Exchange Rates and Fiscal Adjustments: Evidence from the OECD and Implications for EMU*

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Abstract

This paper characterizes monetary and exchange-rate policies during successful and unsuccessful fiscal adjustments by analyzing the OECD economies over the period 1970 to 1998. We find that successful adjustments are almost always preceded by large nominal and real exchange rate depreciations while unsuccessful adjustments are preceded by revaluations and followed by depreciations. The extreme adjustments of Ireland and Denmark in the 1990s fit this pattern of depreciation for success very closely. Early depreciation is a significant and quantitatively important predictor of the persistence of adjustment: each 1 percent of depreciation in the two years preceding a fiscal adjustment leads to approximately 2 percent increase in the probability of success. Since the size of the typical pre-adjustment depreciation is 5%, this is an important effect. When compared to an indicator of the composition of the fiscal adjustment, the reliance on spending cuts, the two variables have similar quantitative impacts on the likelihood of persistence. Our results are robust to alternative definitions of the depreciation period, the persistence of the adjustment, and whether we use effective, DM or US$ exchange rates. Monetary policy does not play a significant role in fiscal adjustments. Our results suggest that attaining persistent fiscal adjustment within EMU is likely to become a more "costly" endeavor than it was beforehand, as EMU members have adopted a single currency and therefore abandoned the use of exchange rate policies vis-à-vis each other.

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1 Introduction

The literature on the effects of fiscal adjustments has experienced a revival in the 1990s. The unexpected consequences of several major adjustments that took place in Europe in the mid-eighties renewed our interest in understanding the determinants of successful fiscal adjustments. Sizeable fiscal contractions in Denmark and Ireland led to expansions rather than recessions[1], while a large fiscal expansion in Sweden in the early nineties led to a severe recession. Whatever explains these economic outcomes, it is something other than traditional Keynesian effects of fiscal policy. The literature on the effects of adjustments has uncovered some empirical regularity. The size, persistence and composition (in terms of spending cuts or tax increases) of the fiscal adjustment, as well as the fiscal stance at the time of the adjustment, all seem to affect whether it will be successful. However, a missing element in the explanation of successful adjustments is its monetary side.

Several authors have pointed to the role of monetary policy and exchange rates before and during adjustments. Giavazzi and Pagano (1990) say "disentangling the effects of wage moderation and the effects of fiscal variables on the supply side and the cost of firms, versus the effect of the exchange rate is a critical next step to understand the dynamics of fiscal adjustments." Alesina and Perotti (1997) mention the role of exchange rates explicitly when discussing avenues for further research: "A very important policy decision concerns the policy mix which should accompany a major fiscal adjustment, particularly the exchange rate policy. Several major successful adjustments have been preceded by devaluations, but the same happened for some of the unsuccessful ones. The question is whether a devaluation helps in determining the success of the adjustment and its macroeconomic consequences." In spite of being recognized as important, the interplay of fiscal, monetary and exchange rate policies during adjustments has not been studied yet. This is a particularly relevant issue for the eleven European countries that have adopted a common currency by joining the Economic and Monetary Union (EMU) and thereby relinquished the conduct of independent monetary and exchange rate policies.

The goal of this paper is to assess empirically the role of monetary and exchange rate policies during fiscal adjustments. We add to the literature on fiscal adjustments in three ways. First, we characterize the behavior of monetary and exchange rate policy, before, during and after fiscal adjustments. By examining successful and unsuccessful adjustments separately, we highlight the possible contribution of these policies for success. Our second contribution is to test the importance of monetary and exchange rate policy explicitly against the success factors that have been previously studied in the literature. Thirdly, we suggest a theoretical explanation for the role of monetary and exchange rate policy in successful adjustments.

Our results can be summarized as follows. Nominal and, especially, real exchange rate depreciations before a fiscal adjustment significantly increase the probability that the

[1] Respectively in 1983-86 and 1987-89, involving a cut in the deficit of 7.2% and 5.7% of GDP.

adjustment will be successful in the sense that it will bring a permanent improvement in the public finances. A one standard deviation increase in rate of depreciation of the real exchange rate in the two years before a fiscal adjustment leads to 11 to 15 percent higher chance of success. When compared with the composition effect, namely the impact of the spending-tax composition of the fiscal adjustment, an exchange rate depreciation has a similar quantitative effect since a one standard deviation increase in the spending share of the adjustment leads to a 10 percent higher probability of success. Unlike the exchange rate, monetary policy does not play a significant role in promoting persistence. Monetary policy is expansionary, and significantly so, only *after* unsuccessful adjustments.

These results have important implications for the feasibility of fiscal consolidations in the EMU. Since the ability to devalue the exchange rate is an important element in bringing a fiscal adjustment to a successful end, fiscal adjustments in the EMU are less likely to be successful. Because of the common currency, an EMU member that undertakes a fiscal adjustment cannot devalue its currency with respect to its main trading partners (the other EMU members) or unilaterally decide to devalue the Euro with respect to the US Dollar or the Japanese Yen.

The paper is organized as follows. Section 2 briefly reviews the literature on fiscal adjustments. Section 3 looks closely at three episodes of fiscal adjustments, highlighting the role of monetary and exchange rate policies. Section 4 characterizes successful and unsuccessful fiscal adjustments and empirically tests the role of monetary policy and exchange rate devaluation in their success. Section 5 suggests a theoretical framework that is consistent with our findings and discusses the implications for EMU. Section 6 concludes.

2 Fiscal Adjustments: Theory and Evidence

Fiscal adjustments have been the focus of the macroeconomic policy debate in recent years. The members of the EMU, as well as other countries that hope to become members in the future, have pursued large deficit reductions to satisfy the convergence criteria mandated by Maastricht Treaty. Latin American economies have improved their budget balances under the pressure of IMF conditionality and the threat of capital outflows.

A fiscal adjustment, defined as a reduction in the government primary budget deficit, can result from a reduction in government expenditures or an increase in tax revenues.[2] The theoretical implications of a fiscal adjustment on private consumption and output are different in different models.[3] Infinite horizon models predict that a permanent reduction in government spending raises private consumption provided public and private consumption have zero or positive substitutability: individuals' permanent income

[2] This corresponds to a change in the primary deficit. The total deficit may also be cut due to a reduction in the interest paid on the outstanding stock of debt.

[3] For a review of the theoretical literature on fiscal adjustments, see Giavazzi, Japelli and Pagano (2000).

increases because current and future taxes are lower, thereby raising private consumption.[4]

Changes in taxes that are not accompanied by changes in current or future public spending have no effects on private consumption or investment: aggregate saving remains unchanged, as changes in public saving lead to compensating changes in private saving. This is the well know Ricardian Equivalence result, as in Barro (1974). Ricardian Equivalence, however, holds only in a world where taxes are not distortionary, individuals are not credit constrained and there is no uncertainty about future government policies. If current changes in taxes signal future changes in public spending, as suggested by Feldstein (1982), the temporal pattern of taxes has real effects in the economy.

Fiscal adjustments have different effects in overlapping generation models of finitely lived individuals. Cuts in public spending raise private consumption if matched by cuts in taxes, but fail to do so if current taxes remain high. Similarly, changes in taxes lead to changes in private consumption, whether accompanied or not by changes in public spending.

Finally, Keynesian models predict that an increase in government spending has an unambiguous positive effect on output: higher public demand raises production and private spending, notwithstanding some crowding out with respect to private investment due to higher interest rates. Wealth effects can mitigate or reverse this result, as consumption and investment are negatively affected by a decrease in wealth. An increase in taxes with a constant level of public spending, on the other hand, decreases private consumption and interest rates. Investment goes up, but the overall effect on output is negative. Once again, wealth effects mitigate output contraction.

A different class of models proposes that the effects of fiscal policy on output and private consumption are non-linear and depend on the circumstances of adjustment. Factors such as the size and persistence of the fiscal impulse, the level and growth of public debt at the beginning of the adjustment as well as its composition may lead to effects similar to those predicted by infinite horizon models. Blanchard (1990) presents a model where the level of public debt affects the impact of the adjustment on the economy. The effects of distortionary taxation are highly non-linear and households have finite horizons. An increase in net taxes lowers private consumption if public debt is low, but may raise it if public debt is high. This happens because higher current taxes delay the date of adjustment, postpones the deadweight cost of adjustment to future generations and thus increases the lifetime income of existing households.[5] Other authors have

[4] When private and public consumption are complements, the effects of spending cuts are more complex as individuals will tend to reduce private consumption in response to a reduction in public consumption.

[5] Sutherland (1990) proposes a similar mechanism. If an adjustment is expected when public debt reaches a certain threshold, a rise in taxes when the economy is closer to the threshold delays adjustment and thus may increase the lifetime wealth of finite-horizon households. Perotti (1999) proposes a model where some households are liquidity constrained. A decrease in spending lowers consumption of liquidity constrained households and increases that of unconstrained households. Which effect dominates depends on the ratio of public debt to GDP: when it is high tax the positive effect on consumption dominates.

pointed to the possibility of non-linear effects in public spending cuts. Small cuts in public spending have Keynesian effects, while large cuts signal a change in regime and thus lead to increases in private consumption. This has been suggested in Feldstein (1982) and Drazen (1990); Bertola and Drazen (1993) propose a similar non-linearity on the basis of an expected probability of stabilization that arises when spending reaches a pre-determined threshold.[6] Feldstein (1982) suggests that the magnitude of the fiscal adjustment in itself may signal its persistence, leading to non-linear effects of the size of the deficit cut on the economy.

A number of researchers have taken the question of whether fiscal adjustments can be expansionary to the data. Giavazzi and Pagano (1990, 1996) started this empirical literature with the analysis of the Danish stabilization of 1983-86 and the Irish stabilization of 1987-89. They conclude that, in both cases, the fiscal adjustments were so large that private consumption increased in response to an upward revision of permanent income's estimates. Giavazzi, Jappelli and Pagano (2000) search for non-Keynesian responses of national saving to fiscal policy and find them to be associated to large and persistent fiscal impulses, especially during fiscal contractions, confirming the findings in Giavazzi and Pagano (1996).

Another factor that has been associated with success of fiscal adjustments is the fiscal stance at the time of adjustment. On one hand, Perotti (1999) has provided evidence that the higher the level of debt (or the more rapid the growth of public deficits), the more likely for the fiscal adjustment to have expansionary effects. On the other hand, Giavazzi, Jappelli and Pagano (2000) find that a high or rapidly growing debt/GDP ratio does not predict non-Keynesian responses to fiscal adjustments.

Alesina and Perotti (1996), Alesina, Perotti and Tavares (1998) and Alesina and Ardagna (1998) classify fiscal adjustments on the basis of their ex post performance: adjustments are successful if, three years down the road, the debt/GDP ratio has fallen at least 5 percentage points. They find that composition matters: cutting spending rather than raising taxes leads to more persistent improvements of public finances and is usually accompanied by an increase in GDP. Conversely, Giavazzi, Jappelli and Pagano (2000) find that composition matter, but in the opposite way: fiscal contractions are expansionary if carried out by tax increases rather than spending cuts.

3 Some case studies

Earlier analyses of fiscal retrenchments in Ireland, Denmark and Sweden in the 1980s concentrate on the size and persistence of the fiscal impulse, the level and growth of the debt/GDP ratio, and the composition of the adjustments. These studies ask which of these factors are important in making an adjustment successful or expansionary. While almost all these studies suggest that monetary and exchange rate policies may have played a key role in the adjustment, there is no systematic assessment of their importance. In this

[6] The mechanics of the argument work in a way similar to the Blanchard (1990) and Sutherland (1997) arguments with public spending taking the role of taxes and public debt, respectively.

section, we review these adjustment episodes highlighting the role of exchange rate and monetary policy.

3.1 Ireland

From 1974 to 1983, Irish public finances had deteriorated steadily, bringing public debt from 55% to about 95% of GDP. At the same time, the current account also deteriorated, reaching a staggering 13.7% of GDP in 1981. The Irish authorities then decided to pursue a fiscal adjustment. According to our definition of adjustment,[7] Ireland had three episodes of fiscal adjustment since the early 80s: 1983-84, 1987-89 and 1996. The main features of these fiscal adjustments are summarized in Table 1. Of the three adjustments, those in 1983-84 and 1987-89 were successful, while the 1996 adjustment was not successful. In terms of the adjustment's impact on output, the 1987-89 tightening was expansionary as both potential and actual GDP growth rose during the adjustment relative to the average of the two years before. The 1996 adjustment, on the other hand, lowered potential but raised actual GDP growth, whereas the 1983-84 adjustment lowered both growth rates.

The third and fourth rows of Table 1 report the size of the fiscal impulse for each episode; these are, respectively, the average and total improvement in the primary balance to GDP. The fiscal impulse in 1987-89 was the strongest and it coincided with the peak in the public debt to GDP ratio. Row six in Table 1 reports the (average) composition of the fiscal adjustment, indicating what fraction of the primary surplus improvement was due to a reduction in government disbursements versus an increase in tax revenues.[8] Most of the fiscal improvement in 1983-84 came through cuts in discretionary taxation, including increases in duties, VAT, a temporary levy on income and new residential property taxes.[9] The 1987-89 adjustment, on the other hand, relied on massive reductions in government outlays, which fell from 50% to 38% of GDP in three years. This sharp reduction in outlays was achieved by imposing a ceiling on public wage increases, a lower replacement ratio for unemployment benefits and a severe cut of public investments. The 1996 fiscal improvement came both from lower public spending and higher tax revenues, mainly originating from higher income taxes on households.

Table 1 reports the developments in Irish monetary policy during the fiscal adjustments, i.e. the difference in the average growth rate of M1 and the three years before the stabilization. The fiscal tightening in 1983-84 and in 1996 were accompanied by sharp contractions of the monetary aggregates, while that in 1987-89 by a monetary expansion.

[7] A fiscal adjustment is an improvement of the primary balance to GDP ratio of at least 1.5% in a single year. An adjustment is successful if the changes in the deficit in the two years immediately after the adjustment are zero or negative. In later sections we also consider a three-year definition of success.

[8] A figure above 100% indicates that the cut in government spending was accompanied by a reduction in tax revenues.

[9] See OECD Economic Surveys, Ireland 1984/85.

Table 1: Fiscal adjustments in Ireland

	1983-84	1987-89	1996
Successful	Yes	Yes	No
Average potential GDP growth differential	-0.4	0.8	1.0
Average actual GDP growth differential	-0.8	5	-1.1
Average primary surplus/GDP change	2.2	2.8	1.7
Total primary surplus/GDP change	4.3	8.3	1.7
Initial net debt/GDP	83.3	116.3	84.3
Composition	53.7	151.5	64.7
M1 growth differential	-8.2*	6.3	-27
Total current account/GDP change	4.0	1.6	0
*: M3			

Irish exchange rate policy played an important role in the fiscal adjustments: successful adjustments were preceded and/or accompanied by large nominal and real exchange rate devaluations, while the unsuccessful ones followed a period of nominal and real exchange rate appreciation. Figure 1 shows the daily DM/Pound exchange rate (the number of DMs for one Irish Pound) from March 13, 1979 until December 31, 1998; a fall of the exchange rate is a devaluation of the Pound with respect to the DM. The vertical lines indicate the beginning and end of each fiscal adjustment. Figure 2 shows the monthly real effective exchange rate[10] of the Irish Pound. A fall in the real exchange rate identifies a real depreciation of the Irish Pound, namely an increase in competitiveness; the vertical lines indicate beginning and end of each fiscal adjustment.

Up to 1979, the Irish Pound was linked to Sterling and in 1979 Ireland became a member of the European Monetary System (EMS). Until 1983, Ireland adopted a middle course in the various realignments of the system that resulted in depreciation (both in nominal and real terms) against the DM and the Dutch Guilder but an appreciation against all other currencies in the EMS. The realignment on March 21, 1983 was the opportunity to correct this appreciation of the real exchange rate. The Irish Pound was devalued by 3.5% with respect to the DM (see Figure 1), slightly more than the devaluation of the other EMS currencies. Figure 2 shows that, as a result of the March 1983 realignment, the real exchange rate depreciated by more than 7% in the following four months. The March 1983 realignment was also accompanied by a sharp reduction in monetary growth and the announcement of a stronger commitment by the Irish Central Bank to maintain the new parity between the Pound and the DM, in contrast to the earlier policy of successive realignments since 1979. In fact, the DM/Pound exchange rate remained unchanged until August 1986. As a result, inflation halved and short-term interest rates were reduced from 16.3 to 13.2%. The boost to competitiveness and the reduction in interest rates stimulated the demand for domestic products and investment, thereby easing the stabilization considerably in 1984. GDP growth jumped from –0.2 in 1983 to 4.3% in 1984, business investment growth recovered from –11 in 1983 to –3% in

[10] The real effective exchange rate is normalized to 100 in June 1982.

1984, and the current account/GDP ratio improved by 4 percentage points over the stabilization (see the last row of Table 1).

[Figures 1 and 2 here]

Exchange rate policy was also important in the 1987-89 stabilization. But unlike the 1983-84 adjustment where the devaluation was carried out after the consolidation had started, the Irish pound was devalued by 8% against the German DM in August 1986, well before the stabilization had started (see Figure 1). The devaluation offset the loss of competitiveness suffered in 1985-86 due to the depreciation of the sterling.[11] In addition, a reduction in the rate of wage increase relative to the average for the main trading partners and gains in relative productivity led to a sustained improvement in competitiveness throughout the stabilization, as shown in Figure 2, that further improved the current account. The credibility of the exchange rate commitment further reduced nominal and real interest rates and gave a remarkable impulse to domestic investment: business investment rose by 17% and household investment rose by 11% during the adjustment.

The Irish pound was devalued by 7% against the DM during the 1993 attacks on the EMS currencies that led to the widening of the currency bands. After 1993, the Irish Pound slightly depreciated until March 1995; however, in the final stage of convergence toward the EMU, it steadily appreciated both against the DM and the other European currencies. As a result, Ireland's real exchange rate appreciated by more than 10% between 1993 and 1997. The fiscal tightening of 1996, although limited in size, was unsuccessful and reduced real output growth from 11% to 7.4%. Because of the requirements of the Maastricht Treaty, Ireland could not devalue its currency and rely on the impulse of external demand; interest rates, already low, did not fall any further.

3.2 Denmark

Denmark started running large and persistent current account deficits in 1973; its cumulated current account deficit over the period 1973-82, i.e. the sum of the current account balances, amounted to 30% of GDP, a level only exceeded by Ireland. At the same time, Danish public finances had been deteriorating rapidly, bringing public debt from 12% to 65.5% of GDP in 1982. As a result, over the same period of time, short and long interest rates increased to reach 17% and 22%, respectively. With inflation just above 10%, interest payments on the outstanding stock of public debt became a significant burden on the budget and put pressure on the government to start a stabilization program in 1983 that lasted until 1986. Denmark joined the EMS since its creation in 1979.

In September 1982 the Social Democratic government resigned and was replaced by a minority Conservative coalition government. The new government adopted a sweeping stabilization that abolished the semi-automatic regulation of public sector wages, put a freeze on public investment and unemployment benefits, and increased

[11] The United Kingdom is Ireland's principal trading partner.

social security contributions, direct and indirect taxation.[12] The main features of the program are summarized in Table 2. The adjustment was successful and had an expansionary effect on output; actual GDP growth increased on average by 2.6% and potential GDP growth increased by 0.3% during the adjustment with respect to the average of the two years before it. Business investment increased by 30% and household investment by 20% at the beginning of the program, and they continued to grow on average by 13% until 1986. The improvement in the primary budget was remarkable: from 1983 to 1986, the primary budget/GDP improved by almost 14%. On average, half of the primary surplus improvement came from lower government expenditures and the other half came from higher tax revenues.

Table 2: Fiscal adjustment in Denmark

	1983-86
Successful	Yes
Average potential GDP growth differential	0.3
Average actual GDP growth differential	2.6
Average primary surplus/GDP change	3.5
Total primary surplus/GDP change	13.8
Initial net debt/GDP	65.5
Composition	51.0
M1 growth differential	7.7
Total current account/GDP change	-1.4

Figure 3 shows the daily DM/Danish Krona exchange rate between March 1, 1979 and December 31, 1989. The central rate of the Danish Krona was devalued by 4.76% against the DM in September 1979, 4.76% in November 1979, 5.5% in October 1981, 3% in February 1982 and 4.25% in June 1982. These devaluations resulted in large gains in competitiveness for Denmark over the period 1979 to 1982. Figure 4 shows monthly data for the Danish real effective exchange rate between January 1979 and December 1998; between January 1979 and December 1982, the Danish real effective exchange rate depreciated by almost 17%. Hence, when the fiscal program got under way in October 1982, Danish competitiveness was at an all time peak. Moreover, the fiscal adjustment was accompanied by the announcement that exchange rate of the Krona was going to be held fixed henceforth. The announcement gained credibility as the March 1983 realignment within the EMS led to a 2.5% revaluation of the parity of the Danish Krona; competitiveness was not adversely affected because, in the same realignment, the DM and the Dutch Guilder were revalued by 5.5% and 3.5% respectively.

An interesting feature of the Danish adjustment is that monetary policy was expansionary during the consolidation. As Table 2 shows, M1 growth was on average 7.7% higher during the adjustment than in the two years before it. Nevertheless, the

[12] See OECD Economic Surveys, Denmark 1982/83.

combination of fiscal adjustment and credible exchange rate policy lowered inflation from 10% in 1982 to 3.6% in 1986 and interest rates from 20% in 1982 to 10% in 1986.

External demand rose and the current account improved from –3.9% to –2.4% of GDP in the first half of the adjustment thanks to early gains in competitiveness. As fiscal tightening continued and the exchange rate was kept fixed against the low inflation currencies in the EMS, the real exchange rate appreciated and the current account worsened. The fiscal adjustment ended in 1987, having achieved to turn the budget deficit into a surplus and to stabilize the debt to GDP ratio. In January 1987, the parity of Danish Krona within the EMS was devalued by 0.45% and the current account started to improve.

[Figures 3 and 4 here]

3.3 Sweden

Sweden embarked in two large fiscal adjustments in 1983-87 and 1994-96, which are summarized in Table 3.[13]

The performance of the Swedish economy has deteriorated significantly since the early 1970s. Real GDP growth decelerated markedly, productivity and industrial production were well below the average in the industrialized economies. Like other small open economies, such as Ireland and Denmark, Sweden developed an external problem. The current account deficit deteriorated steadily since 1973 and at a faster pace in the early 1980s due to terms of trade losses associated with the second oil price increases. Meanwhile, the government budget position weakened sharply, which lead to a doubling of public debt as a percentage of GDP from 1976 to 1982.

Table 3: Fiscal adjustments in Sweden

	1983-87	1994-96
Successful	Yes	Yes
Average potential GDP growth differential	0.2	1.0
Average actual GDP growth differential	2.1	4.5
Average primary surplus/GDP change	2.1	3.8
Total primary surplus/GDP change	5.9	10.2
Initial net debt/GDP	66.3	83.9
Composition	252.4	86.5
M1 growth differential	-3.3	0.3
Total current account/GDP change	3.4	4.5

[13] The years 1985 and 1995 barely missed the threshold for being defined an adjustment according to our definition. Since there was not a major change in policy in those years, we treat the years 85 and 95 as part of the two fiscal episodes.

The fiscal tightening of 1983-87 was successful and it first stopped, and then even reversed the upward trend in public debt as a percentage of GDP. The new Social Democratic government that took office in September 1982 embarked on a wide-ranging program aimed at reducing central government expenditures.[14] This is reflected in the composition variable: the figure of 252.4% indicates that spending cuts while tax revenues fell drove the fiscal adjustment of 1983-87. The adjustment was slightly expansionary on potential GDP growth, but strongly expansionary on actual GDP growth, with respect to the two years before the adjustment.

A key element of the 1983-87 adjustment was a 10% devaluation of the Krona in September 1981 followed by a 16% devaluation in October 1982. The daily nominal exchange rate between the DM and Swedish Krona over the period March 1979 to December 1998 is shown in Figure 5. Sweden was pegging its currency, the Krona, to a trade-weighted currency basket; the devaluations in 1976-77 had only made up partially for the past cost and price differentials and did not provide Swedish firms with a competitive advantage. The devaluation in September 1981 and especially that in October 1982 were designed exactly to bring resources to export sectors of the economy. In fact, competitiveness improved by 30% during that period. Figure 6, which plots the Swedish real effective exchange rate, shows the sharp depreciation right before the beginning of the fiscal consolidation. Merchandise export volumes expanded rapidly and the current account went from a deficit of 3.4 percentage of GDP in 1982 to a 0.7 surplus in 1984. Monetary policy was tightened during the fiscal adjustment: M1 growth fell by 3.3% against the two-year pre-adjustment average. Inflation more than halved by the end of the fiscal adjustment (going from 8.5% to 4.1%), interest rates fell and investment grew rapidly, both by business and household.

A strong recession hit Sweden and its main trading partners toward the end of 1990. This negative shock coupled with the fact that the real exchange rate had appreciated by more than 20% since the devaluation in 1982 pushed Sweden into its longest and deepest recession in post-war history. A large fall in property prices triggered a crisis in the financial system that required a public bailout. More than half million people lost their jobs, raising the unemployment rate above 8% in a country where it had been on average well below 2%. At the same time, the government declared its intention to seek full membership of the European Community and, in May 1991 pegged the Swedish Krona to the ECU. In response to massive exchange-market pressure against the Krona, the Central Bank allowed the Krona to float in November 1992. The primary balance had deteriorated by 16 percent of GDP between 1990 and 1993 due to the economic downturn, a tax cut designed to stimulate the economy and the government bailout of the financial system.[15]

[14] In particular, health insurance benefits, transfers to local authorities, rent subsidies and wages in the educational system were reduced. See OECD Economic Surveys, Sweden, 1981/82.

[15] For a detailed account of Sweden's financial expansion in the early 1990s, see Giavazzi and Pagano (1996).

A program to stabilize public finances was started by mid 1993; its main features are described in Table 3. Following parliamentary elections in September 1994, the Center-Right coalition government was replaced by a Social Democratic minority government. The new government tightened fiscal policy with a mix of spending cuts, higher taxes and social-security contributions and privatization. The adjustment was successful and public debt fell by more than 10% of GDP over the period 1994 to 1996. The stabilization program came at a peak of Swedish competitiveness. Figure 5 shows that the Krona had depreciated by 23% against the DM since November 1992 and Figure 6 shows that, during 1993, the real effective exchange rate dropped by more than 30%. As a result, external demand remained strong and the current account improved by 4.5% of GDP over the period. The size of the fiscal adjustment was remarkable, as the primary balance to GDP improved by more than 10 percent; nevertheless, falling interest rates and rising asset prices stimulated private consumption and business investment. As a result, the fiscal program was accompanied by strong output growth. The adoption of a 2% inflation target for monetary policy and a stable Krona has lead to an appreciation of the real exchange rate during the adjustment.

[Figures 5 and 6 here]

The fiscal adjustment episodes reviewed in this section present us with mixed evidence on the importance that composition, size, and the fiscal stance at the time of the adjustment have on the final success of the consolidation. As for the successful adjustments, four of them were expansionary and one contractionary; three successful adjustments originated by combined spending cuts and higher tax revenues while two adjustments originated only by spending cuts. Three successful adjustments were accompanied by monetary expansions while two of them by monetary contractions. Public debt at the time of the adjustment ranged between 65% and 116% of GDP, both for successful and unsuccessful episodes. By contrast, the evidence on the importance of exchange rate devaluation appears more robust. Of the six episodes analyzed above, five were successful and one unsuccessful. The unsuccessful adjustment, i.e. Ireland in 1996, was the only episode *not* preceded by nominal and real exchange rate devaluation. In the remainder of the paper we further investigate the importance of monetary and exchange rate policies during fiscal adjustments.

4 Empirics

In this section we use national accounts data from OECD countries to study fiscal adjustments. We summarize the behavior of macroeconomic variables around fiscal adjustments using a very simple specification. We then estimate how different variables proposed in the literature on fiscal adjustments as well as changes in the exchange rate affect the likelihood of an adjustment being persistent.

4.1 Summary Statistics

We collected fiscal, monetary and output data on 20 OECD countries, to characterize their behavior in periods just before, during and just after fiscal

adjustments.[16] The data set is provided by the Organization for Economic Cooperation and Development *Economic Outlook* and covers the period 1970 to 1999. In several forms, this data set is extensively used in the empirical literature on fiscal adjustments. The data is provided has annual frequency and some fiscal variables are available corrected for the cycle. Data on money supply is from the International Monetary Fund's *International Financial Statistics*. In Appendix I we provide a complete description of the data series, including sources, units and transformations.

First we divide the sample years into adjustment and non-adjustment years. A period of adjustment is a year when the primary deficit is cut by 1.5 percent of GDP or more. This definition is chosen to be in line with the definition used in several other papers on the empirics of fiscal adjustments and is a rather stringent definition of fiscal adjustment.[17] Adjustment years are then subdivided into successful and non-successful adjustments. We then classify a fiscal adjustment as successful if either the primary deficit does not increase in the two years immediately after the adjustment or the level of the public debt decreased by more than 3 percent, we consider the adjustment to be a success. In all other cases, we classify the adjustment as non-successful.[18] In our sample there are 88 fiscal adjustments, of which 56 are successful and 32 are not successful.[19]

With the objective of describing the data, we ran fixed effects panel regressions of the several macroeconomic variables of interest on their own lagged value and dummies for periods just before, during and just after successful and non-successful adjustments. As an example, in the case of GDP, the specification uses its lagged value and six dummies, respectively for years before, during and after adjustments, successful and unsuccessful. We take two years before and two years after a fiscal adjustment as the before, after and during dummies for each and every year of a multi-year adjustment.[20] The inclusion of fixed effects and lagged values makes sure that significant coefficients on adjustment dummies capture deviations from the behavior of the variable, after time-unvarying determinants and recent past behavior have been taken into account.

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[16] The countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, United Kingdom and the United States.

[17] For instance, the sustained output expansion in the United States from the mid-1990's, which has led to a marked decrease in the budget deficit, does not, according to our criterion, display a single "adjustment year" according to our criterion.

[18] Note, however, that if governments allow the primary deficit to fluctuate with the business cycle so that output contractions are accompanied by budget deficits, eventually most adjustments will "become" unsuccessful. In other words, fiscal stabilization as gauged by our success indicator, is a temporary phenomenon. We experimented with another definition of success, namely the one corresponding to a 3 year horizon and a 5 percent decrease in public debt. Most of the results, as we will mention at the appropriate time, are not at all sensitive to this definition of success.

[19] Out of the total 88 fiscal adjustments, 12 take place in two consecutive years and 6 in three consecutive years. The success rate in the second and third consecutive years of adjustment is very similar to that in the first year, around 66 percent.

[20] The multi-year adjustments are classified as successful or non-successful according to whether the first year of adjustment is a success or not. We obtained almost identical results for specifications that considered only one-year adjustments and for specifications that consider each year of multi-year adjustments as successful or non-successful on their own.

Table 4 below presents the results for the different panels. In the first column we report the coefficient on the lagged value of the dependent variable. As we can observe, for the overwhelming majority of cases, this coefficient is highly significant, with *t*-statistics typically in excess of 5. The behavior of most macroeconomic variables is characterized by a high degree of persistence so that eventual significance of the dummy variables on the timing and success of adjustments is a demanding benchmark. Our aim is to assess whether the coefficients on the periods before, during and after adjustments are significantly different from 0. GDP and consumption tend to be significantly below the average growth rate in the sample just before adjustments. Controlling for lagged growth, GDP and consumption grow by almost 1 percent less than average before successful adjustments (columns (1) to (3)). The coefficient during successful adjustments is positive, though not significantly different from 0. This indicates that the adjustments have some expansionary effects. But part of the boom is temporary, as the after-adjustment dummy coefficients are negative again, though smaller in size. In failed adjustments there is no such reversal in GDP and consumption growth (columns (4) to (6)). As to the current account, during successful adjustments the current account balance moves significantly into surplus. The behavior of total investment and its components, in particular business fixed investment, is remarkable: before adjustment, investment growth is at 2 to 3 percent points below the average for the sample. Whereas during successful adjustments there is a significant reversal and investment grows at 2 to 3 percent above average rates, during unsuccessful adjustments its growth is not significantly higher than average. After failed adjustments investment collapses again, significantly so in the case of business investment, while investment growth resumes after successful adjustments. Housing investment also experiences a sustained boom following successful adjustments and no change in behavior in failed adjustments. Figures 7 and 8 illustrate the behavior of GDP and its components during and around fiscal adjustment years.

[Figures 7 and 8 here]

The behavior of exchange rates, both nominal and real, delivers a clear-cut picture. Successful adjustments occur after nominal and real devaluations, which metamorphose into appreciations after the adjustment years. Unsuccessful adjustments, display a different general pattern of exchange rate appreciation before and during the adjustment and devaluation afterwards. The size of the average yearly devaluation before successful adjustments is 2.3 percent for the nominal effective exchange rate, 1.8 percent for the exchange rate with respect to the Deutsche Mark and 4.2 percent for the exchange rate with respect to the US Dollar. The appreciation after these adjustments is also sizable, though somewhat smaller. The behavior of the exchange rate is compatible with the improvement in the current account balance during successful adjustments. Figures 9 through 11 present graphically the change in exchange rates (effective, nominal against the DM and nominal against the US$) during the two types of adjustment. The difference in behavior is noticeable.

[Figures 9, 10 and 11 here]

Money and inflation have an interesting response to fiscal adjustment, as Figure 12 illustrates. There is no significant change in M1 or M2 before successful adjustments but there is a crunch in M2-M1 immediately after successful adjustments. Inflation falls before, during and after successful adjustments, but the change is significantly only after the adjustment. In failed attempts at adjustment, there is a significant increase in M2 before adjustments, a cut in M1 during the adjustment years and finally the opening of the monetary tap in the years following adjustments, with an increase in M1 by 4.2 above its average growth rate. Consistently, for unsuccessful adjustments, inflation does not fall significantly at any time.

Finally, the behavior of interest rates closes the characterization of the monetary policy picture. Figure 13 shows that the nominal short interest rate falls immediately before successful adjustments and its real counterpart after the adjustment years, together with the nominal long interest rate. In contrast to successful adjustments, during and after unsuccessful adjustments the signs on the dummies are overwhelmingly positive and significant for the nominal interest rate during and the real long interest rate afterwards.

[Figures 12 and 13 here]

The overall picture suggests that exchange rate policy has a role in determining the persistence (that is, the success) of fiscal adjustments. The real exchange rate presents a clear pattern of devaluation before successful adjustments and appreciation before unsuccessful adjustments. This pattern is present for real and nominal exchange rates, for effective as well as for exchange rates against the DM and the US$.

Our results are consistent with the informal evidence on the importance of exchange rate devaluations before and during fiscal adjustments presented by several authors. For example, Giavazzi and Pagano (1990) mention that "several major multi year fiscal adjustments are preceded by a devaluation of the exchange rate." Alesina and Perotti (1997) find that, though there are significant exchange rate depreciations before all type of adjustments, the average depreciation before and during successful adjustments is twice as high. In line with this, decreases in unit labor cost before successful adjustments are twice as high on average than before unsuccessful adjustments. They suggest: "the unit labor cost channel may even be more empirically relevant than the wealth effects and credibility channels on consumption." Finally, consistent with a contribution of the depreciations to the success of adjustments, there is a significant positive increase in the current account only during successful adjustments, suggesting a surge in exports.[21] Lane and Perotti (1998) present empirical evidence

[21] See Table 10 in Alesina and Perotti (1997). The authors mention: "both successful and unsuccessful adjustments have been accompanied and preceded by nominal depreciations, somewhat larger in successful cases. However, significant depreciations accompanied unsuccessful adjustments as well. What is interesting is that while in successful cases the nominal depreciations had an impact on competitiveness (unit labor costs) in unsuccessful cases it did not. These observations suggest that the behavior of real wages is significantly different in the two types of adjustments. As argued above, this difference may be linked to the composition of the fiscal adjustment, and in particular to the difference in the behavior of government wages and employment and taxes on households and social security contributions. The evidence on the trade balance confirms the superior performance of net exports in successful versus unsuccessful adjustments."

TABLE 4: Summary Statistics Before, During and After Fiscal Adjustments

		Success			Failure		
	Lagged Dependent	Before	During	After	Before	During	After
				Income and Its Components			
GDP	0.40**	-0.85**	0.36	-0.50*	-0.44	-0.53	-0.16
	11.99	0.28	0.32	0.27	0.31	0.40	0.32
Consumption	0.39	-0.84**	0.31	-0.34	-0.43	-0.39	0.05
	11.16	0.31	0.35	0.30	0.34	0.44	0.35
Current Account	0.11*	0.34	0.65**	-0.14	-0.09	0.07	-0.37
	1.84	0.32	0.34	0.29	0.37	0.45	0.40
Total Investment	0.25**	-2.90**	2.18**	0.86	-2.18**	1.23	-1.20
	6.69	0.99	1.11	0.96	1.04	1.35	1.08
Housing Investment	0.20**	-3.80**	1.68	-0.80	-0.09	-1.02	0.93
	5.18	1.29	1.48	1.26	1.41	1.82	1.46
Business Investment	0.19**	-3.01**	3.42**	1.74	-2.44**	2.38	-2.56**
	4.98	1.10	1.27	1.10	1.21	1.57	1.25
				Exchange Rates			
Nominal Effective	0.28**	-2.31**	-0.69	1.15*	0.04	-0.17	-0.80
	7.38	0.62	0.72	0.60	0.71	0.90	0.73
Nominal Deutsche Mark	0.30*8	-1.76**	-0.63	-0.22	0.90	2.59**	-0.68
	8.01	0.77	0.90	0.77	0.87	1.14	0.91
Nominal US Dollar	0.34**	-3.77**	-0.13	3.24**	1.81	-0.99	-0.76
	9.10	1.11	1.28	1.10	1.20	1.55	1.24
Real Effective	0.16**	-4.20**	-0.17	1.74	-0.55	1.36	-1.52
	2.89	1.39	1.54	1.26	1.61	2.08	1.68
Real Deutsche Mark	0.26**	-1.29	0.41	-0.56	1.93**	4.95**	0.68
	6.87	0.81	0.94	0.81	0.91	1.20	0.96
Real US Dollar	0.29**	-3.62**	0.59	3.11**	2.34*	0.44	-0.55
	7.67	1.12	1.29	1.11	1.21	1.57	1.25
				Money and Inflation			
M1	0.04	-1.21	-0.14	1.25	0.31	-3.18*	4.23**
	1.13	1.29	1.51	1.28	1.50	1.90	1.55
M2	0.35**	0.06	-0.61	-0.99	2.09**	-0.62	0.09
	7.80	0.90	1.05	0.88	1.03	1.32	1.02
M2 - M1	0.42**	0.45	-1.17	-2.71**	2.55*	0.28	-1.39
	6.88	1.29	1.50	1.27	1.46	1.88	1.44
Inflation	0.84**	-0.43	-0.43	-0.59**	0.42	0.25	-0.45
	39.73	0.32	0.37	0.31	0.36	0.46	0.37
				Interest Rates			
Nominal Short Interest Rate	0.07*	-0.65**	-0.11	0.02	-0.25	1.05**	-0.09
	1.76	0.28	0.34	0.28	0.34	0.43	0.35
Nominal Long Interest Rate	0.19**	-0.17	-0.03	-0.35**	0.07	0.06	0.10
	5.00	0.16	0.19	0.17	0.19	0.24	0.20
Real Short Interest Rate	-0.23**	-0.17	-0.03	-0.35**	0.07	0.06	0.10
	-5.49	0.16	0.19	0.17	0.19	0.24	0.20
Real Long Interest Rate	-0.22**	-0.34	-0.53	0.22	-0.08	0.67	0.99**
	-5.77	0.38	0.44	0.37	0.45	0.58	0.46

Note: All variables defined in Appendix I – Data. For multi-year fiscal adjustments we have classified it as success or non-success on the basis of the criteria for success for the first year. Below the value of the coefficient we present its standard error. * and ** indicate a significant coefficient respectively at the 10% and the 5% confidence levels.

showing that a fiscal adjustment leads to an expansion of exports and add that these effects are "reinforced if the fiscal reform is accompanied by a flexible exchange rate or a devaluation".

4.2 Predicting Success in Fiscal Adjustments

We now turn to the determinants of successful adjustments. In this section we attempt to affect the persistence of fiscal adjustments. We use a Probit specification, with success as the dependent variable to be explained. Success is measured by a dummy with value 1 in years when the primary deficit to GDP ratio decreases by 1.5 % *and* followed by years when the primary deficit does not increase.[22] The probability of success is explained by lagged exchange rate changes as well as other variables suggested in the literature.

Several adjustment characteristics have been associated with the likelihood of its persistence in time. These adjustment characteristics are also associated with positive impact on output. Thus, we now present factors likely to make fiscal contractions more persistent and more expansionary. In a seminal paper examining the large fiscal adjustments of the 1980's in Denmark and Ireland, Giavazzi and Pagano (1990) inferred that the **size of the adjustment** had a role in reversing individual expectations regarding future fiscal policy: large adjustments tended to be non-contractionary as regards output. Giavazzi and Pagano (1996) later confirmed that the response of the private sector to cuts in the deficit varied with the size of the fiscal impulse.[23]

One of the most robust results to emerge in the literature relates the **composition of the fiscal adjustment** with its persistence. Alesina and Perotti (1995) first pointed that if the cut in the deficit relies mostly on public spending cuts, it is more likely to be successful and lead to output expansions. Specifically, successful adjustments are associated with cuts in wage government spending and transfers, whereas non-successful adjustments rely mostly on public investment cuts.[24] As demonstrated by Alesina and Ardagna (1998) and Alesina and Perotti (1995), the response of the private sector to the adjustment depends on whether spending cuts or tax increases prevail.[25]

Several empirical studies have shown that fiscal adjustments may have expansionary effects. Perotti (1999) examines adjustments in "good" and "**bad" times**, the latter being periods when the level of public debt is high or rising fast. This author finds that adjustments are more likely to be expansionary in bad times. However, in contrast with these results, Giavazzi, Japelli and Pagano (2000) find no evidence that

[22] Or the share of public debt in GDP decreases. We will use 2 and 3 years after the fiscal adjustment as alternative criteria for success.

[23] Giavazzi, Japelli and Pagano (2000) find a non-linear effect related to the size and persistence of the impulse. Non-linearities are particularly apparent for the case of increases in net taxes and during fiscal contractions.

[24] Alesina, Perotti and Tavares (1998) have confirmed these results.

[25] All the above-mentioned papers explain the diverging effects with differences in credibility. Higher credibility is associated to stronger positive private sector response.

neither the level nor the rates of increase in public debt are good predictor of non-linear responses.[26]

In this paper we use the empirical literature on fiscal adjustments to guide our research on the role of exchange rates in determining success. Our benchmark specification is:

$$\text{Success}(t) = \alpha + \beta_1 * \text{Exchange Rate}(t-1, t-2) + \beta_2 * \text{Level of Public Debt}(t-1) + \beta_3 * \text{Change in Primary Deficit}(t-2, t-1) + \beta_4 * \text{GDP growth}(t-1) + \beta_5 * \text{Change in Spending}(t) + \varepsilon(t)$$

where (t) refers to the time period and (t-1,t-2) refers to averages of the time periods. The main variable of interest is Exchange Rate (t-1, t-2), the growth in the exchange rate in the two years preceding the adjustment.[27] In Table 6 we present results for the sub-sample of fiscal adjustments, whereas Tables 7 and 8 will present results for the whole sample, including year and country dummies.

The control variables are:

- Level of Public Debt (t-1), that is, Government Net Financial Liabilities as percent of GDP in the year preceding adjustment;
- Change in Primary Deficit (t-2, t-1), the change in the primary deficit in the two years preceding adjustment;
- GDP growth (t-1), the rate of growth in real GDP the year before the adjustment;
- Change in Spending (t), the contemporaneous change in primary public spending, corrected for the business cycle.

The first two control variables capture the contention in the literature that in periods of fiscal distress fiscal adjustment are more likely to be persistent. The inclusion of GDP growth corrects for the phase of the business cycle at the time of the adjustment. The change in public expenditure during adjustment captures the so-called composition effect, the empirical fact that successful fiscal adjustments tend to rely on spending cuts rather than tax increases.

Table 5 displays the results for the impact of lagged money supply growth on the sample of adjustments. We use one and two-year lags of M1 and M2 monetary aggregates, with and without the basic controls, and 2 and 3 year definitions of success. The coefficient reported shows the change in the probability of success of an infinitesimal change in the independent variable, evaluated at the sample mean. Below the coefficient, we report robust standard errors and the *t*-statistic.[28] As can be verified, money supply

[26] Except in the case of developing countries and the rate of public debt accumulation.

[27] In Table 5, where the effect of lagged money supply changes on the success of adjustment is examined, we use changes in the monetary aggregates M1 and M2 instead of the exchange rate.

[28] Robust standard errors use the Huber/White/sandwich estimator of variance in place of the traditional estimators. This variance estimator produces consistent standard errors even if the residuals are heteroskedastic.

Table 5: Predicting Successful Adjustments - A Few Simple Specifications

	Money Supply M1	Money Supply M2
	2 Year Definition of Success	
	1 Year Lagged Exchange Rate	
Lagged Growth in Money Supply	0.00	0.0008
	0.004	0.006
	(0.00)	(0.13)
Number Observations	89	72
Log L	-58.68	-47.62
Pseudo R2	0.00	0.00
	2 Year Definition of Success	
	2 Year Lagged Exchange Rate	
Lagged Growth in Money Supply	-0.004	-0.005
	0.006	0.008
	(-0.62)	(-0.66)
Number Observations	88	70
Log L	-57.48	-45.95
Pseudo R2	0.00	0.00
	2 Year Definition of Success	
	2 Year Lagged Exchange Rate	
	With Controls	
Lagged Growth in Money Supply	0.001	-0.002
	0.007	0.01
	(0.21)	(-0.18)
Number Observations	71	56
Log L	-41.34	-33.73
Pseudo R2	0.11	0.09
	3 Year Definition of Success	
	2 Year Lagged Exchange Rate	
	With Controls	
Lagged Growth in Money Supply	-0.01	-0.02
	0.008	0.01
	(-1.51)	(-1.44)
Number Observations	71	56
Log L	-42.37	-34.95
Pseudo R2	0.13	0.08

Note: The coefficient is interpreted as the percentage change in the probability of the fiscal adjustment being a success for a 1 percent change in the independent variable. The standard error and the t-statistic are presented below the coefficient. The controls used are the rate of growth of real GDP and Gross National Public Debt as share of GDP a year before the fiscal adjustment; the total change in the public deficit in the 2 years before the adjustment and the contemporaneous change in primary public spending corrected for the cycle. The Lagged Change in Exchange Rate is the change in the exchange rate in the year before or the two-years before the adjustment, where a positive value denotes an appreciation. * and ** indicate a significant coefficient respectively at the 10 % and the 5 % confidence levels.

never comes out as a significant predictor of success. With the exception of the last specification presented, the *t*-statistics are unusually small so that the evidence is overwhelming that money supply does not matter for success. In the last specification, which uses the 2-year lag of money supply, with controls and the 3-year definition of success, money supply becomes more important but remains non-significant. The negative sign indicates that, if anything, monetary expansion diminishes rather than increase the probability of success. Nevertheless, the small size of the coefficient in this and the other specifications confirms that money supply is not a key variable in determining success.

In Table 6 we follow the same procedure and specification to examine the impact of exchange rates on success, examining both nominal and real exchange rates, different lags of the exchange rate (one year and two year),[29] different definitions of success (two and three years following the adjustment), with and without additional controls.[30] For each variable we present the percentage point change in the density function of a 1 percent change in the right-hand side variable. As can be easily verified, the lagged growth in the exchange rate is a robust predictor of success in fiscal adjustments. This is true for all three exchange rates considered, independently of whether we use nominal or real exchange rates (compare first three versus last three columns). The coefficient on the exchange rate remains significant or close to significant irrespective of the lag used (first two sets of results), the addition of controls (second and third sets of results) and the definition of success (third and fourth sets of results). The only cases of significance below the usual degree of confidence of 10 percent are the nominal effective and real effective exchange rates when the 3-year definition of success is used. Overall, the results are stronger for changes in real as opposed to nominal exchange rates.

The negative sign on the Lagged Growth of the Exchange Rate indicates that an appreciation before a fiscal contraction is associated with lower persistence. The size of the coefficient, ranging from 1.3 to 2.6 for the effective exchange rate, indicates that a 1 percent average depreciation in the years preceding fiscal adjustment leads to roughly 2 percent higher probability of success. In our sample, the standard deviations of the nominal and real exchange rate depreciations before an adjustment is 5.55 and 5.72, respectively. Therefore, a one standard deviation increase in the rate of depreciation before an adjustment leads to an 11 percent higher chance of success. Depreciation has a statistically and economically significant impact on the persistence of fiscal adjustments.

Tables 7 and 8 present results for the whole sample and for EMU countries, respectively. The results are robust and consistent with those in Table 5 so that the coefficient on the exchange rate is negative throughout and significant or close to significant. Remarkably, these results hold also for the US$ and DM exchange rates, which are not reported here for reasons of parsimony. In Table 7, the coefficient is significant at the 10% level for the sub-sample of adjustments but becomes highly

[29] In all specifications, we used the second and third years of multi-year adjustments, appropriately defining success for those years. We find that the results are weakened when only single year adjustments are considered. However, throughout the specifications, the coefficient on the exchange rate variable is negative and close to significance.

[30] The coefficient and its significance for the control variables is not presented in Table 6 for lack of space. These results are presented for the specifications in Tables 7 and 8 below.

Table 6: Predicting Successful Adjustments - A Few Simple Specifications

	Nominal Exchange Rate			Real Exchange Rate		
	Effective	**Deutsche Mark**	**US Dollar**	**Effective**	**Deutsche Mark**	**US Dollar**
	2 Year Definition of Success					
	1 Year Lagged Exchange Rate					
Lagged Growth of Exchange Rate	-1.65**	-2.04**	-0.72**	-1.63**	-2.80**	-0.80**
	0.83	0.79	0.38	0.90	0.78	0.42
	(-1.97)	(-2.53)	(-1.89)	(-1.79)	(-3.53)	(-1.91)
Number Observations	96	98	95	62	98	95
Log L	-61.06	-59.84	-61.76	-37.94	-57.76	-61.71
Pseudo R2	0.04	0.08	0.03	0.04	0.11	0.03
	2 Year Definition of Success					
	2 Year Lagged Exchange Rate					
Lagged Growth of Exchange Rate	-2.46**	-2.23**	-1.37**	-2.65**	-2.08**	-1.67**
	1.09	0.91	0.49	0.82	0.87	0.56
	(-2.23)	(-2.43)	(-2.78)	(-3.25)	(-2.37)	(-3.00)
Number Observations	95	98	95	58	96	95
Log L	-59.17	-61.24	-59.45	-60.26	-61.25	-58.64
Pseudo R2	0.05	0.06	0.06	0.08	0.07	0.08
	2 Year Definition of Success					
	2 Year Lagged Exchange Rate					
	With Controls					
Lagged Growth of Exchange Rate	-1.83*	-1.80*	-1.06**	-2.22*	-2.43**	-1.24**
	1.16	0.95	0.54	1.38	0.88	0.61
	(-1.56)	(-1.88)	(-1.93)	(-1.62)	(-2.77)	(-2.04)
Number Observations	76	76	75	53	76	75
Log L	-43.02	-42.62	-42.40	-29.79	-41.67	-42.25
Pseudo R2	0.13	0.14	0.13	0.12	0.16	0.14
	3 Year Definition of Success					
	2 Year Lagged Exchange Rate					
	With Controls					
Lagged Growth of Exchange Rate	-1.29	-1.33	-1.26**	-2.42*	-2.61**	-1.97**
	1.09	0.95	0.60	1.32	1.00	0.67
	(-1.18)	(-1.40)	(-2.09)	(-1.82)	(-2.59)	(-2.92)
Number Observations	76	76	75	53	76	75
Log L	-45.91	-45.66	-43.96	-28.53	-43.58	-41.91
Pseudo R2	0.12	0.12	0.14	0.22	0.16	0.18

Note: The coefficient is interpreted as the percentage change in the probability of the fiscal adjustment being a success for a 1 percent change in the independent variable. The standard error and the t-statistic are presented below the coefficient. The controls used are the rate of growth of real GDP and Gross National Public Debt as share of GDP a year before the fiscal adjustment; the total change in the public deficit in the 2 years before the adjustment and the contemporaneous change in primary public spending corrected for the cycle. The Lagged Change in Exchange Rate is the change in the exchange rate in the year before or the two-years before the adjustment, where a positive value denotes an appreciation. * and ** indicate a significant coefficient respectively at the 10 % and the 5 % confidence levels. For the whole sample, with year and/or country dummies, the number of observations varies since years and countries for which there is no variance in the outcome are discarded. Thus, the sample includes years and countries for which there are both successful and non-successful adjustments.

significant for the whole sample. The size of the coefficient indicates that a one percent depreciation leads to almost 2 percent higher chances of success in cutting the deficit. The significance of the coefficients on nominal and real exchange rate depreciation increases as country and year dummies are added. This is encouraging, as country and year effects explain a good deal of adjustment persistence.[31]

As to other controls, the coefficient on the lagged change in the primary deficit comes out as positive and significant, indicating that a sharper deterioration in fiscal status makes it more likely that the fiscal adjustment will stop the increase in the deficit. In contrast, the level of public debt before the adjustment tends to come out as non-significant (the exception is the full sample with both year and country dummies). The coefficient on lagged GDP growth is not significant for the most part. The corrected change in public spending, on the other hand, affects the likelihood of success in a strong and significant way. A one-percent change in spending increases the chances of success by 10 percent. A comparison of the standard deviations of effective exchange rate changes and changes in corrected spending, respectively 5.5 and 1.25 percent, indicates that composition and exchange rate depreciation have quantitatively similar impacts on the probability of success. The value of the log of the maximum likelihood function indicates that the effective real exchange rate is a better predictor of success than its nominal counterpart. The larger size and significance of the coefficient on the real exchange rate, the decreased significance of the coefficients on fiscal status and size of the spending cut, all suggest that the real exchange rate is the key variable in explaining persistence.

Table 8 presents similar results for the Economic and Monetary Union (EMU). The issue analyzed in this paper is particularly important for EMU member countries, which have just abolished cross-country currency fluctuations by fixing the bilateral exchange rates within their economic area, thus relinquishing control of the exchange rate vis-à-vis their main trading partners. Even if for the sub-sample of adjustments in the EMU (with small sample sizes) the coefficient on the exchange rate is not significant, its sign indicates that a depreciation is correlated with increased likelihood of success. Moreover, all right-hand side variables lose significance in the case of EMU, even the lagged change in the deficit and the contemporaneous change in public spending. These results are sensitive to the use of a 3-year definition of success, as well as to the exclusion of the control variables.[32].

The main conclusion is that all evidence suggests that exchange rate depreciations before fiscal adjustments increase their persistence. The impact of depreciation on success is quantitatively significant and consistent with the case-study evidence presented in Section 3 above, as well as the priors expressed in the empirical literature on fiscal adjustments.

[31] Other variables also tend to gain significance in the specification with country and year dummies, suggesting this is a sensible specification and should be taken as a benchmark.

[32] We also have used one-year lags of exchange rate changes. The results for the whole sample of countries are robust to this definition of lagged exchange rate change. For the sample of EMU countries, the qualitative results remain but their significance is weakened.

Table 7: Predicting Successful Adjustments
All observations - Effective Exchange Rate

	Nominal Exchange Rate				Real Exchange Rate			
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
Lagged GDP Growth	-0.01	2.41**	0.14	2.86**	-3.07	1.59	0.88	3.73
	2.40	1.26	0.66	1.52	3.92	1.86	1.22	2.85
	(0.00)	(1.96)	(0.21)	(1.91)	(-0.78)	(0.87)	(0.73)	(1.30)
Lagged Debt Level	0.14	-0.02	0.24**	0.86**	-0.05	-0.06	0.14	0.69**
	0.13	0.06	0.09	0.27	0.17	0.07	0.15	0.33
	(1.10)	(-0.31)	(2.81)	(3.30)	(-0.27)	(-0.78)	(1.00)	(2.14)
Lagged Change in Deficit	4.31**	1.81*	1.39**	4.12**	3.29	1.39	0.89	4.10**
	2.13	1.07	0.58	1.39	2.46	1.32	0.76	1.69
	(2.02)	(1.74)	(2.60)	(3.22)	(1.32)	(1.07)	(1.19)	(2.56)
Change in Public Spending	-10.52**	-10.70**	-4.68**	-10.03**	-1.41	-5.72*	-5.56**	-8.96**
	5.25	2.41	1.31	2.75	6.74	2.97	2.00	3.96
	(-2.02)	(-3.94)	(-3.68)	(-3.54)	(-0.21)	(-1.82)	(-2.68)	(-2.15)
Lagged Growth Exchange Rate	-1.83*	-1.91**	-1.16**	-1.95**	-2.23*	-1.64**	-1.33**	-2.19**
	1.16	0.43	0.26	0.61	1.38	0.44	0.35	0.68
	(-1.56)	(-4.56)	(-4.07)	(-3.30)	(-1.62)	(-3.75)	(-3.60)	(-3.25)
Year Dummies	No	Yes	No	Yes	No	Yes	No	Yes
Country Dummies	No	No	Yes	Yes	No	No	Yes	Yes
Nr Observations	76	248	374	216	53	198	222	142
Log L	-43.02	-91.06	-110.72	-73.25	-29.79	-74.54	-76.69	-50.63
Pseudo R2	0.13	0.26	0.24	0.37	0.12	0.19	0.21	0.36
Predicted P	0.64	0.20	0.13	0.23	0.66	0.18	0.16	0.25
Actual P	0.66	0.13	0.07	0.13	0.69	0.12	0.10	0.15

Note: The coefficient is interpreted as the percentage change in the probability of the fiscal adjustment being a success for a 1 percent change in the independent variable. The standard error and the t-statistic are presented below the coefficient. Lagged Growth GDP is the rate of growth of real GDP and Lagged Debt Level is the Gross National Public Debt as a share of GDP, both measured one year before the fiscal adjustment; Lagged Change in Deficit is the total change in the public deficit in the 2 years before the adjustment (a positive value denotes an increase in the deficit); the Change in Public Spending is the contemporaneous change in primary public spending corrected for the cycle; the Lagged Change in Exchange Rate is the average change in the exchange rate (a positive value denotes an appreciation). * and ** indicate a significant coefficient respectively at the 10 % and the 5 % confidence levels.

Table 8: Predicting Successful Adjustments
EMU Countries Sample - Effective Exchange Rate

	Nominal Exchange Rate				Real Exchange Rate			
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
Lagged GDP Growth	-1.97	0.64	-0.68	-1.68	-10.89**	-1.01	-0.79	0.64
	2.86	1.50	0.84	1.61	5.23	2.74	1.22	1.50
	(-0.69)	(0.43)	(-0.81)	(-1.04)	(-2.00)	(-0.37)	(-0.63)	(0.43)
Lagged Debt Level	0.31*	0.03	0.12	0.19	-0.33	-0.04	0.18	0.03
	0.21	0.10	0.13	0.38	0.28	0.08	0.19	0.10
	(1.52)	(0.29)	(0.93)	(0.51)	(-1.14)	(-0.46)	(0.97)	(0.29)
Lagged Change in Deficit	5.20	3.85	1.56	6.67**	-1.49	1.21	-0.54	3.85*
	4.48	2.28	1.08	2.41	5.48	2.22	1.20	2.28
	(1.18)	(1.48)	(1.48)	(2.66)	(-0.27)	(0.52)	(-0.44)	(1.48)
Change in Public Spending	-3.58	-7.06**	-3.10*	-8.26**	19.64**	4.91	0.26	-7.06**
	7.04	3.09	1.58	3.87	8.56	3.59	2.51	3.09
	(-0.51)	(-2.07)	(-1.86)	(-2.13)	(2.18)	(1.44)	(0.11)	(-2.07)
Lagged Growth Exchange Rate	-1.98	-2.25**	-0.68**	-2.51**	-5.72**	-2.71**	-1.50**	-2.25**
	1.63	0.62	0.40	1.13	2.60	0.87	0.52	0.62
	(-1.22)	(-3.34)	(-1.62)	(-2.20)	(-2.18)	(-2.86)	(-2.91)	(-3.34)
Year Dummies	No	Yes	No	Yes	No	Yes	No	Yes
Country Dummies	No	No	Yes	Yes	No	No	Yes	Yes
Nr Observations	39	133	200	107	26	98	121	65
Log L	-22.57	-48.48	-60.00	-39.08	-12.74	-33.14	-37.93	-25.16
Pseudo R2	0.14	0.21	0.16	0.30	0.28	0.21	0.16	0.28
Predicted P	0.59	0.17	0.12	0.21	0.58	0.15	0.12	0.23
Actual P	0.61	0.12	0.08	0.14	0.66	0.10	0.08	0.15

Note: The coefficient is interpreted as the percentage change in the probability of the fiscal adjustment being a success for a 1 percent change in the independent variable. The standard error and the t-statistic are presented below the coefficient. Lagged Growth GDP is the rate of growth of real GDP and Lagged Debt Level is the Gross National Public Debt as a share of GDP, both measured one year before the fiscal adjustment; Lagged Change in Deficit is the total change in the public deficit in the 2 years before the adjustment (a positive value denotes an increase in the deficit); the Change in Public Spending is the contemporaneous change in primary public spending corrected for the cycle; the Lagged Change in Exchange Rate is the average change in the exchange rate (a positive value denotes an appreciation). * and ** indicate a significant coefficient respectively at the 10 % and the 5 % confidence levels.

5 Theoretical Framework and Implications for EMU

The stylized facts of successful and unsuccessful adjustments in OECD economies can be summarized as follows. Large nominal and real exchange rate devaluations precede successful adjustments. During a successful adjustment, investment increases and the current account improves somewhat; after a successful adjustment, nominal and real interest rates fall and inflation declines. As for money growth, the evidence indicates that very little happens before and during a successful adjustment; the only action comes from a reduction in the growth of deposits after the successful adjustment is finished. Before unsuccessful adjustments M2 grows faster than it did on average before the adjustment. We briefly describe a theoretical framework that encompasses the stylized facts described above.

Consider a small open economy inhabited by infinitely lived agents who face a cash-in-advance constraint: in order to purchase goods at time *t,* agents must acquire currency in period *t-1* sufficient to cover all consumption purchases. Each agent is a producer and a consumer at the same time and she values private but not public consumption. There is a central bank, that controls monetary policy by choosing the rate of monetary growth, and a government that controls fiscal policy by choosing public spending and tax revenues. Seignorage is one of the revenue sources in the government budget constraint: a primary deficit can be financed by issuing bonds or by printing money or by a combination of the two.

Suppose the government runs budget deficits and a goal-dependent central bank partially finances them by raising money growth. In this setting, people anticipate that future inflation will be high, causing nominal interest rates to rise. With a cash-in-advance constraint, high nominal interest rates imply a high opportunity cost of holding money, hence low consumption and production.

Suppose now the government announces a fiscal adjustment consisting of a permanent reduction of public spending. At the same time, the central bank pegs its exchange rate to a low-inflation currency and announces that its goal is to maintain the peg. When pegging the domestic currency, the central bank chooses the parity that can lead to depreciation or appreciation of the exchange rate. With a fraction of domestic prices already set in the short run, a nominal depreciation implies real exchange rate depreciation in the short run. These policies affect the economy in several ways. Provided the central bank is really goal-independent and wants to maintain the new parity, by choosing a visible nominal anchor such as the exchange rate, the credibility of the program can be established more strongly and quickly. By refraining to devalue the exchange rate, the central bank effectively transfers the control of its monetary policy to that of the low-inflation country it has pegged its currency to. Hence, the central bank will not be able to generate seignorage according to government demand. Public debt, especially if high, constrains the government and forces it to cut primary deficits. In other words, if deficits cannot be monetized, the government has no choice but make its ends meet. As current and expected future inflation fall, both nominal and real interest rates also fall and affect the economy in two ways. First, as the opportunity cost of holding

money is lower, private agents consume more; hence, output also increases. Second, investment goes up because the cost of borrowing is lower and consumption demand is higher. Higher consumption and investment in capital, coupled with the fact that production cannot increase much in the short run (because capital has to be sunk in one period before), lead to a current account deficit. On the other hand, a real exchange rate depreciation, because of sticky prices, leads to an improvement of the current account. The final effect on the current account depends on which of the two effects prevails.

What are the implications of our results for EMU? The EMU has substantially altered the conduct of monetary policy in Europe by creating a common currency and a European Central Bank. Among the most conspicuous changes in the policy-making framework in Europe are the fiscal mandates stipulated by the Pact for Stability and Growth that accompany the monetary agreement.[33] The institutional setting is thus characterized by centralization of monetary policy while, in the fiscal sphere, national autonomy is kept within the constraints dictated by the Pact. More formally, fiscal budget deficits are mandated to be below 3% of GDP, to be exceeded only in case of deep recessions, i.e. real GDP growth rates below –2% or, with the concurrence of the Council of Ministers, below –0.75%. Countries with an excessive deficit that cannot be justified are subject to mandatory deposits and fines if this fiscal excess is not corrected in two years.

The combination of centralized monetary and decentralized, but constrained, fiscal policy-making raises two questions, the second of which relates directly to our paper. The first is whether countries are more or less likely to incur deficits in a monetary union. On one side, the loss of monetary autonomy may increase the use of fiscal policy to respond to asymmetric output shocks. Both factor and product market integration and the statutory limits above effectively limit fiscal autonomy.[34] Governments are likely to be constrained by the diminished capacity to raise taxes due to increasing factor (namely capital) mobility. In the past, governments in Europe have been able to place a substantial part of their debt with their private banks; this situation may change in the future. Moreover, lower seigniorage revenues harden the fiscal budget constraint on the fiscal authority, even though seignorage revenues are typically small in OECD economies.

The second question, which is of special interest to us, is whether EMU countries with excessive deficits are in a better position to correct those deficits than before EMU. Our paper suggests they are not. As currency devaluation has been shown to accompany successful, i.e. persistent, fiscal adjustments, it will be harder for individual countries to correct fiscal imbalances in the EMU, which holds fixed the parities with the major trading partners.

Eichegreen and Wyplosz (1998) look at the major recession in OECD countries and find only seven instances of countries with deficits in excess of 3 percent of GDP in the

[33] For an overview of the history and the political and economic rationale of monetary unification in Europe see Eichengreen (1993).

[34] Obstfeld (1999) has underlined how fiscal and monetary policy will likely be more intertwined after monetary union. “It is hard to believe that the Euro-11 club of EMU finance ministers will refrain from forceful comment on ECB policy, including but not limited to exchange-rate developments. In its turn, the ECB will surely weigh in on fiscal matters.

period 1955-96. By examining the growth rate of GDP and the behavior of the budget deficit, they indicate that these are "snap" recessions in that real GDP growth is negative only for the year of recession and positive in all years immediately before and after. In contrast, the budget deficit increases dramatically in the recession year and stays at values higher than 3 percent of GDP for at least 3 years thereafter. This suggests that, even though instances of exceeding the EMU deficit limits will be rare, if they occur, they are likely to require discretionary fiscal policy measures. In this context, the abandonment of the exchange rate as a policy instrument is an important loss, given its significant impact on the persistence of the adjustment. Further evidence that EMU countries will find it more difficult to undertake successful adjustments is given in Obstfeld (1999). Obstfeld shows that most recent adjustments within the EMU are relying on tax increases (sometimes temporary) and not on spending cuts, suggesting they may not be sustainable. In fact, even the European Monetary Institute has expressed reservations about the persistence of the fiscal adjustments undertaken in the build-up to monetary union.

6 Conclusions

There is a large literature on the determinants of successful fiscal adjustments and their impact on output. These works have looked at fiscal policy alone, without considering the role of monetary and exchange rate policies. This paper characterizes monetary and exchange-rate policies during successful and unsuccessful adjustments and studies their role in determining the success of a fiscal adjustment.

The results emerging from our empirical analysis for the OECD economies over the period 1970 to 1998 can be summarized as follows. First, large nominal and especially real exchange rate depreciations precede successful adjustments, whereas unsuccessful adjustments are usually preceded by revaluations and followed by depreciations. Second, nominal and real exchange rate depreciations are quantitatively important in predicting success for fiscal adjustments: a 1 percent average depreciation in the years preceding fiscal adjustment leads to a roughly 2 percent increase in the probability of success. When compared to the composition of the fiscal adjustment, namely a measure of how much the adjustment relies on cutting spending versus raising tax revenues, we find that the two variables have similar impacts on the probability of success. Third, monetary policy does not play a significant role in successful adjustments. There is evidence that monetary policy is sharply contracted during and expanded after unsuccessful adjustments; as for successful adjustments, however, monetary policy simply does not change much, with the exception of a contraction in the growth of M2-M1 following a successful adjustment.

These findings have important implications for the EMU. Some EMU members still have high public debt to GDP ratios that require large interest rate payments and make the fiscal constraints dictated by the Pact for Stability and Growth binding on them. Hence, they need to undertake further fiscal adjustments. Our results suggest that a successful adjustment within EMU will be more "costly" than they used to be outside EMU, when countries could still devalue their exchange rates. To achieve a permanent improvement of its fiscal position, an EMU member must rely entirely on the size and composition of its fiscal reform.

This work is a first step toward an understanding of the role of monetary and exchange rate policies during fiscal consolidations. Future work will hopefully shed light on the channels through which exchange rate changes affect the success of a fiscal adjustment and their quantitative importance.

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Appendix I: Data Sources

GDP- Source: OECD Economic Outlook. **Definition:** Growth rate of real GDP, computed as the difference between the value in the current year minus the value one year before, divided by the value the year before.**Unit:** Percentage points.

Consumption - Source: OECD Economic Outlook. **Definition:** Growth rate of real private consumption, computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

Current Account - Source: OECD Economic Outlook. **Definition:** Change in the current account balance as a share of GDP between the current and last year. A positive sign indicates an increase in surplus or a decrease in the deficit. **Unit:** Percentage points.

Housing Investment - Source: OECD Economic Outlook. **Definition:** Growth rate of real investment in housing, computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

Business Investment - Source: OECD Economic Outlook. **Definition:** Growth rate of real business investment, computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

Total Investment - Source: OECD Economic Outlook. **Definition:** Growth rate of real total investment, computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

Nominal Effective - Source: OECD Economic Outlook. **Definition:** Growth rate of the nominal effective exchange rate, defined as the difference between the value in the current year minus the value one year before, divided by the value the year before. A positive value denotes an appreciation of the country's currency. **Unit:** Percentage points.

Nominal Deutsche Mark - Source: OECD Economic Outlook. **Definition:** Growth rate of the nominal exchange rate against the Deutsche Mark, defined as the difference between the value in the current year minus the value one year before, divided by the value the year before. The exchange rate versus the Deutsche Mark was computed using the each currency's exchange rate against the United States Dollar and the US Dollar/Deutsche Mark exchange rate. A positive value denotes an appreciation of the country's currency. **Unit:** Percentage points.

Nominal US Dollar - Source: OECD Economic Outlook **Definition:** Growth rate of the nominal exchange rate against the United States Dollar, defined as the difference between the value in the current year minus the value one year before, divided by the value the year before. A positive value denotes an appreciation of the country's currency. **Unit:** Percentage points.

Real Effective - Source: OECD Economic Outlook. **Definition:** Growth rate of the real effective exchange rate, defined as the difference between the value in the current year minus the value one year before, divided by the value the year before. A positive value denotes an appreciation of the country's currency. **Unit:** Percentage points.
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Real Deutsche Mark - Source: OECD Economic Outlook. **Definition:** Growth rate of the real exchange rate versus the Deutsche Mark, defined as the growth of the nominal exchange rate against the Deutsche Mark plus the growth in the Consumer Price Index (CPI) at home minus the growth of the Consumer Price Index in Germany. A positive value denotes an appreciation of the country's currency. **Unit:** Percentage points.

Real US Dollar - Source: OECD Economic Outlook. **Definition:** Growth rate of the real exchange rate versus the US Dollar, defined as the growth of the nominal exchange rate against the US Dollar plus the growth in the Consumer Price Index (CPI) at home minus the growth of the Consumer Price Index in the United States. A positive value denotes an appreciation of the country's currency. **Unit:** Percentage points.

M1 - Source: IMF International Financial Statistics. **Definition:** Growth rate of M1 monetary aggregate computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

M2 - Source: IMF International Financial Statistics. **Definition:** Growth rate of M2 monetary aggregate computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

M2 – M1 - Source: IMF International Financial Statistics. **Definition:** Growth rate of the difference between M2 and M1 monetary aggregates, computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

Inflation - Source: IMF International Financial Statistics. **Definition:** Growth rate of the Consumer Price Index computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

Nominal Short Interest Rate - Source: OECD Economic Outlook. **Definition:** Growth rate of the short-term nominal interest rate computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

Nominal Long Interest Rate - Source: OECD Economic Outlook. **Definition:** Growth rate of the long-term nominal interest rate computed as the difference between the value in the current year minus the value one year before, divided by the value the year before. **Unit:** Percentage points.

Real Short Interest Rate - Source: OECD Economic Outlook. **Definition:** Growth rate of the short-term real interest rate computed as the difference between the growth in the short-term nominal interest rate and the rate of inflation. **Unit:** Percentage points.

Real Long Interest Rate - Source: OECD Economic Outlook. **Definition:** Growth rate of the long-term real interest rate computed as the difference between the growth in the long-term nominal interest rate and the rate of inflation. **Unit:** Percentage points.

Lagged Debt Level - Source: OECD Economic Outlook. **Definition:** Government Net Financial Liabilities as a Share of Gross Domestic Product one year before the fiscal adjustment. **Unit:** Percentage points.

Lagged Change in Deficit - Source: OECD Economic Outlook. **Definition:** Total change in the primary deficit as a share of Gross Domestic product in the two years before the fiscal adjustment. A positive value indicates an increase in the public deficit. **Unit:** Percentage points.

Change in Public Spending - Source: OECD Economic Outlook. **Definition:** Change, corrected for the business cycle, in the level of primary spending as a share of GDP in the year of the fiscal adjustment. **Unit:** Percentage points.

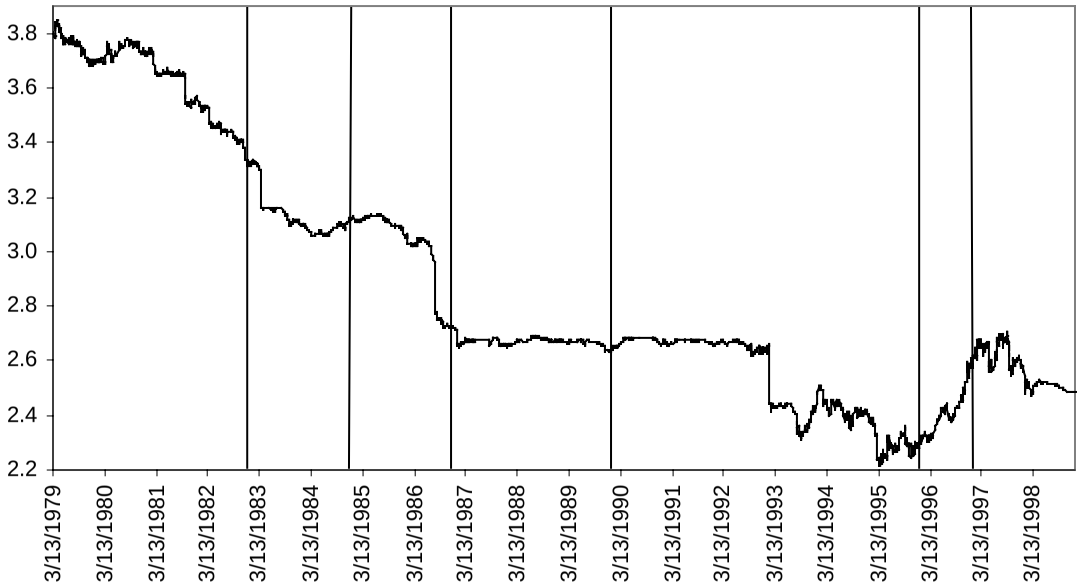

Figure 1: DM/Irish Pound nominal exchange rate

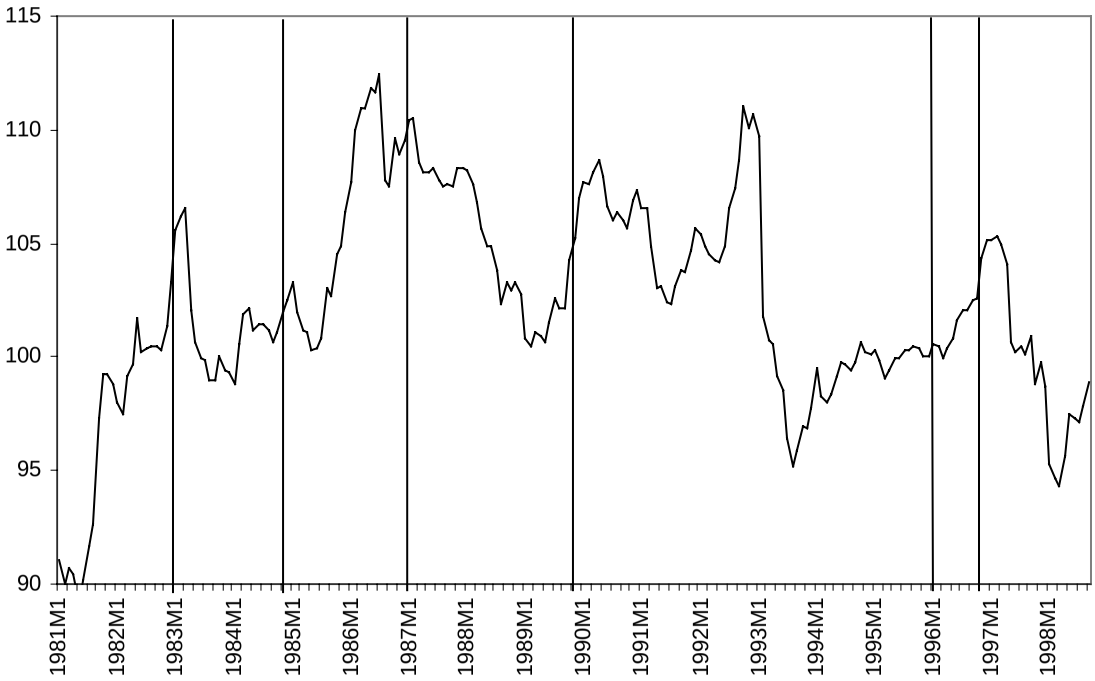

Figure 2: Irish real effective exchange rate

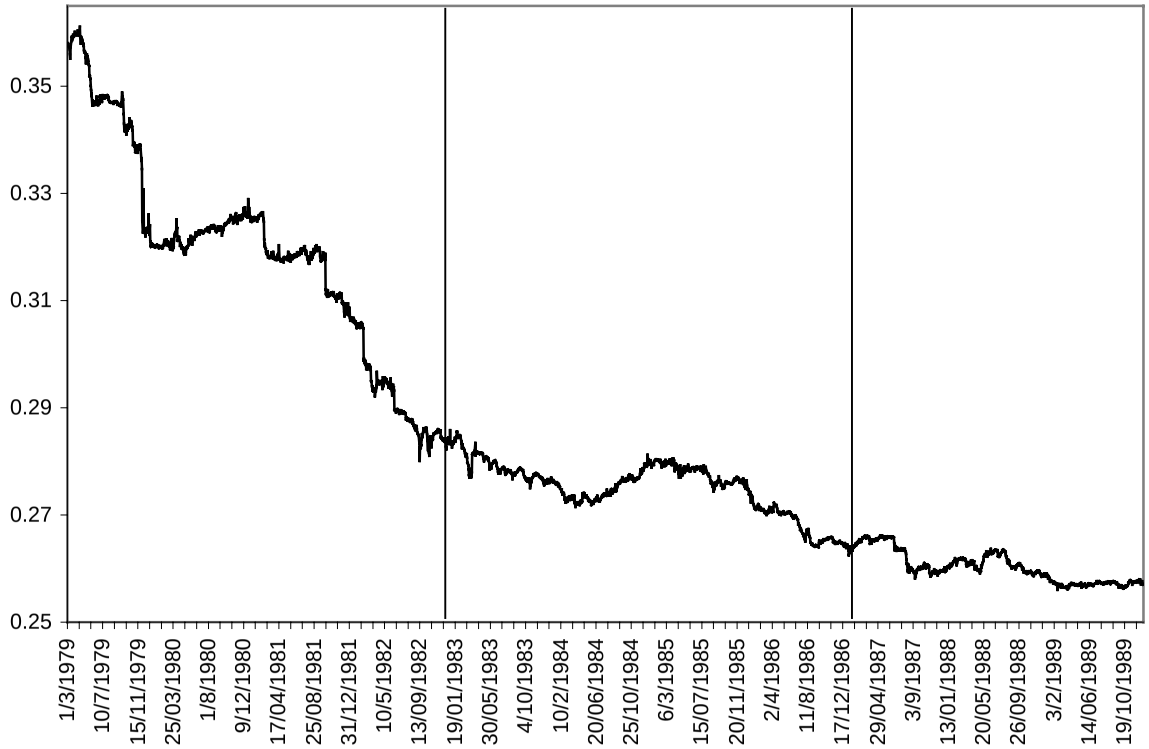

Figure 3: DM/Danish Krona nominal exchange rate

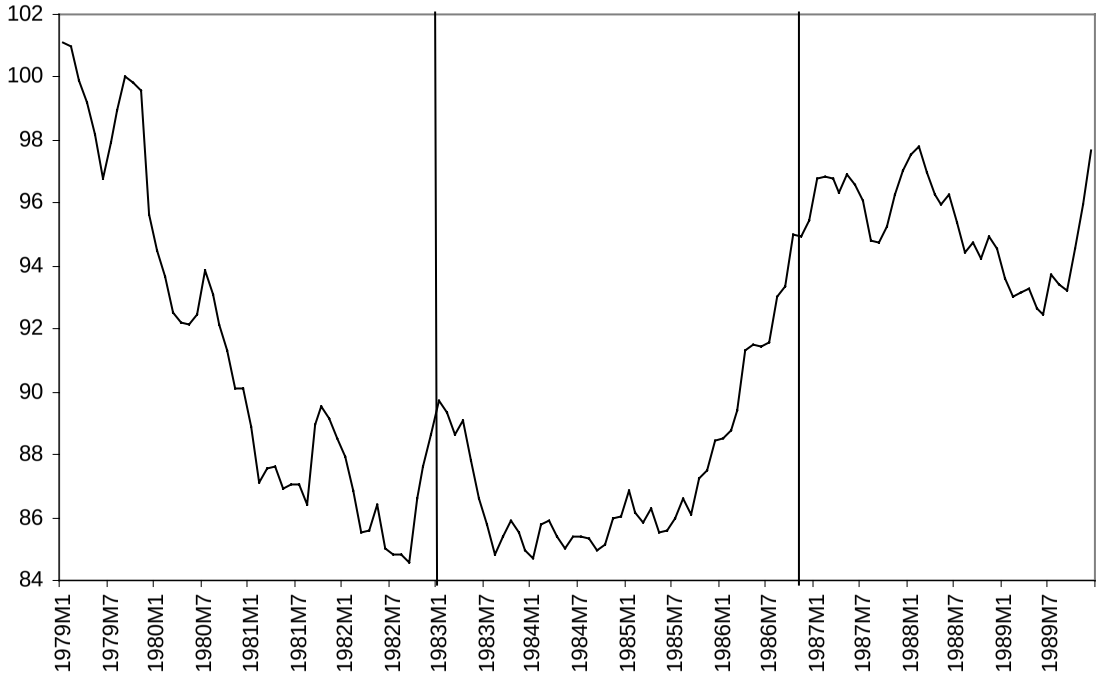

Figure 4: Danish real effective exchange rate

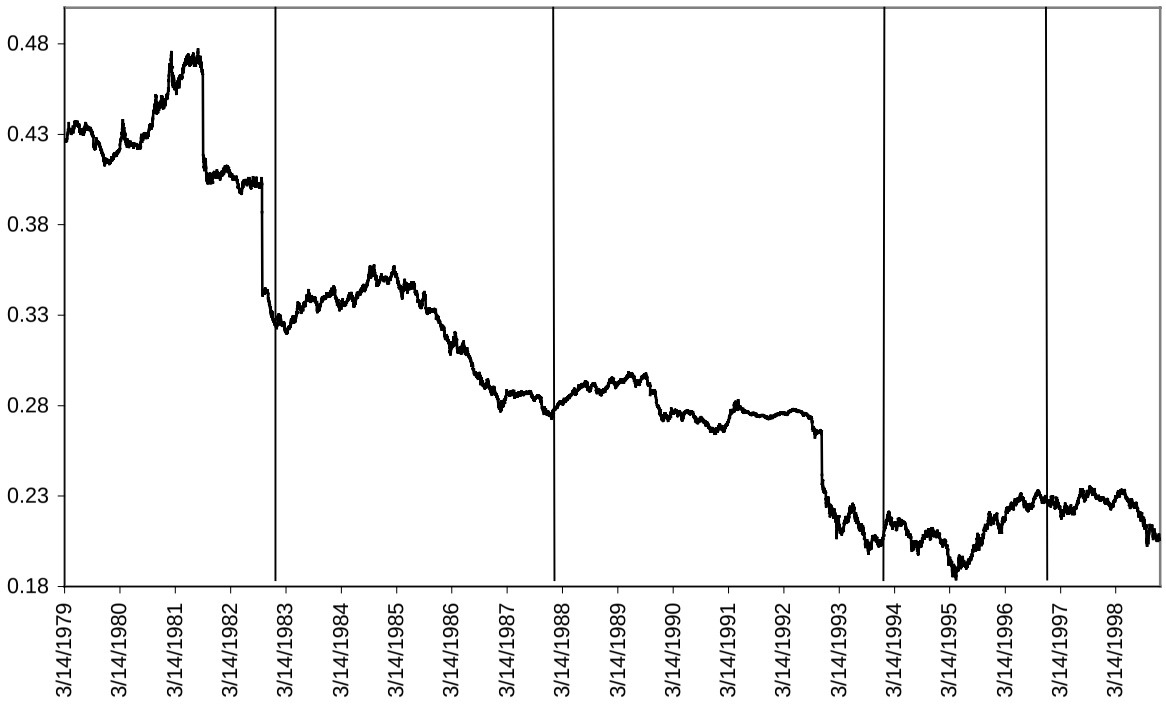

Figure 5: DM/Swedish Krona nominal exchange rate

Figure 6: Swedish real effective exchange rate

Figure 7
Investment Growth and Fiscal Adjustments

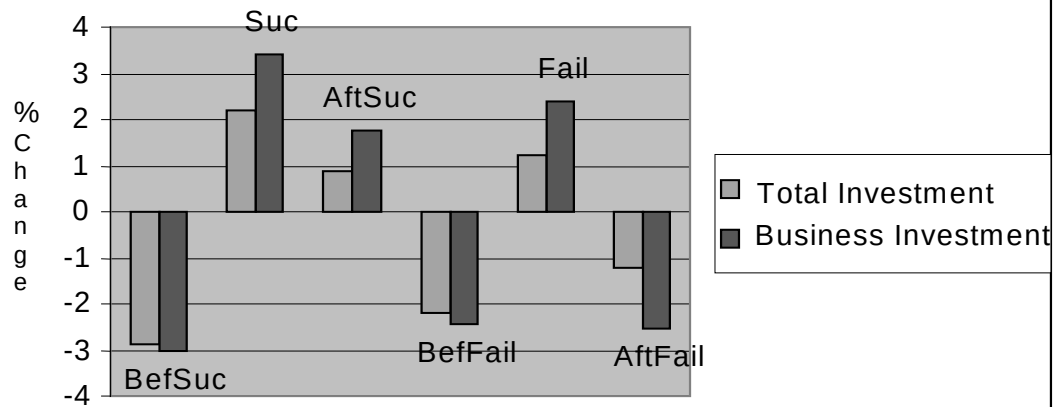

Figure 8
GDP Growth and the Current Account in Fiscal Adjustments

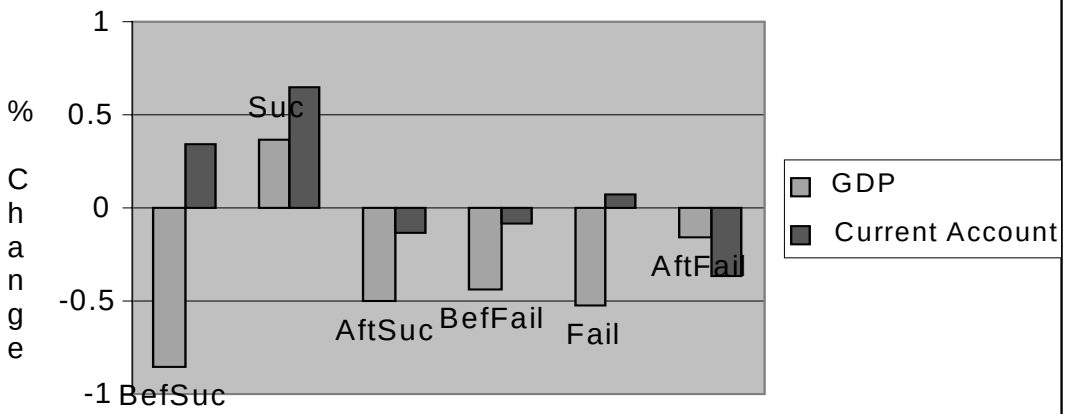

Figure 9
Effective Exchange Rates and Fiscal Adjustments

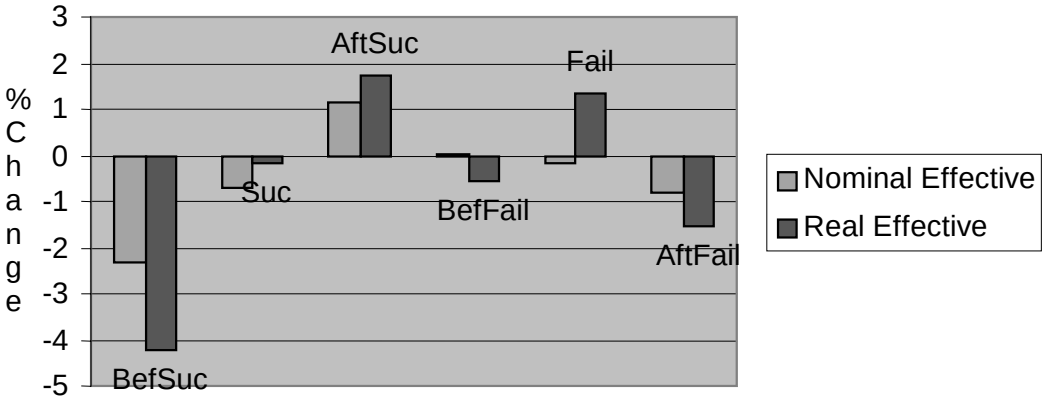

Figure 10
Exchange Rate against the DM and Fiscal Adjustments

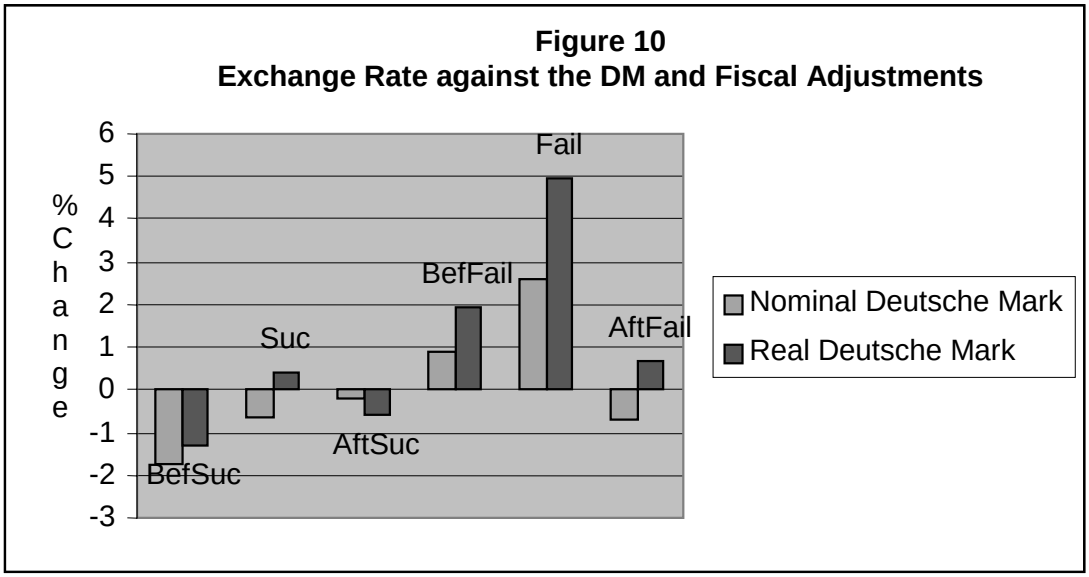

Figure 11
Exchange Rate against the US$ and Fiscal Adjustments

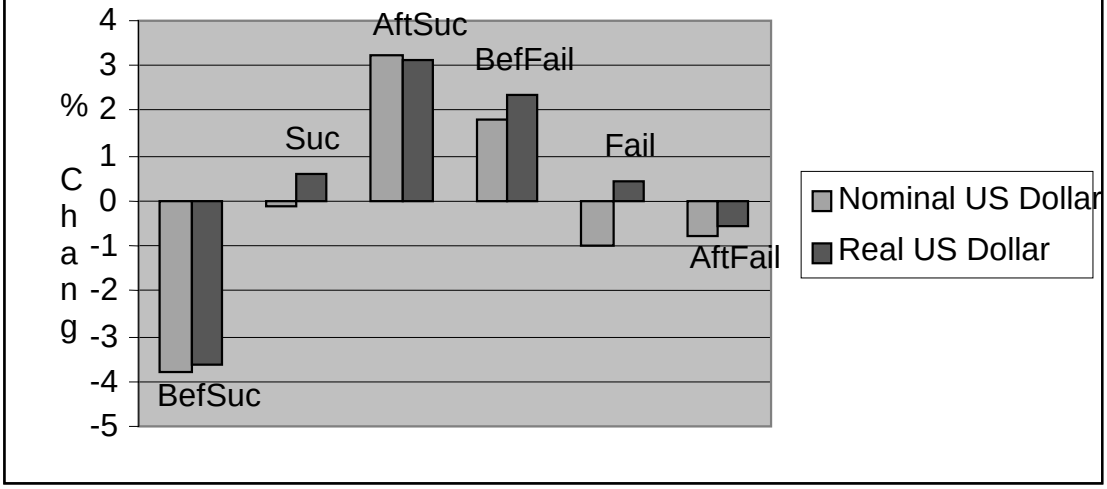

Figure 12
Money Supply and Fiscal Adjustments

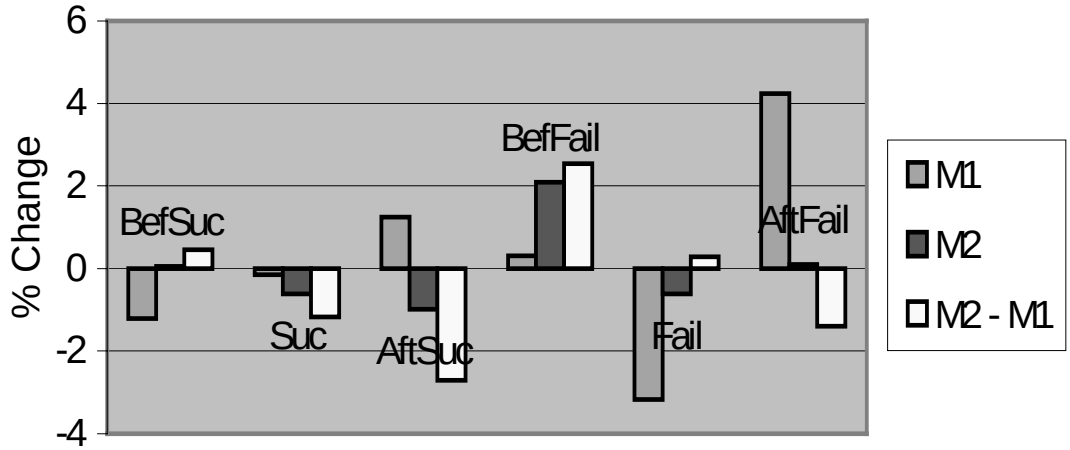

Figure 13
Inflation, Interest Rates and Fiscal Adjustments