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ECONOMIC POLICY IN EMU*

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ABSTRACT: Membership in the Economic and Monetary Union (EMU) implies the absence of national monetary and exchange rate policy tools. The remaining policy instruments are mainly fiscal policy and incomes policy (generally, measures which affect the costs of firms). At the union level monetary and exchange rate policies are, however, still available. In this paper the effects of these different national and union-level economic policy tools are analyzed in a three-country theoretical macroeconomic model. In the model we have two large countries ("EMU" and "the USA") and a small country ("Finland"). The model is recursive in the sense that the large economy model is solved first, and the effects are then inserted into the small country model. The exchange rate between "EMU" and "the USA" is floating. "Finland's" membership in the "EMU" is modelled through a common exchange rate with "EMU". The results are partly obtained a priori, but because of the complexity of the model the majority of the results are based on numerical simulations. For a small EMU country fiscal policy is an effective policy instrument, assuming that the country is not heavily indebted. Adjustment in the cost level through changes in wages or different kinds of indirect labour costs is also a good tool. The choice of the instrument depends on the shock against which the tool is directed. At the union level fiscal policy is efficient in those countries where the measures are implemented. The size of the effect depends on the responsiveness of prices and wages. The spill-over effects on the output of other EMU countries are small because the exchange and interest rate effects tend to eliminate the effect due to foreign demand. Fiscal policy is thus an appropriate tool in dealing with asymmetric economic developments, assuming that the public economies are sound. Monetary policy is a very efficient instrument which should be used carefully. Its use in stabilizing output is appropriate when all countries are in the same cyclical situation. If the situations differ, monetary policy measures will create problems for those countries whose economic development differs from that of the majority. Measures affecting production costs are also a strong instrument when implemented in many countries at the same time.This type of simultaneous policy has, however, strong spill-over effects on other EMU countries, whose economic situation might not require such a policy. Measures affecting costs are thus more suitable for specific problems of individual countries, unless there is a union-wide shock, whose effects are very similar in all member countries.

KEY WORDS: Economic and Monetary Union (EMU), European integration, economic policy, exchange rate regimes

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TIIVISTELMÄ: Jäsenyys talous ja rahaunionissa (EMU) merkitsee raha- ja valuuttakurssipolitiikan poistumista kansallisen talouspolitiikan välineistöstä. Jäljelle jäävät instrumentit ovat lähinnä finanssipolitiikka ja tulopolitiikka (laajemmin, keinot jotka vaikuttavat tuotantokustannuksiin). Unionin tasolla raha- ja valuuttakurssipolitiikka ovat kuitenkin edelleen käytettävissä. Tässä raportissa analysoidaan teoreettisessa kolmen maan makrotaloudellisessa mallissa kunkin kansallisen ja unionitason talouspolitiikkainstrumentin vaikutuksia. Mallissa on kaksi suurta maata ("EMU" ja "USA") ja yksi pieni maa ("Suomi"). Malli on rekursiivinen siten, että suuren maan malli ratkaistaan ensin ja siitä saadut vaikutukset sijoitetaan pienen maan malliin. "EMU"n ja "USA"n välinen valuuttakurssi kelluu. "Suomen" jäsenyys "EMU"ssa on mallitettu "EMU"n kanssa yhteisen valuuttakurssin muodossa. Tuloksista osa on saatu a priori, mutta kolmen maan mallin monimutkaisuudesta johtuen suurin osa tuloksista pohjautuu numeerisiin simulointeihin. Pienelle EMU-maalle finanssipolitiikka on tehokas politiikkainstrumentti, olettaen että maa ei ole hyvin velkaantunut. Tuotantokustannusten sopeuttaminen palkkojen tai välillisten työvoimakustannusten avulla on myös sopiva väline. Instrumentin valinta riippuu shokista, jota vastaan toimenpide on suunnattu. Unionin tasolla finanssipolitiikka on tehokas keino niissä maissa, joissa toimenpide toteutetaan. Vaikutuksen suuruus riippuu palkkojen ja hintojen reaktioherkkyydestä. Toimenpiteen vaikutukset muiden EMU-maiden tuotantoon ovat pieniä, koska valuuttakurssi- ja korkomuutokset vaikuttavat vastakkaissuuntaisesti ulkomaisen kysynnän muutosten kanssa. Finanssipolitiikka on siten sopiva väline epäsymmetrisiä taloudellisia häiriöitä vastaan, olettaen että kyseessä olevan maan julkinen vaje ja velka ovat pieniä. Rahapolitiikka on hyvin tehokas väline, jota tulisi käyttää varovasti. Sen käyttö tuotannon vaihtelujen pienentämisessä on sopivaa, jos kaikki jäsenmaat ovat samassa suhdannetilanteessa. Jos suhdannevaiheet poikkeavat, rahapoliittiset toimet luovat ongelmia niille maille, joiden suhdanteet poikkeavat enemmistön (tai vaikutusvaltaisimman maaryhmän) suhdanteista. Kustannustasoon vaikuttavat toimet ovat myös tehokas väline, jos ne toteutetaan monessa maassa samanaikaisesti. Niiden tuotantovaikutukset välittyvät kuitenkin voimakkaasti myös sellaisiin EMU-maihin, joiden taloudellinen tilanne ei tällaista politiikkaa edellyttäisi. Kustannustasoon vaikuttavat toimet sopivat siten paremmmin yksittäisten maiden erityisten ongelmien hoitoon, paitsi silloin kun koko unionia kohtaa sellainen taloudellinen häiriö, jonka vaikutukset ovat hyvin samanlaisia kaikissa jäsenmaissa.

ASIASANAT: Talous- ja rahaunioni (EMU), Euroopan integraatio, talouspolitiikka, valuuttakurssijärjestelmät

CONTENTS

1 INTRODUCTION

The need to study economic policy in EMU comes from the absence of national monetary and exchange rate policies as economic policy tools in EMU. The most important remaining tools are fiscal policy and wage/price reactions, which can occur either through a centralized agreement (incomes policy), through market reactions or through government actions, which affect wage demands. These include changes in social security payments. The diminishing of the number of economic policy tools can be a cost for an economy if it faces asymmetric shocks due to either country-specific shocks or due to asymmetric reactions of common shocks (because of asymmetric economic structures). Irrevocably fixed exchange rates and a common currency increase also the importance to study the Union-level economic policy, its effects on the whole EU economy and on individual countries.

In the current study the tools of national as well as Union-wide economic policy are analyzed. The framework used is a three-country macroeconomic model. The model includes two big countries and a small open economy, which is modelled in a recursive way. The currencies of the big countries are floating. One of the big "countries" is called "EMU" and the other "the USA" (or "the rest of the world"). In the small country (called "Finland"), in addition to the analysis of the effects as a member of EMU, the effects are compared to those in two alternative regimes. These are floating exchange rates and the currency basket exchange rate regime.The small country's membership in EMU is modelled as a common exchange rate with one of the big countries, which is called "EMU". The model is the same as used in Kotilainen (1991a, 1991b, 1992 and 1995). The paper is based on those studies.

The analysis presented below is static. In Kotilainen (1995) also a dynamic Dornbusch-type model is used. The intertemporal effects of policy measures on the credibility of the policy makers is not taken into account. The analysis can be applied directly to situations where there are no chronic imbalances in the economy. In situations, where there is, for example, a large structural deficit in the budget and/or a large public debt, the analysis must be adjusted on the basis of evaluations done outside the model, or other kinds of models must be used. The aim of this paper is to clarify the basic short-run relationships of different policy tools in the home country as well as at the Union level. A three-country framework is not often used in economic policy analysis. The model used in the paper is simple, but it shows several important channels which should be taken into account in the policy formulation. (For a broader scope of questions related to EMU, see for example Kotilainen, Alho and Erkkilä, 1994.)

The model is presented in section 2. In section 3 we present the effects of different kinds of economic policy measures, first in the small home country and then in the big countries.The conclusions are presented in section 4.

2 THE MODEL

We use the model presented in Kotilainen (1991b, 1992 and 1995). The model is presented in natural logarithms (except interest rates) as follows:

Country 1 ("the USA")

(1) $m_1 - p_1 = k_1 y_1 - \Phi_1 i_1$

(2) $y_1 = -\mu_1 r_1 + \sigma_1(e + p_2 - p_1) + \varepsilon_1 y_2 + f_1$

(3) $p_1 = \alpha_1(e + p_2) + \beta_1 y_1 - s_1$

(4) $i = i_1 = i_2 = i_3 = r_1 = r_2 = r_3$ (ex ante) (common to countries 1 and 2)

Country 2 ("EMU")

(5) $m_2 - p_2 = k_2 y_2 - \Phi_2 i_2$

(6) $y_2 = -\mu_2 r_2 - \sigma_2(e + p_2 - p_1) + \varepsilon_2 y_1 + f_2$

(7) $p_2 = \alpha_2(p_1 - e) + \beta_2 y_2 - s_2$

Country 3 ("Finland")

(8) $m_3 - p_3 = k_3 y_3 - \Phi_3 i_3$

(9) $y_3 = -\mu_3 r_3 + \sigma_3[\theta(e_{31} + p_1 - p_{3)} + (1-\theta)(e_{32} + p_2 - p_3)] + \varepsilon_3[\theta y_1 + (1-\theta) y_2] + f_3$

(10) $p_3 = \alpha_3[\theta(e_{31} + p_3) + (1-\theta)(e_{32} + p_2)] + \beta_3 y_3 - s_3$

(11) $i = i_1 = i_2 = i_3 = r_1 = r_2 = r_3$ (ex ante)

The symbols are as follows: m = nominal money stock, p = price level (GDP deflator), k = income elasticity of money demand, i = nominal interest rate, Φ = interest rate semielasticity of money demand, y = real output, μ = real interest rate semielasticity of goods demand, r = real interest rate, σ = elasticity of goods demand with respect to relative prices ("competitiveness elasticity"), e = the price of the currency of country 2 in terms of the currency of country 1, ε = elasticity of goods demand with respect to foreign real income, α = the elasticity of domestic prices with respect to foreign prices, β = the elasticity of prices with respect to domestic output, f = exogenous goods demand shock, s = exogenous price shock ("productivity shock"), e_{31} and e_{32} = prices of the currencies of countries 1 and 2 in terms of the currency of country 3, respectively. Additionally, relative prices ("competitiveness") are defined as follows: $c \equiv e + p_2 - p_1$, $c_{31} \equiv e_{31} + p_1 - p_3$, and $c_{32} \equiv e_{32} + p_2 - p_3$. All coefficients of the model as defined above are non-negative. We also assume that $0 < \varepsilon_1, \varepsilon_2, \varepsilon_3 > 1$ and $0 \leq \theta \geq 1$.

The countries are assumed to produce tradeable goods which can be somewhat different as aggregates. This difference is reflected in the values of $\sigma's$. The purchasing power parity condition (PPP) is not required in the model. The absolute PPP holds only if $\alpha_1 = \alpha_2 = \alpha_3 = 1$. The form in which the interest rate parity condition is written implies that the assets of different countries are assumed to be perfect substitutes. It implies also that the agents are on average risk neutral. (For more about the model, see Kotilainen, 1995.)

The model is a version of the extended Mundell-Fleming model with supply side equations (3), (7) and (10). These equations are in turn based on a Gray-Fischer type of labour market submodel, which consists of a production function, labour demand function and an equation for wage determination (Gray, 1976). In the submodel labour is the only factor of production which is modelled explicitly. Labour demand is determined on the basis of the excess of producer prices in relation to wages. Wages in turn are determined by consumer prices and economic activity (output). The submodel is written for country 1 as follows:

$$(12)\quad y_1 = \gamma_1 n_1 + u_1$$

$$(13)\quad n_1^d = \chi_1 (p_1 - w_1)$$

$$(14)\quad w_1 = \Omega_1(\tau_1 p_1 + (1-\tau_1)(e+p_2)) + \kappa_1 y_1 - q_1,$$

where n_1 = labour, w_1 = nominal wage, γ_1 = elasticity of output with respect to labour, χ_1 = responsiveness of labour demand with respect to the relation between producer prices and wages, Ω_1 = responsiveness of nominal wages with respect to consumer prices, τ_1 = the share of domestic goods in the consumer price index, κ_1 = responsiveness of nominal wages to changes in output, u_1 = an exogenous productivity shock (positive when the term is positive), and q_1 = an exogenous change in wages for example due to a change in social security payments of the employees (an increase in q_1 means a decline in wages). (For more about the model, see Kotilainen, 1995.)

After inserting (14) to (13) and after that (13) to (12) we obtain:

$$(3)'\quad p_1 = \frac{\Omega_1(1-\tau_1)}{1-\Omega_1\tau_1}(e+p_2) + \frac{1+\gamma_1\chi_1\kappa_1}{\gamma_1\chi_1(1-\Omega_1\tau_1)}y_1 - \frac{\gamma_1\chi_1 q_1 + u_1}{\gamma_1\chi_1(1-\Omega_1\tau_1)}.$$

Equation (3)' is consistent with (3). We can denote the multiplier of $(e+p_2)$ by α_1, that of y_1 by β_1, and the whole last term on the right by s_1. From the last term we see that an increase in productivity and a decline in prices have an analogous effect on domestic producer prices.

In addition to a priori results, the effects reported below are based on numerical simulations. A part of the parameter estimates is collected from empirical studies. Due to a lack of relevant studies some numerical values are more guesstimates than estimates. Numerical simulations are needed because in a three-country model there are conflicting effects, the net outcome of which is not always clear a priori. In the baseline scenario it is assumed that the other EMU countries' share of the small country's foreign trade is 70 %, the rest of the world fills the remaining 30 %. (For the parameter estimates, see appendix 1.)

3 EFFECTS OF DIFFERENT ECONOMIC POLICY TOOLS

3.1 Domestic economic policy as a member of EMU

Membership in EMU means from a small country's point of view loss of exchange rate and monetary policy instruments. Fiscal policy, however, is more effective in EMU than in the floating rate regime (see Kotilainen, 1992 and 1995). It is the more effective the less prices re-

act to changes in output (the lower β_3 is) and the less output demand reacts to changes in competitiveness (the smaller σ_3 is). This is due to the increase in the price level, which worsens competitiveness (in the case of an expansive fiscal policy). The effects of expansive fiscal policy on output and prices are as follows:

$$(15)\ \frac{\delta y_3}{\delta f_3} = \frac{1}{1+\beta_3\sigma_3} > 0$$

$$(16)\ \frac{\delta p_3}{\delta f_3} = \frac{\beta_3}{1+\beta_3\sigma_3} > 0.$$

Incomes policy is modelled through s_3. An increase in this term means that domestic producer prices decline for an exogenous reason. This can be an increase in productivity. It can also be interpreted to be a decrease in wages, which leads to a decline in prices and consequently to an improvement in competitiveness (see equation (3)'). The effects of an increase in s_3, depicting a decline in wages, are as follows:

$$(17)\ \frac{\delta y_3}{\delta s_3} = \frac{\sigma_3}{1+\beta_3\sigma_3} > 0$$

$$(18)\ \frac{\delta p_3}{\delta s_3} = -\frac{1}{1+\beta_3\sigma_3} < 0.$$

The immediate effect of an increase in s_3 on output is smaller than the effect of a direct demand increase realized through debt financed fiscal policy. The effect of a decline in wages is indirect. The magnitude of it depends positively on the competitiveness elasticity σ_3. The relation between q_3 and s_3 depends on the share of the domestic component in consumption and on the elasticity of wages with respect to changes in the price level. The greater these are, the more an increase in q_3 increases s_3 (in an analogous way as for country 1 in equation (3)').

In a case where the country is indebted the effect of a debt financed fiscal policy is not as effective as in this model, because increasing debt can affect the interest rate. It is possible, however, that in a credible EMU the interest rate reaction is very small. Fiscal policy is thus an effective tool in short-run stabilization, assuming that there are unemployed resources.

If the real exchange rate is in a fundamental disequilibrium (overvalued), decreasing the wage and price levels is in turn the most crucial tool in bringing the economy back to equilibrium. The real exchange rate can be overvalued because of a permanent fall in exports (for example a decline in Finland's exports to Russia) or because of unrealistic wage increases in the past. Cutting wages increases in this case the output. Borrowing does the same but at the same time increases the price level and delays the necessary adjustment. The debt must also be paid back some day.

3.2 Economic policy at the Union level

In addition to domestic measures the economic policy is pursued also at the EMU level. Because the exchange rate of the common currency (ECU) is floating against the rest of the world, monetary policy as well as interventions affecting the exchange rate are available. There is thus more room for manoeuvre at the aggregate level but on the other hand the effects are not tailor-made for the purposes of individual countries.

We study the effects of EMU-level economic policy with the help of a two-country model consisting of equations (1)-(7). We consider the effects of fiscal, monetary and wage policies used in EMU. We study first the effects of these tools on the big "countries", EMU and the "USA", and then their effects on the small country. We compare the effects as a member of EMU to those in the floating and basket peg regimes.

3.2.1 Fiscal policy

Big country effects

An expansionary fiscal policy increases the outputs of the EMU area as well as that of the "USA" by the same amount if the countries are assumed to be symmetric, and if domestic prices do not respond to changes in the foreign prices (see appendix 2 for the effects in the baseline scenario). If domestic prices respond fully to changes in the foreign prices (by multiplier 1), there is an increase in the output of the EMU area, but a corresponding fall in the output of the USA. When the response is between 0 and 1 the output of EMU increases all the time, but that of the USA increases to some medium point, and starts to decrease thereafter. The exchange rate of the EMU area appreciates, and prices decline if their reaction to the appreciation is strong enough. The international interest rate increases. (For the analysis, see Kotilainen, 1992 and 1995.)

If real wages are flexible in the USA, the effects of fiscal policy are the greater in EMU the more rigid real wages are there, i.e. the more flexible nominal wages are.[1] This is due to the fact that the appreciating exchange rate decreases the domestic price level more, which improves competitiveness. (Kotilainen, 1995.)

Small country effects

As a member of EMU the small country has the same effects as the whole area if the fiscal policy measures are applied there in the same magnitude as in the whole Union, and if the small country is structurally similar to the aggregate. But if the whole fiscal stimulus occurs in the rest of the union, and there is no direct effect in the small country, the appreciating exchange rate and the increasing interest rate tend to lower the output, but the increasing demand from the rest of the union (through imports) tends to increase the output. The net effect is rather neutral in the baseline scenario. (Appendix 3.) The conclusion about the effects of EMU-wide fiscal policy is thus that the fiscal policy should affect the small country directly in order to have the desired stimulus. The corollary to this is that the fiscal policy of a member country does not much harm other member countries, either, assuming that the credibility of the whole union does not worsen.

In the case when the small country is not a member of EMU and has either a floating rate or a basket peg regime, the indirect effects of a fiscal stimulus occurring in some of the EMU countries are stronger than when being a member. In the floating rate regime the effective exchange rate depreciates, which tends to increase the output. In the basket peg regime the effec-

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[1] According to OECD (1989, 44) real wages have been rather flexible in the USA in the past. In Europe flexibility has varied between countries.

tive exchange rate remains unchanged. The foreign demand and interest rate effects are the same in all regimes.

3.2.2 Monetary policy

Big country effects

An expansive monetary policy in the EMU-area affects the output if there is some rigidity in the reaction of domestic prices to the foreign ones, but if this reaction multiplier (α) is one, the neutrality-of-money result is obtained for both big countries (appendix 2). When the multiplier is zero there is an increase in the output of EMU and a decline in that of the USA. The net effect is, however, positive, assuming symmetry of countries. When the multiplier is somewhat higher than 0 but lower than 1 the outputs of both countries increase. The exchange rate of the EMU depreciates and the international interest rate declines. The prices increase in EMU and decline in the USA as a result of the previously described change in the bilateral exchange rate.

When real wages are rather flexible in the USA, the effectiveness of the monetary policy of EMU is the greater the more flexible real wages are in EMU. This means that nominal wages are rigid and do not increase as a response to the depreciation of the exchange rate. The effect of the depreciation is thus not mitigated by increasing prices. (Kotilainen, 1995.)

Small country effects

As a member of EMU Finland experiences the same effects as the whole EMU if it can be assumed that the economic structures are the same. But even if there are structural differences the effect is qualitatively similar. The exchange rate depreciates, the interest rate declines and the foreign demand from the other EMU countries increases. The demand from the rest of the world does not increase as much; it can even decline if α is small (see the big country effects). Union-wide monetary policy is an effective tool in affecting the small country output, too (appendix 3). It is accordingly important that the timing of this policy is appropriate from the small country's point of view. Problems might arise if the cyclical situation of the small country differed essentially from that of the average.

If the small country was not a member of EMU and had a floating exchange rate, its output would be almost insulated from the monetary policy of EMU. In this case the exchange rate appreciates, which tends to offset the positive effects of the decreasing interest rate and of the increasing goods demand from the EMU area. In the basket peg regime the effective exchange rate is stable (and does not depreciate as in EMU). (Appendix 3.)

3.2.3 Incomes policy

Big country effects

Incomes policy is modelled as in the small country. In the two-country model consisting of the two large countries we are not able to draw a priori results (except when $\alpha = 1$) (Kotilainen, 1992 and 1995). We thus report the effects in the case of the baseline scenario (appendix 1).

A decline in the average wage level in the EMU increases the output of that area (appendix 2). The output of the "USA" declines if producer prices of that area do not react to the corresponding decline in the EMU. If prices decline in the "USA", too, the output of that area increases also, but by less than that of the EMU. The international interest rate declines. The exchange rate of the EMU area depreciates, because the increasing output must be sold abroad.[1]

When real wages are rather flexible in the USA, a greater effectiveness of incomes policy in EMU is achieved if real wages are rigid there. The depreciation of the exchange rate does not slow down the decline in prices in this case. Competitiveness remains consequently better, which increases the output more. (Kotilainen, 1995.)

Small country effects

When the wage cut is realized in the small country in the same way as at the Union level on average, the effects are very similar, assuming symmetric economic structures. If the small country trades with "the USA", too, this creates some differences compared to the EMU average.

If the cut in wages occurs in the rest of the Union but not in the home country, foreign demand increases and the international interest rate falls. As a member of EMU the small country faces also a depreciating exchange rate (for the reason, see above).

When the small country is not a member of the Union, but has instead a floating rate or a basket peg regime, the depreciation does not occur. In the case of floating the effective exchange rate appreciates and competitiveness worsens. In the basket peg regime the effective exchange rate is stable. Competitiveness deteriorates because of a smaller decline of prices than in EMU. Output increases consequently more as a member of EMU than outside it. (Appendix 3.)

4 CONCLUSIONS

Among domestic policy tools fiscal policy is very effective in influencing short-term variations of the output. Using this tool is the most appropriate in dampening normal cyclical variations or in smoothing output changes in the case of temporary export demand shocks. When the real exchange rate is structurally out of equilibrium, incomes policy is a more appropriate tool than fiscal policy. In the case of temporary sectoral shocks flexibility in costs, i.e. wages, profits and raw material prices, of the sector in question is more appropriate than economy-wide measures.

At the union level all policy tools are effective assuming that domestic prices and wages do not react to the foreign ones (assuming symmetry of the large countries). When domestic prices react fully to changes in the foreign ones, fiscal and incomes policies are still effective. Fiscal policy is in this case of a beggar-thy-neighbour nature, which can create a policy reac-

[1] This reaction is specific to the model. In models where domestic employment increases clearly as a result of lower wage costs, and in models where credibility improves as a result of a decline in prices, the reaction of the exchange rate can be different.

tion by the rest of the world (mainly from the USA and Japan). When fiscal policy is used for short-run stabilization, this kind of a danger might be rather small. Incomes policy is of a beggar-thy-neighbour type, when nominal wages and prices are rigid, but when the decline in prices transmits abroad, both countries gain. Expansive monetary policy increases the output of the Union but decreases that of the rest of the world when nominal prices are rigid. There is, however, a net increase in the "world" output. When nominal prices are fully flexible, monetary policy is neutral with respect to output.

All the above mentioned policy tools can thus be used (selectively) at the Union level. Success in using them depends on the credibility of the whole union. The credibility considerations, which are now relevant at the national level shift in EMU largely to the Union level. The effectiveness of monetary policy is the better the better is the anti-inflationary reputation of the European Central Bank (ECB). Lack of credibility increases the long-term interest rates, which diminishes the increase in output from what is presented in the current model. Lack of success in avoiding excessive budget deficits in turn affects the effectiveness of fiscal policy by crowding out private demand through higher interest rates.

The effects of Union-wide policy measures on individual countries are similar to those occurring at the Union level if the small country is structurally close to the EMU average. Structural differences, for example, in the country composition of exports, create differences in effects.

The Union-wide policy measures are the more attractive the more similar is the national business cycle compared to the EMU average. If there are systematic differences, the Union-wide policy can have negative effects on the variation of the output of the small country. Monetary and incomes policies are in this case the most counteractive. In cases when the cyclical situation of the small country differs essentially from that of the Union, national fiscal policy measures in booming member countries would be the most appropriate tool in the economic policy of the EMU. If for example the rest of the EMU is overheating and some countries are in recession, a more appropriate measure than monetary restriction would be fiscal contraction realized in individual countries. In this case the foreign demand effect from the EMU would be negative for the countries in recession, but the interest rate and exchange rate effects would tend to compensate for this effect. Monetary restriction decreases foreign demand, increases the interest rate and spurs an appreciation of the exchange rate, all of which worsen the recession.

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APPENDIX 1

THE NUMERICAL VALUES OF THE PARAMETERS USED IN THE BASELINE SCENARIO OF THE MODEL

When studying the effects of shocks originating in the big countries, we use the following numerical values for the parameters:

common parameters:

$k = k_1 = k_2 = k_3 = 0.67; \Phi = \Phi_1 = \Phi_2 = \Phi_3 = 0.46; \mu = \mu_1 = \mu_2 = \mu_3 = 0.2;$

$\beta = \beta_1 = \beta_2 = \beta_3 = 0.3;$

big country parameters:

$\sigma = 0.1; \varepsilon = 0.3; \alpha = 0.1$

small country parameters:

$\sigma_3 = 0.3; \varepsilon_3 = 0.6; \theta = 0.3; \alpha_3 = 0.3.$

We assume that the big countries are symmetric. We thus denote these parameters without subscripts. The smallness of the third country normally implies higher values for the elasticities with respect to foreign demand and relative prices than for the big countries.

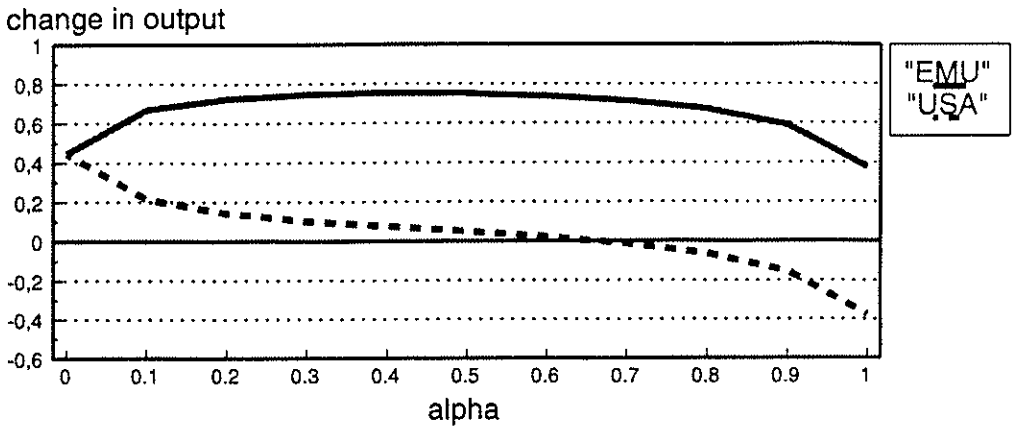
The numerical values presented above are assumed to reflect rather short-term relationships between the variables (about one year). Money demand coefficients with respect to income and interest rates are adopted from Kremers and Lane (1990). These values are estimated for the EMS countries as an aggregate, but they are used here as an approximation for all countries. Many other studies give estimates which are consistent with these figures. σ_3, μ_3 and ε_3 are determined on the basis of econometric studies for the Finnish economy. θ reflects the share of the non-EU countries in Finland's foreign trade. α_3 is the share of foreign inputs in the input-output calculations for the Finnish economy. Because all parameters needed do not have a direct counterpart in the empirical studies, the values adopted must be seen more as "guesstimates" than estimates. The values of α, σ and ε are assumed to be lower than the corresponding estimates for Finland because only one third of the trade of the whole EU occurs with non-EU countries. The USA is also less open than smaller countries.

APPENDIX 2

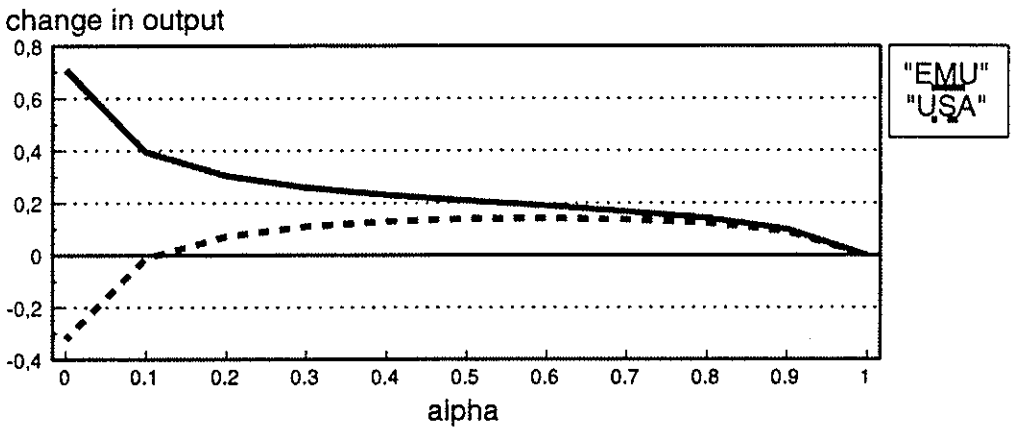
THE EFFECTS OF EXPANSIVE FISCAL, MONETARY AND INCOMES POLICY MEASURES OF "EMU" ON THE OUTPUT OF "EMU" AND THE "USA" (SENSITIVITY WITH RESPECT TO DIFFERENT DEGREES OF PRICE INDEXATION, OTHERWISE BASELINE SCENARIO)

LARGE COUNTRIES

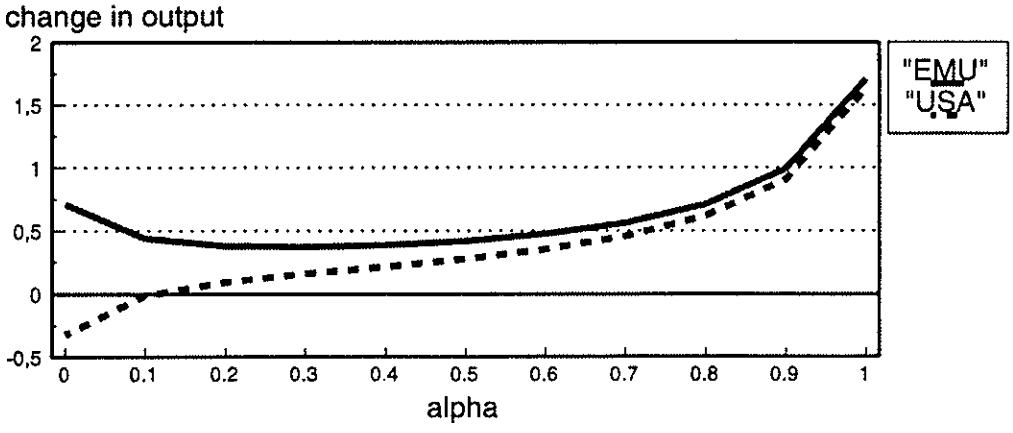
Expansive fiscal policy in the "EMU"



Expansive monetary policy in the "EMU"



Wage reduction in the "EMU"

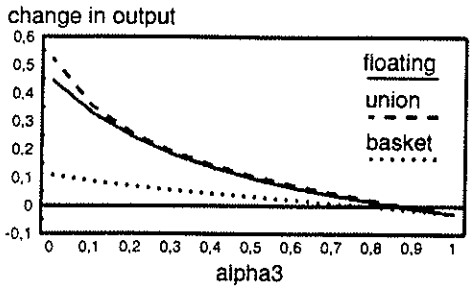


APPENDIX 3

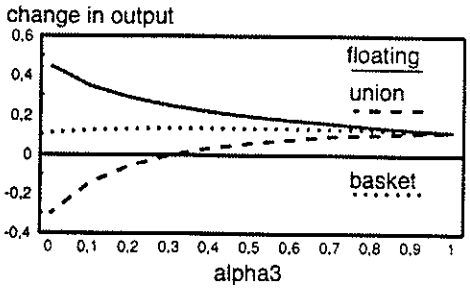
EFFECTS OF EXPANSIVE FISCAL, MONETARY AND INCOMES POLICY MEASURES ON THE SMALL COUNTRY ("FINLAND") IN DIFFERENT EXCHANGE RATE REGIMES (EU FISCAL AND INCOMES POLICY STIMULUS OCCURS IN THE REST OF THE UNION, BUT NOT IN "FINLAND") (SENSITIVITY WITH RESPECT TO THE DEGREE OF PRICE INDEXATION $\alpha_3 = 3 * \alpha$)

SMALL COUNTRY

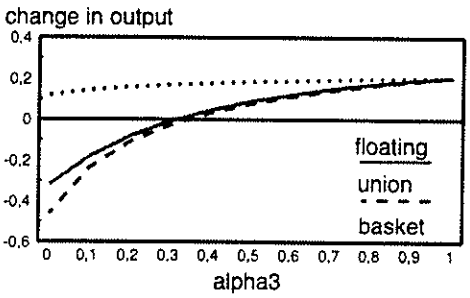
EXPANSIVE FISCAL POLICY IN THE "USA"



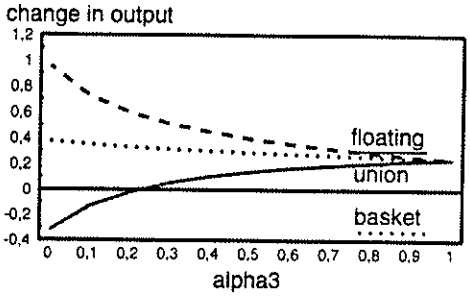
EXPANSIVE FISCAL POLICY IN THE "EMU"



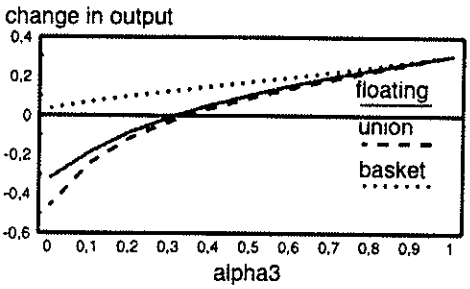
EXPANSIVE MONETARY POLICY IN THE "USA"



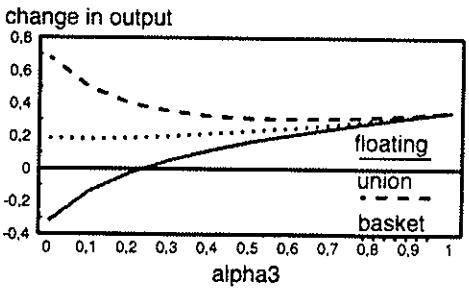
EXPANSIVE MONETARY POLICY IN THE "EMU"



WAGE REDUCTION IN THE "USA"



WAGE REDUCTION IN THE "EMU"



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