates usually react promptly to changes in the official rates or to announcements regarding the money supply. Central banks were therefore able to use this transmission mechanism to partially isolate the domestic economy from foreign shocks. Given a regular term structure, a cut in the short-term rates will transmit to the long-term rates leading to improved investment conditions in the future. With an increase in investment employment will also start to rise. For a given labour force the increase in employment will be accompanied by a corresponding decline in unemployment. Besides

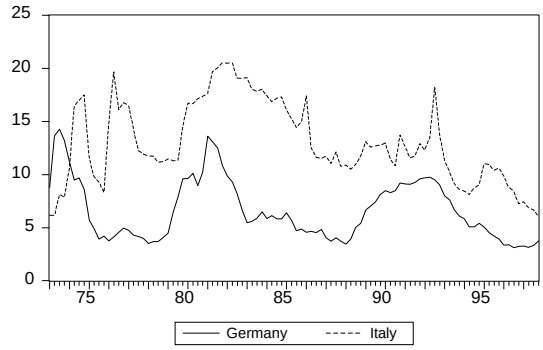
this channel, interest rate policies were also used sometimes to accommodate public spending as well as to improve the current deficit position of a government. This interest rate policy was at least possible in European countries in which central banks were not independent of the government. Whether the former interest rate policies were successful in stimulating growth or reducing unemployment will be tested as a next step in our analysis. For this reason, we also take into account the international differences in short-term interest rates in the regressions.

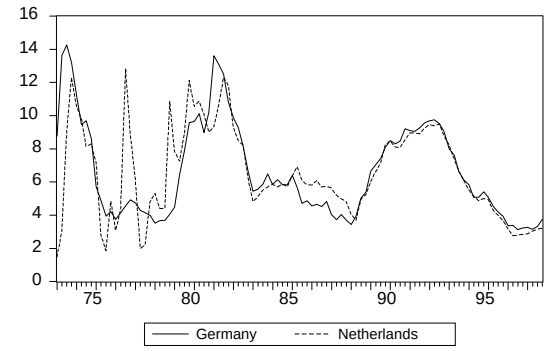
Figure 3: National Interest Rates Compared to German Interest Rate











Three-month interest-rates.

Data source: Interbank loans of OECD National Accounts (Austria, Germany, Great Britain, Italy, and France) and call money rate of the International Financial Statistics of the IMF (Netherlands).

We used 3-month interest rates to represent this instrument eliminated in EMU.[17] Regarding these short-term interest rates in Figure 3, different features can be detected. Except for the Austrian short-term interest rate, the other European national interest rates have been constantly higher than the German one. As far as Austria, the Netherlands and also France are concerned, only in the 1990s have their short-term interest rates fallen, and thus have approached the level of the German rate. Italian and UK interest rates have also been falling to the German level, but were still relatively distant.[18] Up to 1990, the changes in the other European interest rates developed almost in parallel to changes in the German interest rate, although at a different level. However, only separate and independent changes of interest rates inducing either convergence or divergence of the countries' interest rate levels are supposed to have affected the bilateral development of fundamental variables.

3 Evidence of the Impact of Monetary Instruments on the Synchronisation of Economic Development

As discussed in the previous section, adjustment instruments are needed inside EMU that prevent the deterioration of national economic disparities or even contribute to their reduction. Without a simultaneous or convergent development of the course of national business cycles, EMU will generate problems such as unemployment. In order to assess the role of the nominal exchange rate and the national interest rate in the past, the extent to which the two instruments prevented a divergence of the economic development, i.e. absorbed the negative and country-specific effects of asymmetric shocks, is analysed in the following. Additionally, real exchange rate changes are included in the empirical analysis in order to evaluate their contribution relative to the one of nominal exchange rate changes. If changes in real exchange rates turn out to have always had a positive, converging impact while changes in nominal exchange rates never prove to have had one, we can conclude that the latter did neither have a temporary nor a permanent impact on the former and on the economic situation. In this case, prices must have completed the entire adjustment. On the contrary, if nominal changes had

[17] As long as available, these interest rates are represented by interbank loans from the OECD. As for the Netherlands these rates were not available from 1973 on, in this case the call money rate indicated by the IFS was used.

[18] Finally in December 1998, the national central banks of the EMU countries set their official rates to a unique level, thus eliminating all short-term interest rate differentials.

the same impact as real changes, nominal changes would have carried the whole burden of this adjustment.

Recent empirical studies do not attribute an important role to the nominal exchange rate in adjusting different macroeconomic developments in the long run. Canzoneri et al (1996) analyse exchange rate movements and macroeconomic shocks of a set of five representative EU-countries. They find that mostly real instead of nominal shocks cause disequilibria in output while nominal exchange rates only react to real shocks to a minor extent.

What is more, empirical studies dealing with long run effects of devaluations realize contractionary effects although these studies mainly focus on developing countries.[19] A recent research by Kamin and Klau (1997) includes 27 developing as well as developed countries in their sample. Even though they become aware of no significant contractive effect of devaluations in the long run, their results fail to confirm that devaluations are expansionary for developing as well as for industrialised countries. Correspondingly, the European Commission (1990) finds a tendential, but not significant effect of the real exchange rate's devaluation on the difference of a country's GDP growth from the average EC growth.

With respect to European interest rate linkages there also is no clear evidence in favour of one view. Von Hagen and Fratianni (1990) as well as Fratianni and von Hagen (1990) argue that with the start of the EMS in 1978 there was a strong asymmetry in the system. This means that the monetary policy conducted by the Deutsche Bundesbank dominated the other members' policy. The authors anticipate hereby that the German monetary policy forces the other states to follow its disciplinary rule. Using quarterly national interest rate data as well as additional explanatory variables, they conclude that, although, Germany was an important player, this does not necessarily mean that German policy was independent of other members' policies in the EMS. Given that these conclusions hold, there was still room for the other members to have an independent interest rate policy. Contrary to these results are the empirical findings reported by Kirchgässner and Wolters (1990, 1991, 1993). They conclude that there was a clear dominance of German interest rates over the other ones. The papers by Kirchgässner and Wolters as well as by Fratianni and von Hagen differ in several aspects. There is a difference in time periods, interest rate variables and in estimation

methods. Therefore, whether interest rate policy has effectively been used until 1996 remains an open question.

In order to evaluate the contribution of both nominal instruments to achieve and guarantee convergence of cyclical development, their role is tested econometrically in the following. As a measure of economic sychronisation, bilateral differentials of economic growth ***(GR)*** and of unemployment rates ***(UR)*** between Germany and the five representative EU-countries are constructed. Instead of reference average rates, we use bilateral differentials, and hereby Germany plays the part of the reference country.

$$GR^{Germany} - GR^{foreign\ country} = f(X, ER, i^{foreign\ country} - i^{Germany})$$
$$UR^{foreign\ country} - UR^{Germany} = f(X, ER, i^{foreign\ country} - i^{Germany})$$

If according to the estimation results, nominal or real exchange rate ***(ER)*** changes or interest rate ***(i)*** differential changes prove to have been able to contribute to the narrowing of dispersions, the two nominal instruments turn out to have been effective adjustment mechanisms in the past in the case of asymmetric disturbances.
The inclusion of both exchange rate and interest rate policy instruments can lead to problems of multicollinearity as both are not a priori independent of each other. Therefore the explanatory policy variables have to be tested carefully for correlation if both are included in the same regression. However, in the estimations we regard changes in exchange rates as well as bilateral interest rate differentials which might render this problem less difficult.

3.1 Data Description

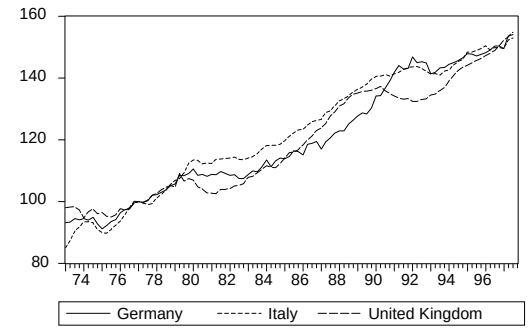
The variables to be explained econometrically are the differentials relative to West Germany in economic growth of different countries and in unemployment rates. In the regressions we use data from 1974 up to 1996.[20]
Economic growth variables are performed by calculating the percentage growth of real gross domestic product (GDP).[21] We, therefore, use GDP data from the OECD in con-

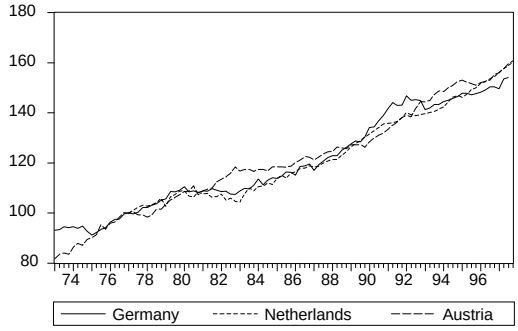
[19] See e.g. Agénor (1991) and Lizondo and Montiel (1989) for a survey and own empirical studies on contractionary devaluations in developing countries.
[20] In some cases data for 1997 are available, but as this availability is not given for all necessary variables and countries and as changes in recent national account data are quite large, we only use data from 1974 to 1996.
[21] Growth rates are calculated in relation to the preceding quarter.

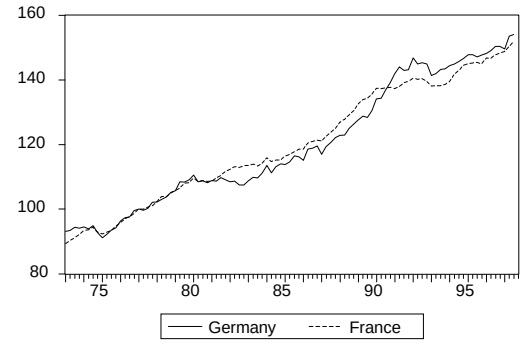
stant terms and seasonally adjusted. As quarterly GDP data from the OECD are not available for Austria over the whole period from 1974 to 1996, these data are taken from the International Financial Statistic of IMF. The developments of the national GDP variables are shown in Figure 4, which presents GDP indices based on 100 in 1977. It is obvious that the average development of economic growth does not differ much in all six EU-countries. There are periods in which some countries underlay a better performance than others. But on average, their economic performance is the same between 1977 and 1997 as they all turn out to be at about the same index point in 1997. It is important to note that with respect to these six representative countries there is no country with an outstanding economic trend overtaking all others.[22]

Country differentials in economic growth are calculated by subtracting the growth rates of the five included EU-countries from the West German. ADF-tests show that all growth variables as well as the country differentials are stationary.

Figure 4: Real Gross Domestic Product (Volume) Index (based on 1977)







Quarterly, real gross domestic product (GDP) of Italy, Great Britain, the Netherlands (since 1977), Austria, and France in comparison to GDP of West Germany are presented in form of indices with the base year being 1977.
Data Source: OECD Quarterly National Accounts, IMF International Financial Statistics (GDP Austria).

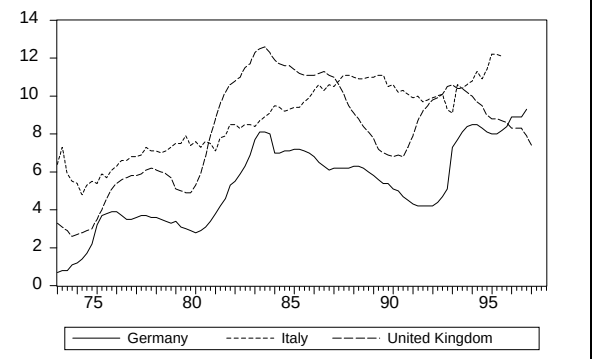
Unemployment is measured by the standardised, seasonally adjusted unemployment rate from the OECD.[23] The unemployment rates are plotted in Figure 5. According to

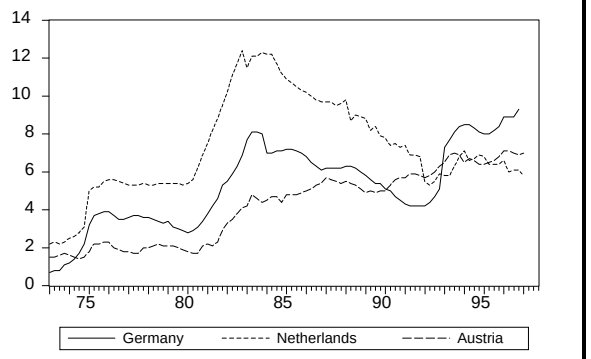
[22] This is in line with the results reported by Buscher (1999), who applied a one-way- as well as a two-way-ANOVA finding that the core-EU-countries move jointly together, but significant differences are obtained for the EU-11 as well as EU-15 countries.

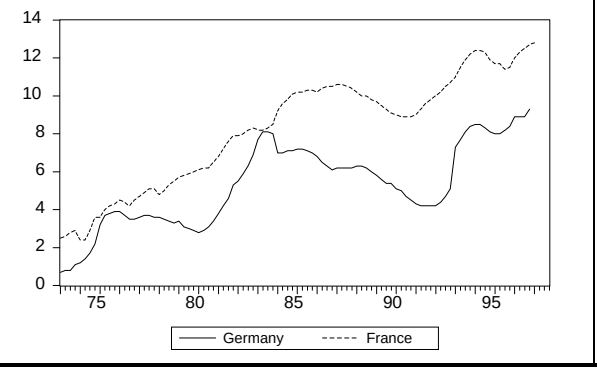
[23] Standardised unemployment rates are used according to the old concept because of the availability of quarterly data. As this unemployment rate is not available on quarterly basis for Austria and for West Germany, we use the

these standardised data, increases and decreases in unemployment rates occur simultaneously in all countries but Italy, whose steadily increasing unemployment rate seems to underlie a separate trend. Only in the 1990s, a generally more distinct development takes place. The Dutch unemployment rate decreases sharply and the British declines slightly. Only France, West Germany and Italy follow an upward trend while the Austrian unemployment rate remains constant.

Figure 5: Quarterly Standardised National Unemployment Rates







Note: Seasonally adjusted quarterly standardised unemployment rates of Italy, Great Britain, the Netherlands, Austria (unemployment in percent of labour force), and France in comparison to the West German unemployment rate in percent of total labour force.
Data Source: OECD, German Bundesbank.

We again generate country differentials by subtraction, thus subtracting the West German unemployment rate from the other countries'. For this case, unemployment rates as well as unemployment rate country differentials are not stationary according to the results of the ADF-tests. Therefore, the differentials are included in first differences in the estimations.

The exogenous variables were already presented in Section 2. In order to get variables of nominal and real exchange rate appreciation and devaluation, we take the percentage change of the bilateral nominal and real external value of the German Mark against the other currencies as described in Section 2. An increase in this variable always represents an appreciation of the German Mark as well as a devaluation of the other currency. These variables are stationary when running the appropriate tests.

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unemployment rate in percent of labour force of Austria from OECD and of West Germany from the German Bundesbank.

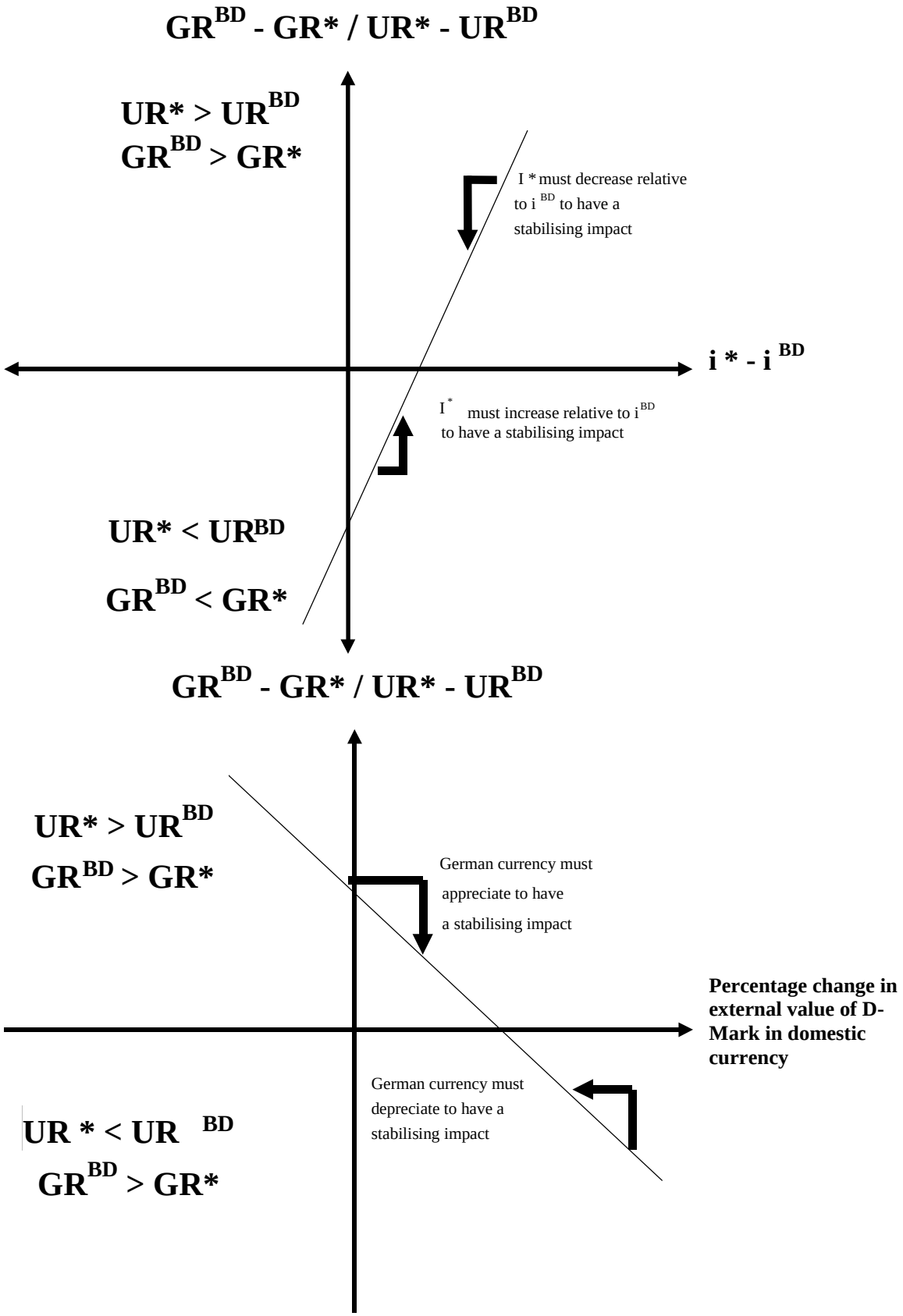
Interest rate country differentials are created by the subtraction of the German short-term interest rate from the foreign short-term interest rate. The national interest rates also have been discussed earlier on. Country differentials in interest rates are stationary as well. According to these definitions of the variables a change in the instruments or the market adjustment mechanisms has a stabilising effect on the real variable developments in the following cases:

Table 1: Possible reactions of real variables on changes in the monetary instruments.

	Reaction of the unemployment rate country differential if the instrument has a stabilising effect	**Reaction of the growth rate country differential if the instrument has a stabilising effect**
case:	**$UR^* - UR^{BD} > 0$**	**$GR^{BD} - GR^* > 0$**
Depreciation of domestic currency relative to D-Mark *(i.e. increase in exchange rate variable)*	■ Differential decreases: domestic unemployment rate goes down relative to formerly lower German rate	■ Differential decreases: domestic growth rate has increased relative to formerly higher German rate
Lowering of domestic interest rate relative to the German rate *(i.e. decrease in interest rate country differential)*	■ see above	■ see above
case:	**$UR^* - UR^{BD} < 0$**	**$GR^{BD} - GR^* < 0$**
Appreciation of domestic currency relative to D-Mark *(i.e. decrease in exchange rate variable)*	■ Differential increases *(i.e. distance between both variables decreases)*: German unemployment rate has gone down relative to formerly lower domestic rate	■ Differential increases *(i.e. distance between both variables decreases)*: German growth rate has increased relative to formerly higher domestic one
Increase in domestic interest rate relative to the German rate *(i.e. increase in interest rate country differential)*	■ see above	■ see above

The necessary reactions of the country differentials as described above imply a positive sign of the interest rate variable and a negative sign of the exchange rate variable. If this turns out to be the case the potential shock-absorbing effect of one or of both instrument is demonstrated.

Figure 6: Stabilising impact of potential adjustment mechanisms



Note: An appreciation (depreciation) of the external value of the German currency implies a depreciation (appreciation) of the domestic currency.

3.2 Regression results

In order to find the empirical impact of the adjustment instruments, each variable is tested independently for its influence. The variable is included in the regression if its coefficient differs from zero at the ten percent level of significance. Regarding the joint effects of interest rate policy and nominal or real exchange rate policy, both variables are included in the regressions as long as they are jointly significant. Looking at possible multicollinearity among the regressors, we pay attention to the simple correlation cofficient between the explanatory variables taking into account the lag structure of the corresponding regression. In none of the cases considered multicollinearity is a serious problem. As an additional check we compare the regression coefficients of the corresponding bivariate regressions with the ones of the multiple regression. Again, there are no remarkable jumps or changes in the coefficient estimates which would usually happen when multicollinearity seriously affects the design matrix.

Besides of multicollinearity, we take also account of the problem of possible endogeneity of the regressors. As mentioned above, the developments of interest rates and exchange rates are not independent of changes in unemployment and growth rates. In all those cases where endogeneity could cause problems we, therefore, additionally report Instrumental Variable estimates instead of OLS. As instruments we use appropriately lagged values of the regressors. In the following tables these regressions are marked with „IV“.

Most of the regressions are run for certain subperiods except for the UK. These subperiods are chosen according to the behaviour of the nominal instruments. To select appropriate subperiods we refer to the graphs listed in the appendix. Gaps between subperiods in the result tables indicate that no statistically significant results for any of the instruments can be obtained.

In order to evaluate the possible effects of interest rate and exchange rate policies the sample period ends in 1996. The reason for this is simply that one of the Maastricht criteria called for a stable exchange rate for at least two years to qualify as a member. The convergence of the national long-term interest rates is also due to the Maastricht treaty. These considerations lead us to restrict the sample until 1996. What is more, instead of generally beginning in 1974, we start the regressions at the latest in 1976 depending on the lag structure of the explanatory variables.

Before turning to the results in detail, we should mention another point. Since we do not set up a structural model to explain the endogenous variables, we try to capture the

effects of other economic variables by an autoregressive specification of the residuals as well as by adding lagged endogenous variables. But the coefficients of the lagged endogenous variables should not be interpreted as partial adjustment coefficients in the usual way, but along the lines of time series analysis.

a) The Impact of the Instruments on Growth Differentials

From an econometric point of view several tests on the equations have been performed. In all cases the residuals turn out to be white noise and normality cannot be rejected. Obvious deficiencies of the equations in Table 2 could not be detected neither. Nevertheless, the explanatory power of the regressions is rather low, even in those regressions including an autoregressive error term or lagged endogenous variables. This indicates that there are more important determinants than the two policy instruments of the variations in these series.

The results for the regressions of the growth differential are reported in Table 2 below for Austria, France, the UK, and Italy. For the Netherlands the policy instruments do not show a statistically significant impact on the growth differential at all from 1976 to 1996. Figure 2a in the Appendix shows that from 1984 there is a remarkable parallelism in the Dutch interest rate movement compared with the German. The interest differential therefore remains practically constant over time. In addition, Guilder/D-Mark exchange rate changes are only of a small magnitude. Hence, not surprisingly, no statistically significant influence of the nominal instrument on the growth differential can be detected since 1984. Furthermore, the potential adjustment instruments do not prove to have a significant effect on relative growth rates in the first time period neither.

For the remaining four countries all interest rate differentials exerting a significant impact on the growth show - contrary to the exchange rate coefficients - the same positive sign. According to Figure 6 this implies that interest rate policies were mainly conducted to achieve or to improve simultaneity in business cycles among the countries. A further common characteristic Table 2 reveals relates to the rather stable lag structure of the interest rate differentials across countries. If there is a significant impact of the instrument, then it takes three to four quarters to change the growth differential for the continental European countries. For the UK the interest rate differential reacts somewhat faster with only a two quarter delay.

Table 2: Regression Results Referring to Growth Rate Differentials

AUSTRIA							
Period	**adj. R^2**	**white noise**	**C**	**Interest Rate Diff.**	**Nom. Exchange Rate**	**Real Exchange Rate**	
75 – 83	0.054	Yes	-0.000	-	-	58.398* (lag 2)	
75 – 83	0.183	Yes	-0.372	0.208** (lag 3)	67.394** (lag 8)	-	
89 – 96	0.185	Yes	-0.081	-	-	-130.39*** (lag 5)	
FRANCE							
Periode	**adj. R^2**	**white noise**	**C**	**Interest Rate Diff.**	**Nom Exchange Rate**	**Real Exchange Rate**	**Lagged endog. Var.**
76 – 83	0.305	Yes	-0.946	0,267*** (lag 4)	-10.457* (lag 1)	-	-0.400** (lag 1)
76 - 83	0.042	Yes	-0.615	0.264** (IV)	-28.690 (IV)	-	-0.408** (IV)
76 – 83	0.306	Yes	-1.15	0,277*** (lag 4)	-	-9.826* (lag 1)	-0.422** (lag 1)
76 - 83	0.306	Yes	-1.149 ***	0.277*** (IV)	-	-10.073 (IV)	-0.423** (IV)
84 – 96	0.070	Yes	0.197	-	-19.82** (lag 7)	-	-
84 – 96	0.090	Yes	0.137	-	-	-23.010** (lag 7)	-
UNITED KINGDOM							
Period	**adj. R^2**	**white noise**	**C**	**Interest Rate Diff.**	**Nom. Exchange Rate**	**Real Exchange Rate**	**AR-process**
76 – 96	0.154	Yes	-0.429	0.101** (lag 2)	-	-4.620* (lag 2)	0.291*** AR (3)
76 – 96	0.151	Yes	-0.432	0.112** (lag 2)	-4.618 (lag 2)	-	0.288*** AR (3)

ITALY							
Period	**adj. R^2**	**white noise**	**C**	**Interest Rate Diff.**	**Nom. Exchange Rate**	**Real Exchange Rate**	**Lagged Endog. Var.**
82 – 91	0.068	Yes	0.363	-	-22.181* (lag 7)	-	-
92 – 96	0.348	Yes	0.213	-	-9.356** (lag 1)	-	0.478** (lag 3)
92 – 96	0.321	Yes	0.172	-	-	-8.668** (lag 1)	0.491** (lag 3)
92 – 96	0.315	Yes	0.826	0,221** (lag 4)	-	-	0.461** (lag 3)

/**/:** indicating that the coefficient is significant at the 10/5/1 percent level. Lag x indicates the delay in quarters a variable enters the regression. AR-process refers to an autoregressive process of the error term.

For Austria and France only for the period from 1975 to 1983 the interest rate differential had an influence, whereas since 1984 all nominal instruments are not important in explaining growth performance with respect to West Germany.[24] Again, these results are not very surprising because both countries collaborated closely with the German Bundesbank in their interest rate policies. The result for the UK is contrary. Here we observe an interest rate impact over the whole sample period. But compared with Austria and France, the coefficient is considerably smaller in size. Finally, for Italy we find an impact of the differential only from 1992 to 1996.[25]

Although the interest rate instrument contributes to a more synchronised economic development between the countries considered, the quantitative effects are nevertheless rather small. For instance, a reduction of one percentage point in the interest rate differential between West Germany and another country, on average, leads to an adjustment of asymmetrically developing growth differentials of somewhat more than 0.2

[24] The fact that until 1983, Austrian growth rates were marked by a higher performance than the German indicates that a decrease in the level of the German interest rate relative to the Austrian contributed to the convergence of both countries' growth rates**.**

[25] The missing interest rate impact for the earlier subperiods in Italy might be partly explained by the fact that the Italian economy operated much more like a closed economy especially with respect to the national financial markets as well as to money markets. Only at the end of the 1980s, Italian financial markets also operated at an international base. Secondly, most of the Italian economy, at least the large companies, were state-owned having employment guarantees, etc. For this reason and because of strong labour union influence the government offset adverse shocks. Third, the Banca d'Italia was not independent. The government exerted a significant influence on the monetary policy, especially with respect to the prime rate, of the central bank. For example, the government had special interest rate offers with respect to government bonds and thus public debt was quite ease to finance. The fourth point is that for most of the time considered in the paper the so-called „Scala Mobile'' was implemented which implied an automatical wage adjustment to the inflation rate.

percentage points for the continental European countries, and to a 0.1 percentage point adjustment for the UK.

Contrary to the interest rate instrument the effects of exchange rate changes are rather mixed over time as well as across countries. For Austria nominal and real exchange rate changes vis-à-vis the German Mark instead of reducing asymmetries reinforced the growth rate differential to diverge for the period from 1975 to 1983. But this evidence should be cautiously interpreted for two reasons. First, the real exchange rate effect is only significant at the 10 percent level and second, for the nominal exchange rate there is a rather long lag of eight quarters. Given the short data period, this result might be somewhat spurious. In the late 1980s and in the 1990s only real exchange rate changes contributed to a buffering of shocks because differentials in interest rates did not exist on the one hand. On the other hand, the nominal exchange rate was closely tied to the German Mark. Despite of a fixed nominal exchange rate, the real rate exhibits some variations as can be seen from the Figure in the appendix. Although exchange rate turbulences characterise the 1990s, the nominal German-Austrian exchange rate remained unchanged. Consequently, it could not act as adjustment mechanism. For this reason, the adjustment of the relative price levels caused the converging impact of the real exchange rate.

With respect to France nominal as well as real exchange rate changes contribute to the synchronisation of economic development for both subperiods. This tendency is stronger for the second subperiod than for the first when the influence only shows a one quarter delay.[26] Given that the French-German exchange rate fluctuated more than the Austrian, these results are in line with our theoretical considerations. Nevertheless the missing impact of the interest rate since 1984 is a little bit surprising. Compared to the also insignificant Austrian and Dutch national interest rate policies, the French-German interest rate differential shows much more variations over the 1984 to 1996 period. One explanation for these variations is the different level of inflation France shows in comparison to both other core countries. Reducing the inflation rate in France lowers the French nominal interest rate and c.-p. the interest rate differential to Germany. If market participants anticipate this disinflationary process, no real effects will occur.

In the German-British case both types of exchange rate changes lead to convergence in growth performance, although the impact is statistically significant only at the 10 per-

[26] As the first lag of this explanatory variable can be influenced by the endogenous variable itself, we used IV-techniques to obtain reliable estimates. Nonetheless, we could find no instrument of a high quality, the IV-

cent level. The United Kingdom is the only country in our study where since 1984 both instruments have had a joint impact on the growth differential. For all other countries either the exchange rate or the interest rate, but not both jointly, were a useful adjustment instrument since the mid-1980s. We should note however that for Great Britain nominal exchange rate changes are not significant when entering the regression jointly with the interest rate instrument.

In the Italian case the regression results show a shock-absorbing effect of nominal and real exchange rate changes since the 1990s as well as a slight evidence for a significant impact of the nominal exchange rate in the 1980s. Although the coefficients in the second subperiod are significant at the 5 percent level, we should be careful due to the extremely short investigation period 1992 to 1996. These rather short subperiods had to be chosen due to two cuts in the development of the policy instruments. In 1984, there is an obvious decline in the amplitude of exchange rate fluctuations marked by the temporary stabilisation of the exchange rate changes which became stronger again from 1992.

As well as the stabilising impact of the interest rates, exchange rate changes contribute, as long as significant, to the convergence in economic development. However, this shock-absorbing impact is rather minor as a one percent change in exchange rates on average only absorbed about 0.05 (UK) to 1.3 (Austria) percent of growth variation in relation to Germany.

b) Regression Results of the Impact of the Instruments on Unemployment Rate Differentials

Tables 3a and 3b show the results of the nominal instruments' impact as well as the real exchange rate's on the differentials of unemployment rates. Before going into the details, we comment on the results as a whole. Except for the UK, the overall performance of the regressions is somewhat worse compared with the results from Table 1. First, it is more difficult to obtain regression results with white noise residuals. Whereas the coefficients of the interest rate differentials show a unique sign in the case of the growth regressions, it is no longer the case for the unemployment differentials. We hereby obtain mixed results in the case of Austria. Another distinction relates to the behaviour of exchange rate changes. In most of the cases we present results for the growth rates regressions being in line with the view that these changes contributed to

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coefficients show the same signs, but remain statistically insignificant.

convergence – in those time periods when coefficients had a significant influence. For the labour market the results are considerably more complex. For Austria and the Netherlands, both countries with a stable nominal exchange rate vis-à-vis the German Mark, changes in the real exchange rate tend – when having a significant impact - to increase the differentials in the corresponding unemployment rates. Contrary to these effects are real exchange rate changes in countries with against the German Mark more fluctuating exchange rates like the UK and even – to a smaller extent - France. In relation to the latter, changes in the rates buffered asynchrone economic developments even in the whole period while changes in the Italian exchange rates never did so.

With regard to the Dutch-German unemployment differential, real exchange rate changes over the whole period exert an impact, albeit a weak one, whereas none of the instruments shows a significant effect on the growth differential. The positive coefficient of the real exchange rate indicates that, on average, changes in the rate lead to a reinforcement of an asymmetric development in the unemployment rates of both countries.

Table 3a: Regression Results Referring to Differentials in Unemployment Rates

AUSTRIA								
Period	**adj. R^2**	**White noise**	**C**	**Interest Rate Diff.**	**Nom. Exchange Rate**	**Real Exchange Rate**	**Lagged Endog. Var.**	**AR-Process**
75 - 83	0.113	Yes	-0.038	-	11.404** (lag 3)	-	-	-
75 - 83	0.314	Yes	-0.072	0.034*** (lag 2)	-	6.666* (lag 3)	-	-
84 - 88	0.259	Yes	0.041	-	51.929** (lag 1)	-	0.391* (lag 1)	-
84 - 88 (IV)	0.237	Yes	0.048	-	58.632 (IV)	-	0.264 (IV)	-
84 - 88	0.357	No	0.420	-0.135*** (lag 6)	-	-	-	-
85 - 88	0.713	Yes	0.629	-0.218*** (lag 6)	-	-	-	-0.457** AR(4)

THE NETHERLANDS							
Period	**adj. R^2**	**White noise**	**C**	**Interest Rate Diff.**	**Nom. Exchange Rate**	**Real Exchange Rate**	
76 - 83	0.084	Yes	0.116	-	-	10.979* (lag 5)	
84 - 96	0.055	Yes	-0.176	-	-	18.355* (lag 6)	
FRANCE							
Period	**adj. R^2**	**White noise**	**C**	**Interest Rate Diff.**	**Nom. Exchange Rate**	**Real Exchange Rate**	**Lagged Endog. Var.**
76 – 83	0.389	No	-0.233	0.065** (lag 6)	-	-	0.448*** (lag 1)
84 – 96	0.163	Yes	0.032	-	-	-5.789** (lag 2)	0.341*** (lag 1)
84 – 96	0.176	Yes	-0.030	0.029* (lag 2)	-5.790* (lag 2)	-	0.332** (lag 1)

/**/:** indicating that the coefficient is significant at the 10/5/1 percent level. Lag x indicates the delay in quarters a variable enters the regression. AR-process refers to an autoregressive process of the error term.

Concerning the Austrian-German unemployment rate differential, the estimates show an influence of interest rates which was positive in the past, i.e. shock-absorbing. But in the mid-1980s, the results rather indicate that its impact reinforced divergent developments. In the 1990s, there is only a spurious correlation of the third lag of the interest rate differential which is eliminated by including the endogenous variable lagged three periods. This result is therefore not stated in the table above. All in all, isolated interest rate policy in Austria led to synchronisation in growth as well as in unemployment rates towards Germany only until 1983. Regarding the effects of the exchange rate changes, an empirically significant effect on relative unemployment rates is also present until the mid 1980s, but it turns out to have rather increased than decreased economic asymmetries.[27] Like on the goods markets, nominal variables have no influence at all since the mid 1980s.

Similar to the growth equations, the results for France show that changes in the nominal interest rate differential had a potentially converging influence on the labour market. Furthermore, this interest rate policy contributed to convergence over the whole

[27] In the subperiod 1984 to 1988, the first lag of the nominal exchange rate can be influenced by the exogenous variable being in first differences. We make use of IV-techniques to obtain reliable estimates. Although no instrument of a high quality can be found, the IV-estimator leads to a very similar coefficient which seems to con-

investigation period, although we are unable to run a regression with white noise residuals for the first subperiod. Nominal as well as real exchange rate policy has proved to be significant only since 1984, but they have only acted to the same, minor extent.

Table 3b: Regression Results Referring to Differentials in Unemployment Rates

UNITED KINGDOM							
Period	**adj. R^2**	**White noise**	**C**	**Interest Rate Diff.**	**Nom. Exchange Rate**	**Real Exchange Rate**	**lagged endog. Var.**
76 – 96	0.544	Yes	-0.145	0.029*** (lag 3)	-	-1.343 ** (lag 4)	0.572*** (lag1)
76 – 96	0.537	Yes	-0.141	0.032*** (lag 3)	-1.210* (lag 4)	-	0.592*** (lag 1)
ITALY							
Period	**adj. R^2**	**White noise**	**C**	**Interest Rate Diff.**	**Nom. Exchange Rate**	**Real Exchange Rate**	
74 – 81	0.157	Yes	-0.180	0.029** (lag 6)	-	-	
82 – 95	0.041	Yes	-0.036	-	4.458* (lag 8)	-	
82 – 91	0.094	Yes	0.093	-	-	7.254** (lag 8)	
82 – 91	0.050	Yes	-0.244	0.033* (lag 6)	-	-	
94 – 95	0.359	Yes	-0.041	-	5.819* (lag 8)	-	

/**/:** indicating that the coefficient is significant at the 10/5/1 percent level. Lag x indicates the delay in quarters a variable enters the regression.

For the United Kingdom, the same results can be found for the growth rate country differentials as well as for the unemployment rate differentials over the whole period. Regardless of the exchange rate variable that is included in the regression, the interest rate coefficient is of a comparable, small size. What is more, the impact of the exchange rate variables is also of equal magnitude in both regressions. Although the impact is faster on the goods markets, the delayed effect on the labour markets points at an even stronger, albeit still low, reaction. The influence of nominal exchange rate changes on the convergence is also clearly significant this time. Concerning the bilat-

firm the OLS results.

eral convergence of the German and British economy, the nominal instruments appear to have acted stabilising in the past. The higher (the lower) British unemployment (growth) rate empirically seems to have decreased (increased) relative to the German one due to a lowering of short-term interest rates relative to Germany as well as by depreciating in nominal terms against the German currency. The British economy and nominal adjustment instruments hereby prove to be constantly and unrestrictedly independent of the German development.

Running the regressions for Italy, we find a positive, shock-absorbing effect of the nominal interest rates (two quarters later than on the goods markets) on the development of the unemployment rate differential until 1991. The impact of exchange rate changes rather seems to have reinforced asymmetric developments since the beginning of the 1980s while they did not have any impact before. Furthermore, exchange rate variations cause a change in the unemployment rate differential with a delay of two years. To test the robustness of this effect, we replicate the regression for the period from 1982 to 1995 for the shorter period 1982 – 1991. For this time span the nominal exchange rate has no influence, but the real rate proves to be significant. Running the same regression for the 1992 to 1995 period[28], only the nominal exchange rate enters the regression significantly. From this we conclude that the effect of the nominal exchange rate for the period from 1982 to 1995 solely results from the very short period from 1992 to 1995 with the known Lira crisis. However, we should not forget that this interpretation is based on rather weak grounds because of the few observations left for the regression.

4. Conclusion

With the start of EMU two potential policy instruments do no longer exist at the national level, namely changes in nominal national interest rates and in national short-term interest rates. According to the theory of Optimal Currency Areas these two instruments could have been useful in the past either to isolate the development of one national economy from the other for a certain period of time or to force the national economic development towards convergence with the other nations. With the loss of these monetary instruments, adjustment mechanisms or national policy variables do no longer exist. For the case that these adjustment instruments have contributed to a large

[28] Because of the high numbers of lags, data from 1992 to 1995 are included , but the regressions are only conducted from 1994 to 1995.

extent to the buffering of shocks by balancing asymmetric economic developments, new or more efficient alternative adjustment instruments are necessary. Potential alternative instruments are then flexible prices or wages, financial transfers, capital mobility, and labour mobility. The requirement of such instruments is the more urgent, the more the former instruments were effective in the past. For this reason, the paper is concerned with the question to what extent these instruments ensured and improved the synchronisation of business cycles in the EU.

To proceed along this line we analysed the developments in five European countries, measured relatively to West Germany. Three of the five countries (Austria, the Netherlands, and France) can be considered as core-EU-countries. This means that they fixed their nominal exchange rates vis-à-vis the German Mark more or less since the mid-1980s, and that, by and large, they followed the German interest rate policy. The remaining two countries, Italy and the United Kingdom, decided to follow a policy more independent of Germany over most of the period between 1976 and 1996.

In order to gain insights into the impact of interest rate and exchange rate policies on the development of real economic variables, we regressed the differentials of growth rates as well as the differentials of unemployment rates on the corresponding interest rate differential and on changes in the nominal and real exchange rate. From the results of the, when necessary, properly selected subperiods we draw the following conclusions: The differentiation of national interest rates clearly tended to be shock-absorbing while changes in exchange rates had mixed effects.

The Netherlands and Austria have abandoned an independent interest rate policy against Germany since the second half of the 1980s. Interest rate effects on growth rate differentials or unemployment rate differentials could therefore not be detected at all neither for the Netherlands nor for Austria after 1984. Additionally, changes in nominal exchange rates were quantitatively unimportant because both countries fixed their currency against the German Mark. Hence, from 1984 or 1988 respectively for the Netherlands or Austria respectively nominal exchange rate changes had no impact on the differentials of the real variables. Consequently, these countries do not have to substitute the nominal instrument for a new one within EMU to a larger extent than at present, because they have not been used since the second half of the 1980s.

With respect to France facts are slightly different. Similar to the Netherlands and Austria, nominal interest rates have been unimportant in buffering asymmetric developments in the growth variables relative to Germany since 1984, but could contribute to convergence in the unemployment rates' development. Additionally, there still is a sta-

bilising impact (albeit a weak one) of real and even nominal exchange rates on the unemployment rate as well as the interest rate differential until 1996. This may partly be due to the various exchange rate crises during this time.
The United Kingdom kept apart from the others with regard to their nominal variables' development over the sample period. Interest rate differentials as well as nominal and real exchange rate changes exert a positive, although relatively small, impact by synchronising the economic developments over the whole sample period.
Italy is the only country in the sample which comes up with asymmetry-reinforcing tendencies of exchange rate changes even after the mid-1980s. But this negative impact relates only to labour market developments. With respect to the growth differentials exchange rate changes show a positive, shock-absorbing effect.
Despite the nominal instruments real exchange rate changes – exclusively or largely influenced by changes in relative price levels when nominal exchange rates were constant – significantly operated even until 1996 on the differentials. Here, the Netherlands are an exception with respect to the growth differential and Austria concerning the labour market. Real exchange rate changes improved convergence after the mid-1980s for all countries regarding their growth performance. Different influences have to be mentioned for the labour markets. In favour of synchronisation are only France and the United Kingdom, whereas for the Netherlands and Italy shock-enforcing effects were present.

Summarising our findings, we conclude that interest rate policy acted as a shock-absorber in countries and periods where national interest rates were isolated from the German. In the core-EU-countries, interest rate differentials and nominal exchange rate changes either helped to stabilise the synchronisation of business cycles or were abandoned as policy instruments. With respect to growth differentials exchange rate changes (real and nominal) were to a larger extent shock-absorbing than with regard to the labour markets where we obtained mixed effects.
Furthermore, in case of a stabilising impact of the interest rate policy, its is effect generally stronger than the exchange rate's effect. Effects on the growth differentials are also stronger than on the differential of the unemployment rates. And finally, changes in the instruments affect goods markets earlier than labour markets, which is in line with the general expectation.
These results would indicate rather bad news for EMU. Adjustment problems within the currency union might be caused by the elimination of monetary instruments, at least

for the non-EU-core countries. An additional need for further or more effective adjustment might occur at least in countries that did not abandon the use of monetary instruments in the last years. Nevertheless, one has to regard the extent of this positive impact. Its effect, in fact, has rather been minor. Additionally, it is important to note that some of the remaining risk was already partly captured by changes in the real exchange rates in the past few years. From these results, we draw the conclusion that the loss of the nominal instruments will not put very much pressure on EMU in the near future. However, there are still other factors like enforced structural changes in EMU that are linked with a stronger need for regional or structural adjustments.

List of Abbreviations and Variables:

BD, FR, UK, IT, NL, AT	Country abbreviations for Germany, France, United Kingdom, Italy , the Netherlands and Austria
D(FRBDURD) ,D(ITBDURD), D(NLUKBDURD), D(ATBDURD) D(UKBDURD)	represent the first difference of unemployment rate (country differentials) between Germany and the other European countries
BDFRGRD, BDITGRD, BDNLUKGRD BDATGRD, BDUKATGRD	represent the growth rate country differential between Germany and the different European countries
FRBDSTID, ITBDSTID, NLBDSTID ATBDSTID, UKBDSTID	represent the interest rate country differential between Germany and the different European countries
FRBD1, ITBD1, NLBD1, ATBD1 UKBD1	percentage change in the external value of the German Mark in nominal terms against the currencies of the different European countries
FRBDReal1, ITBDReal1, NLBDReal1, ATBDReal1, UKBDReal1	represent the percentage change in the external value of the German Mark in real terms against the currencies of the different European countries.

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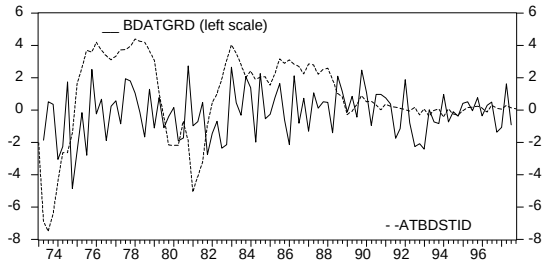
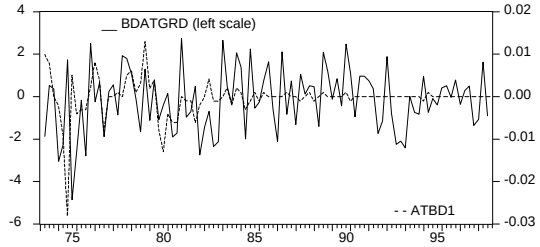
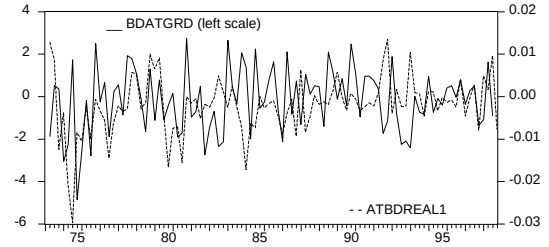
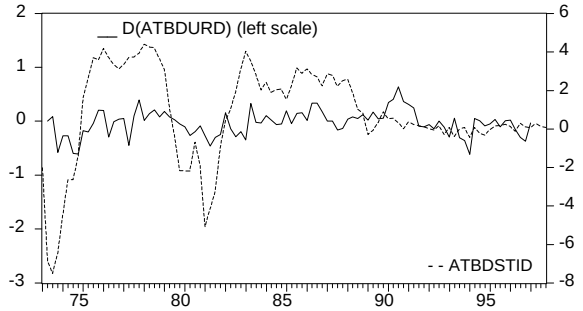
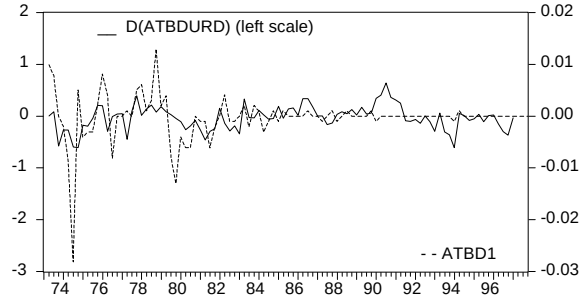
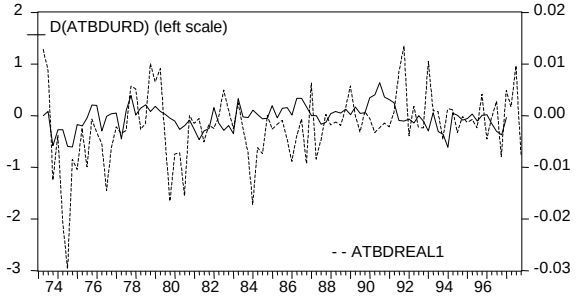
Appendix: Figures

1.) Austria

a) referring to growth rates

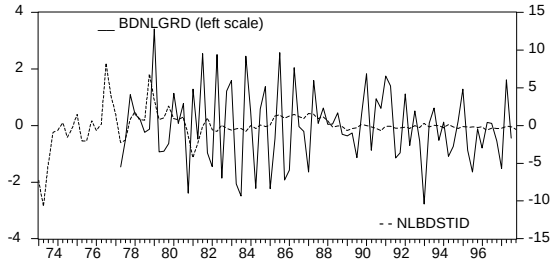
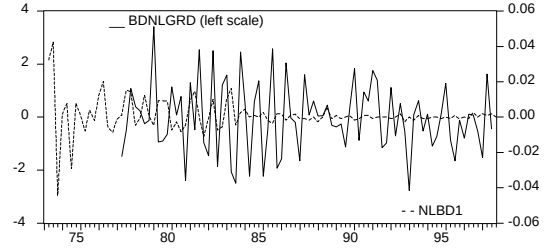
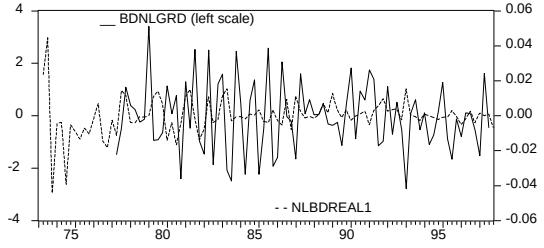
Interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change
		

b) referring to unemployment rates:

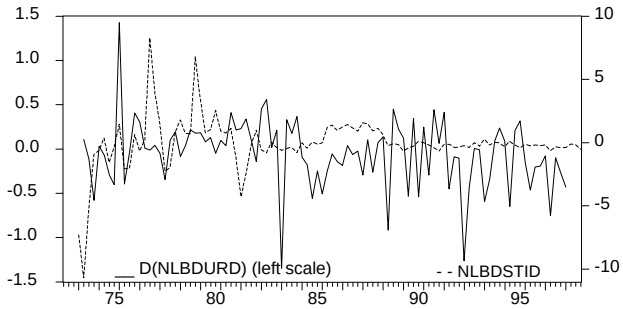
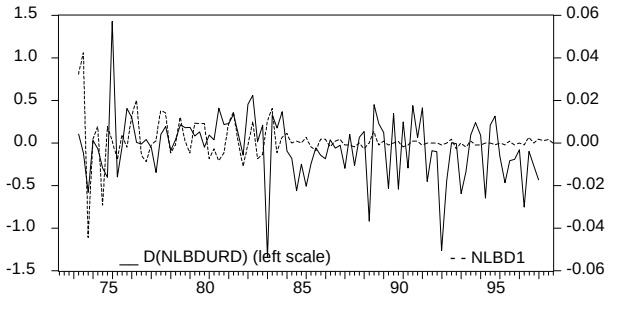
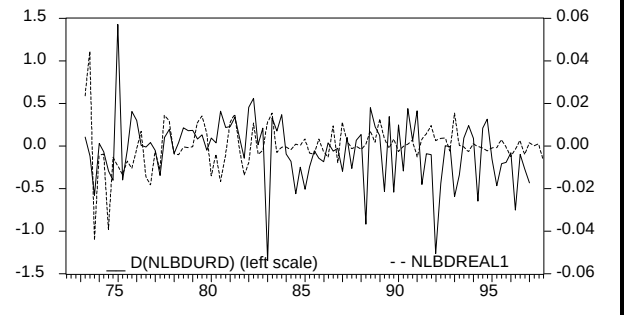
interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change
		

2.) Netherlands

a) referring to growth rates

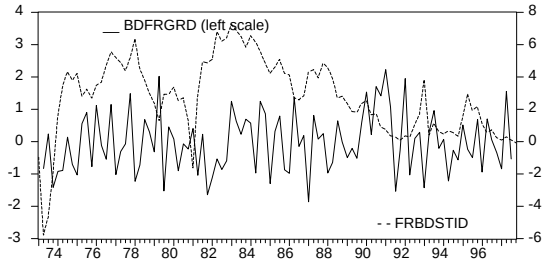
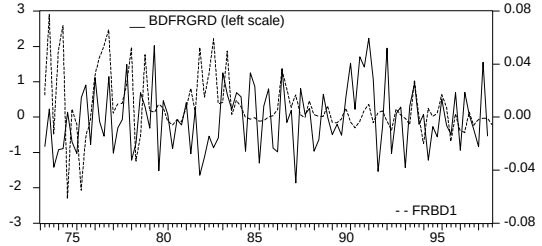
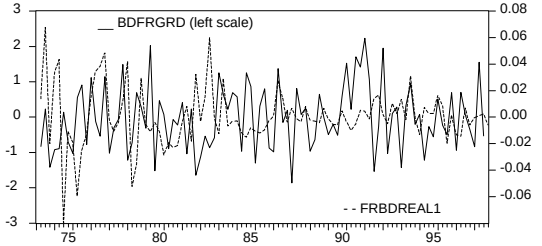
interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change
		

b) referring to unemployment rates

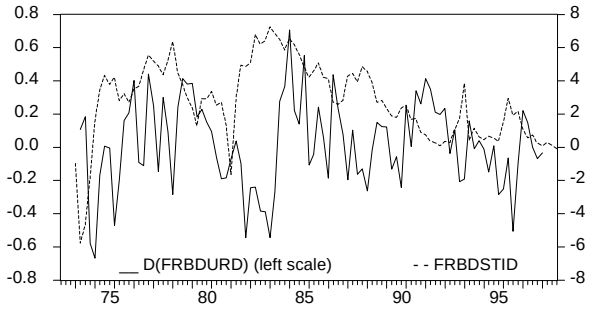
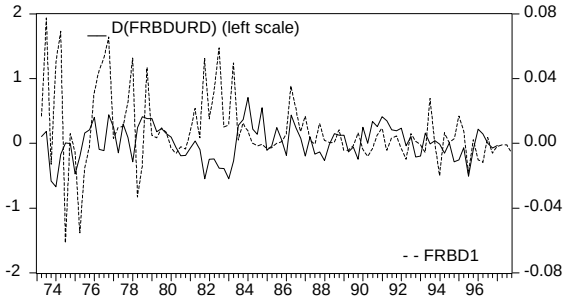
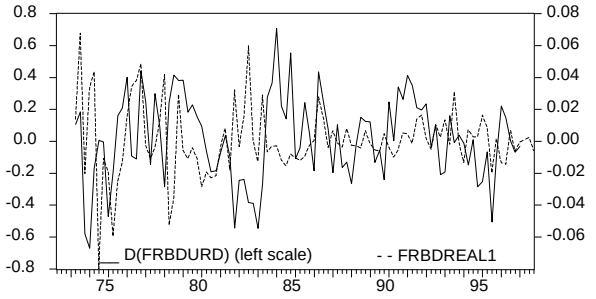
interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change
		

3.) France

a) referring to growth rates

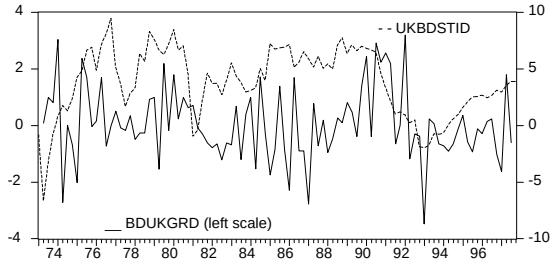
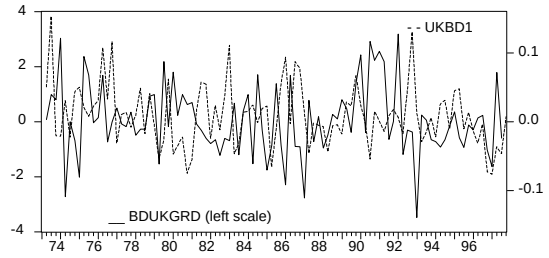
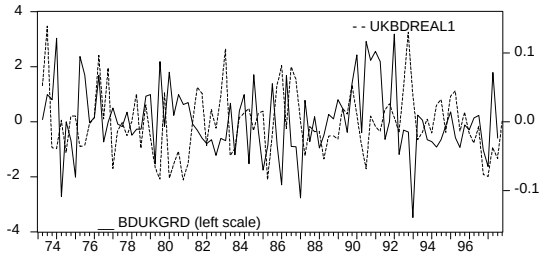
interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change
		

b) referring to unemployment rates

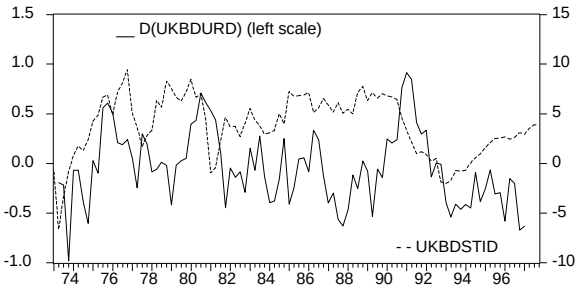
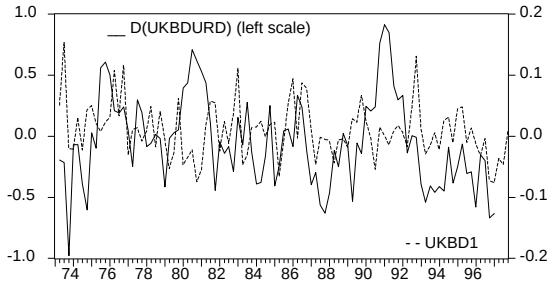
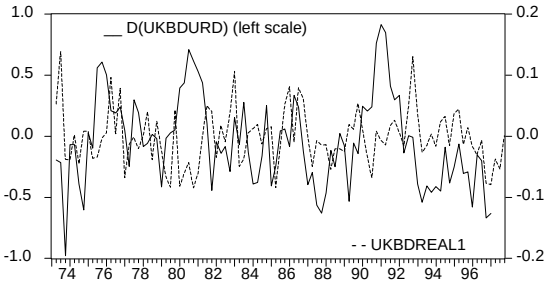
Interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change
		

4.) United Kingdom

a) referring to growth rates

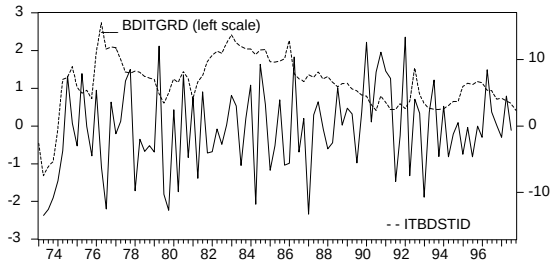
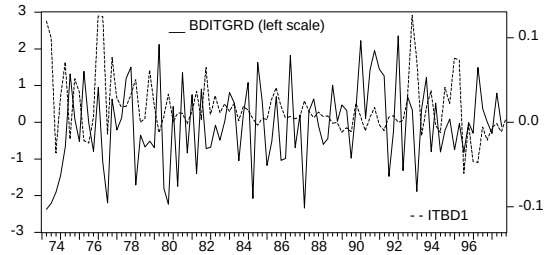
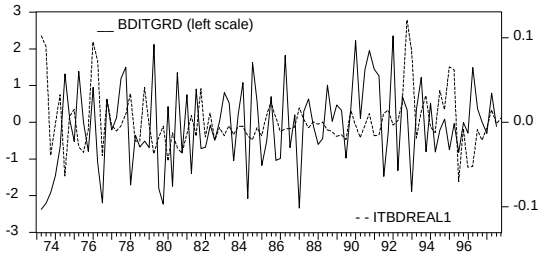
Interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change
		

b) referring to unemployment rates

interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change
		

5.) Italy

a) referring to growth rates

Interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change
		

b) referring to unemployment rates

Interest-rate country-differentials	nominal exchange-rate change	real exchange-rate change