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Effects of Fiscal Contractions: The Importance of Preceding Exchange Rate Movements

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Abstract

We examine the importance of exchange rate and money supply movements for the macroeconomic outcome of fiscal contractions and find: (i) contractions associated with a favorable macroeconomic outcome have been preceded by significantly higher real depreciations as compared to contractions associated with a less favorable macroeconomic outcome and (ii) contractions preceded by real depreciations improve expectations about future income and generate higher private consumption growth. We discuss policy implications for countries both outside and inside the EMU.

Keywords: Fiscal policy; fiscal contractions; exchange rate; money supply; EMU; panel data

JEL classification: *E*21; *E*63; *H*30

I. Introduction

The most renowned paper in the fiscal contraction literature is the seminal work by Giavazzi and Pagano (1990) who studied expansionary contractions in Denmark (1982–1986) and Ireland (1987–1989).[1] Basically, two lines of empirical research have emerged as regards finding the causes of success in terms of: (i) permanently reducing debt ratios and (ii) a favorable macro-

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[1]For related case studies, see e.g. Andersen (1994), Bergman and Hutchison (1996, 1999), Giavazzi and Pagano (1990) and Lambertini and Tavares (2000) for the Danish contraction in the early 1980s, Blanchard (1987), Fels and Froehlish (1987) and Hellwig and Neumann (1987) for the German contraction in the early 1980s and Barry (1991), Bradley and Whelan (1997), Dornbusch (1989) and Lambertini and Tavares (2000) for the two Irish contractions in the 1980s. Related studies of many countries have been carried out by e.g. Alesina and Ardagna (1998), Alesina and Perotti (1996a, 1996b), Ardagna (1999), Bergman and Hutchison (1999), Giavazzi, Jappelli and Pagano (1998), Giavazzi and Pagano (1996), Lambertini and Tavares (2000), McDermott and Wescott (1996), Perotti (1999) and Zaghini (1999).

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economic outcome. This paper addresses the second area. More specifically, we focus on the importance of exchange-rate and money-supply movements before and during the contractions. Lambertini and Tavares (2000) study these variables within the other line of empirical research (how should the debt ratio be permanently reduced).[2] They find that preceding depreciations are important in order to achieve a permanent reduction in the debt ratio whereas monetary changes are not.

The first reason for looking at exchange rates is that the noteworthy and successful contractions in Denmark and Ireland were preceded by depreciations. The second reason is that several papers have mentioned the potential importance of preceding exchange rate movements—without carrying out any statistical analysis.[3] Our aim is to remedy the lack of statistical analysis of the importance of changes in exchange rates (and the money supply) for the macroeconomic outcome of fiscal contractions using data for 19 OECD countries over the period 1970–1997.

We ask two questions in this paper. First, we test whether exchange-rate and money-supply movements before and during contraction periods are significantly different depending on the macroeconomic outcome (Section II). Successful contractions are found to be associated with significantly greater *preceding* real depreciations compared to less successful contractions, while money-supply growth *during* the contractions might also play a role.

The econometric part of the paper (Section III) asks a different—but related—question: do contraction periods preceded by real depreciations improve individuals' expectations about future income compared to contraction periods preceded by real appreciations? We estimate a structural consumption function that controls for the direct effects of e.g. fiscal, exchange-rate and money-supply movements. Contraction periods preceded by real depreciations are found to experience significantly higher private consumption growth compared to contraction periods preceded by real appreciations. The inclusion of money-supply growth makes no difference. We note that both neoclassical and Keynesian theoretical underpinnings can be used to explain these results. The findings that exchange-rate movements and (perhaps) money-supply growth matter for the macroeconomic outcome of fiscal contractions have some policy implications which are discussed in Section IV.

[2]Lambertini and Tavares (2000) and I have worked independently on the importance of preceding exchange rate movements; the contents of this article are based on my earlier papers; see Hjelm (1999, 2000).

[3]See e.g. Alesina and Perotti (1997), Barry (1991), Cardia (1994) and Giavazzi and Pagano (1990).

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II. Macroeconomic Outcome of Fiscal Contractions

We begin by defining *fiscal contraction*. We then evaluate the macroeconomic outcome and denote the contractions as *success*, *partial success* or *failure*. These three categories of fiscal contractions are then confronted with data on exchange-rate and money-supply movements (before and during the contractions), followed by a statistical evaluation as to whether there is any pattern.

Definition of Fiscal Contraction

The definitions in the literature differ in two important respects: the *size* and the *length* of the change in the deficit required in order for a period to be qualified as a "fiscal contraction period".[4] We use the same definition as in Giavazzi and Pagano (1996) because, to our knowledge, it is the strictest definition found in the literature.[5] The more strict the definition, the more severe the fiscal contraction and, probably, the greater the likelihood that individuals will notice and take action due to a fiscal contraction.[6]

Definition. A time point t is regarded as a *fiscal contraction point* if the cumulative decrease in the cyclically adjusted primary deficit as a percentage of potential GDP: (i) in four successive years including t exceeds 5 percent, (ii) in three successive years including t exceeds 4 percent, (iii) in two successive years including t exceeds 3 percent or (iv) in year t exceeds 3 percent. Table 1 displays the 23 contraction periods along with their macroeconomic outcome (to which we turn in the next section).[7] For example, the oft-cited contractions in Denmark, Germany and Ireland are all covered by this definition.

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[4]Most studies apply a definition that makes use of the change in the cyclically adjusted primary deficit as a percentage of (most often) potential GDP; see e.g. Bergman and Hutchison (1999), Giavazzi and Pagano (1996), Giavazzi *et al.* (1998), McDermott and Wescott (1996), Missale, Giavazzi and Benigno (1997) and Zaghini (1999). Alesina and Ardagna (1998), Alesina and Perotti (1996a, 1996b) and Ardagna (1999) do not use these variables when defining a fiscal contraction. Instead they adopt the Blanchard (1993) method for measuring changes in structural deficits. In brief, this method measures what the budget deficit would have been in a certain year if unemployment had not changed from the year before.

[5]The only difference is that Giavazzi and Pagano's (1996) study covers *both* fiscal expansions and contractions. Here we are only concerned with fiscal contractions.

[6]The following 19 OECD countries are included in the study: Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom, USA. The other OECD countries have been excluded due to lack of data on relevant variables.

[7]The definition also incorporates Portugal, 1980. However, this "contraction" is not included in Table 1 because a major part of the improvement was due to money received from the IMF. I owe this point to Lucio Vinhas de Souza.

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Table 1. *The macroeconomic outcome of fiscal contractions*

Contraction period	Cons.		Invest.		Exports		Unempl.	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
SUCCESS								
Canada 93–97	X	—	X	—	X	X	X	X
Denmark 83–87	—	X	X	X	—	—	X	X
Ireland 86–89	X	—	X	X	X	—	X	X
Italy 76–77	X	X	X	X	X	X	—	—
Spain 96–97	—	—	—	X	X	X	X	X
Sweden 84–87	—	X	X	X	—	X	X	X
Sweden 94–97	—	X	X	X	X	X	—	X
UK 94–97	X	X	X	X	—	X	X	X
PARTIAL SUCCESS								
Germany 82–83	—	—	X	—	X	—	—	—
Greece 86–87	—	—	—	—	X	X	X	X
Italy 91–93	—	—	—	—	X	—	X	—
Netherlands 91–93	X	—	—	—	—	—	X	—
Portugal 82–87	—	—	—	—	X	X	X	X
FAILURE								
Australia 86–88	—	—	—	—	—	X	—	X
Belgium 82–87	—	—	X	—	—	—	—	—
Belgium 93–94	—	—	—	—	—	—	—	—
Finland 75–76	—	—	X	—	—	—	—	—
Greece 82–83	—	—	—	—	—	—	—	—
Greece 90–97	—	—	X	—	—	—	—	—
Ireland 81–84	—	—	—	—	X	—	—	—
Italy 82–83	—	—	—	—	—	—	X	—
Italy 95–97	—	—	—	X	—	X	—	—
UK 79–82	—	—	—	—	—	—	—	—

Source: *OECD Economic Outlook*, various issues.
Notes: Cons. = private consumption growth, invest. = non-residential investment growth, exports = real export growth, unempl. = change in unemployment. Columns (1) report comparison with the OECD average during the contraction period and columns (2) with own averages during non-contraction periods. An X denotes that the average outcome of the focus country during the contraction period is better than OECD and own averages, respectively. An X in column (2) for unemployment implies that unemployment has decreased during the contraction period.

Macroeconomic Outcome

We now categorize the 23 contractions into cases of *success*, *partial success* and *failure* depending on the macroeconomic outcome.[8] As we are interested in a broad picture, several macroeconomic variables are considered: private consumption, non-residential private investment, exports (all parts of GDP) and changes in unemployment, a variable suggested by Blanchard (1987).

[8]Note that this labeling of contractions is not intended to correspond to the desires of politicians. Potentially, it could be the case that politicians wanted to slow down the economy (e.g. by reducing output growth), while the opposite is probably more likely.

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It is important to make comparisons with both the OECD average and own average. Here, the comparison with the OECD average is considered more important in order to avoid dependence on the business cycle of the focus country. However, if we *only* make comparisons with the OECD averages, our analysis would suffer from the fact that for some variables and some countries, the OECD average is always higher or lower than that of the focus country. Moreover, the business cycles of the OECD and the focus country are not perfectly correlated. Hence, we have to find a reasonable way to weigh these requirements.

When categorizing the contractions, our decision rules are as follows. If a contraction implies better performance than the OECD *and/or* own average of at least three out of the four macroeconomic areas under consideration *and* at least better performance than the OECD average in two of the four areas, the contraction is denoted as a *success*. If performance is better than the OECD *and/or* own average of two of the four macroeconomic areas *and* at least better than the OECD average in one area, the contraction is denoted as a *partial success*. The rest of the contractions are denoted as *failure*. In Table 1, an X indicates that the focus country has a better outcome than the OECD average (all columns denoted (1)) or own average (all columns denoted (2)).[9]

Of course, there are no strict border lines for assigning contractions to the *success*, *partial success* and *failure* categories.[10] However, this classification does provide a rough picture of the macroeconomic outcome of contractions. It is worth noting at this stage that the successful contractions in Denmark (1983–1987) and Ireland (1986–1989) are denoted as successes here as well. Ireland's first contraction in 1981–1984, generally regarded as a failure, is a failure here as well.

Statistical Analysis

Let us now confront the three categories of contractions (*success*, *partial success* and *failure*) with changes in the exchange rate and the money supply

[9]For change in unemployment, it is not worthwhile to compare with own averages. Instead, an X in column (2) denotes that unemployment has decreased during the contraction period.

[10]We also tried other definitions, such as the same definition as in the text but *without* the requirement of having better figures than the OECD in two (one) areas in the success (partial success) cases. This definition moves Australia (86–88) and Italy (95–97) from the *failure* group to the *partial success* group. The significance of the tests performed is not affected, however. We also tried definitions where the focus country "only" has to be within one standard deviation of the OECD or own average, but this turned out to make little difference.

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before and *during* the contractions. Our interest is in measures of these two variables that we believe have the greatest *real impact* on the macroeconomy and therefore can potentially explain the different macroeconomic outcomes of the contractions shown in Table 1. The exchange-rate variable applied is therefore the *real effective exchange rate* (REER).[11] We use M2 growth (adjusted for inflation and population growth) as M3 is not available for all countries.[12]

We also add information about the average yearly change in cyclically adjusted total expenditures (EXP) and revenues (REV) as a percentage of potential GDP, i.e., the composition of the contractions. The reason is that previous studies have found that contractions which mainly make use of *spending cuts* are more likely to generate a favorable macroeconomic outcome.[13] By including this information here, along with changes in the REER and M2, we can evaluate whether changes in fiscal, money supply and exchange rate variables share any common patterns concerning the macroeconomic outcome.[14] We consider changes in the REER and M2 both (i) during the last two years before the contraction and (ii) during the contraction. The descriptive results in Table 2 are quite striking.

First, all of the success cases have been preceded by *real depreciations* while half of the failure cases are associated with preceding *real appreciations*. The sample mean and standard error of the sample mean (in parentheses) are noted for each of the three groups. There is a significant

[11]REER is a ratio of an index of the period's average exchange rate for the currency in question to a weighted geometric average of exchange rates for currencies in selected countries. REER is also adjusted for price and cost changes between the focus country and its trading partners. Hence, a country's real competitiveness is measured. We have also tested the use of *nominal* exchange rates and comment on the differences in results below.

[12]As noted by a referee, the findings concerning the money supply should be interpreted with caution because it is endogenous when capital flows freely and exchange rates are fixed—a fairly true situation for many of the countries during (at least) part of the time period considered. In short, changes in the money supply can in general not be said to be policy induced. However, the money supply (endogenous or exogenous) can still affect macroeconomic variables which is the issue here.

[13]See e.g. Alesina and Ardagna (1998), Alesina and Perotti (1996a, 1996b), Ardagna (1999) and Zaghini (1999).

[14]It is important to note that our three categories do not differ significantly with respect to the *size* of the contraction or its *length*. Hence we can exclude them as potential possibilities for the different outcomes. The average size of the decrease in the cyclically adjusted primary deficit to potential GDP per year, and the average length of the periods in the three categories are as follows: *success*: 1.8 percent decrease and 3.8 years; *partial success*: 1.6 percent decrease and 3.2 years; *failure*: 1.6 percent decrease and 3.6 years.

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Table 2. *Changes in real effective exchange rates and money supply M2) before (B) and during (D) contractions and the composition of contractions*

	REER		M2			
	B	D	B	D	EXP	REV
SUCCESS						
Canada 93–97	−3.9	−2.8	5.8	4.1	−1.3	0.1
Denmark 83–87	−8.1	4.2	1.7	9.3	−0.6	1.3
Ireland 86–89	−5.3	−3.7	0.9	8.3	−2.1	−0.4
Italy 76–77	−12.1	−5.6	4.4	2.6	−0.8	1.3
Spain 96–97	−9.0	0.6	4.9	−5.5	−0.9	0.7
Sweden 84–87	−20.6	2.2	−9.3	1.6	−0.8	0.7
Sweden 94–97	−23.8	−0.0	−1.0	0.4	−1.8	0.9
UK 94–97	−9.8	4.6	4.0	5.2	−0.8	0.5
Mean and SE	−11.6 (2.5)	−0.1 (1.3)	1.4 (1.7)	3.3 (1.7)	−1.1 (0.2)	0.6 (0.2)
PARTIAL SUCCESS						
Germany 82–83	−8.3	−2.8	−4.0	0.3	−1.6	0.1
Greece 86–87	3.1	−9.5	11.8	−1.0	−1.6	0.6
Italy 91–93	7.5	−5.6	9.0	2.6	−0.3	1.4
Netherlands 91–93	−4.5	0.6	14.2	1.1	−0.3	1.0
Portugal 82–87	7.3	−1.2	18.8	0.2	−1.0	0.6
Mean and SE	1.0 (3.2)	−3.7 (1.8)	10.0 (3.8)	0.6 (0.6)	−1.0 (0.3)	0.7 (0.2)
FAILURE						
Australia 86–88	−13.4	−1.2	17.2	3.5	−1.2	0.1
Belgium 82–87	−12.4	−3.2	0.5	4.1	−1.2	0.2
Belgium 93–94	1.6	2.0	6.3	0.4	−0.7	0.9
Finland 75–76	8.5	6.1	−2.4	0.3	3.0	5.0
Greece 82–83	1.6	13.1	8.4	4.7	0.3	1.8
Greece 90–97	9.4	2.0	14.4	−2.6	−0.7	1.1
Ireland 81–84	2.5	−2.6	4.0	−4.4	−0.4	1.1
Italy 82–83	−1.3	−1.6	−14.7	0.7	−0.1	1.6
Italy 95–97	−21.9	2.2	−2.1	−10.5	−1.0	0.7
UK 79–82	6.7	10.4	−0.9	3.9	−0.0	1.4
Mean and SE	−1.9 (3.3)	2.7 (1.8)	3.1 (2.9)	0.0 (1.5)	−0.2 (0.4)	1.4 (0.4)

Sources: IFS (1998) and *OECD Fiscal Positions and Business Cycles* (1998).
Notes: REER (M2) = percentage change in the real effective exchange rate (money supply, M2, adjusted for population growth and inflation). (M3 is used for Belgium before and during the 93–94 contraction due to redefinition of M2 during these years.) B = percentage change during the last two years before the contraction (a negative sign implies depreciation for REER). D = average yearly percentage change during the contraction period. EXP (REV) = average yearly percentage change in cyclically adjusted total expenditures (revenues) as a percentage of potential GDP during the contraction period. SE = standard error of the sample mean.

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difference[15] (at the 5 percent level) between *success–partial success* and *success–failure* for preceding changes in the REER.[16] We can also note that the *partial success* group has significant higher real depreciations than the *failure* group *during* the contraction periods.

Second, the mean growth in M2 *during* contractions denoted as *success* is greater than the counterparts of the *partial success* and *failure* groups but the differences are not significant. If M1 had been used, the difference between the groups would actually have been significant (not shown in the table).[17] Hence, it seems as if money growth during contraction periods might have played a role in determining the macroeconomic outcome. We can also note that the M2 growth *before* the contractions exhibits a more diverse pattern where the *partial success* group has significantly higher M2 growth compared to the *success* group.

Third, it appears that composition matters to some extent. The difference between the *success* and *failure* groups wih regard to changes in *expenditures* (EXP) is significant at the 10 percent level.[18] The difference between the three categories concerning increases in revenues (REV) is far from significant. It is important to note that no significance tests (such as the one used here) have been carried out in previous descriptive studies.

It is not surprising that a real devaluation generates a favorable macroeconomic response. Resources are allocated towards the traded sector which in theoretical models is assumed to have higher productivity compared to the non-traded sector; see Obstfeld and Rogoff (1996). This explanation does

[15]In these significance tests, a small sample test for difference between two population means was applied, see Aczel (1989):

$$z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}, \quad df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}},$$

where $\bar{x}_i$, s_i^2, n_i, $i = 1, 2$, are the sample mean, sample variance of the mean and the number of observations, respectively. The small sample adjusted degrees of freedom (df) are adjusted downward if not an integer.

[16]Note that if we did not adjust for relative price and wage movements (which are included in the REER *but not* in nominal exchange rate measures), there would be no significant difference between the groups (not shown in the table). This fact highlights the importance of analyzing the *real* exchange rate movements which obviously have the greatest impact on the macroeconomy—a finding in line with results in Lambertini and Tavares (2000).

[17]The reverse is true in the regression analysis where M2 is significant but not M1. Parallel results using M1 (instead of M2) can be obtained from the author on request.

[18]As can be seen in Table 2, Finland is an outlier in both the EXP and REV columns. Excluding Finland makes no significant difference in the calculations, however.

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not require the availability of free resources. A more Keynesian-flavored explanation in the presence of unemployment can also be put forward. According to traditional Keynesian models, real devaluations give the economy an initial push in a positive direction through the increase in exports. Traditional multiplier/accelerator mechanisms then transmit the effects to the entire economy and, if free resources are available and wages are sticky, unemployment falls and output increases even further.

III. Private Consumption Response to Fiscal Contractions

The question we ask in the regression analysis reported below is different from—but related to—the issue examined in the preceding section. We study the private consumption response to contractions—a variable also included in the analysis above. The difference is that we now apply an econometric framework which allows us to consider other private consumption issues. Here we ask whether contraction periods preceded by real depreciations significantly improve individuals' expectations about their future income as compared to contraction periods preceded by real appreciations. A structural consumption function of private consumption growth which controls for the *direct* effects of contractions, including fiscal, exchange-rate and money-supply movements, is estimated.[19] Any effects *beyond* these direct effects could be said to be due to expectations about future income and are in line with both neoclassical and Keynesian models.

Generally, the standard neoclassical model, as in e.g. Barro (1989), implies that a fiscal contraction that is expected to permanently reduce government spending, lowers expected present discounted value (PDV) of taxes. This leads to a higher *level* of private consumption forever and higher *growth* in private consumption during the contraction—after controlling for variables such as current income and interest rates. According to the statistical analysis above, contractions generating a favorable macroeconomic outcome had been preceded by significantly higher real depreciations. It is probably fair to say that it is easier to cut spending permanently if the macroeconomic environment is more favorable. Hence, this hypothesis suggests that individuals believe it is *more likely* that their future tax burden will actually be reduced if the contraction period is preceded by a depreciation (as such periods generate a more favorable macroeconomic outcome). This explanation is also in line with the results in Lambertini and Tavares (2000). They

[19]Previous empirical work using panel regressions has focused on the *private consumption response* to fiscal contractions; see Giavazzi and Pagano (1996), Giavazzi *et al.* (1998) and Perotti (1999). Theoretical models concerning fiscal contractions also focus on the private consumption response; see Bertola and Drazen (1993), Blanchard (1990), Perotti (1999) and Sutherland (1997).

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find that preceding depreciations increase the probability of permanently reducing the debt ratio, i.e., individuals *correctly* expect lower PDV of taxes during such contraction periods![20]

Note, however, that a more Keynesian-flavored argument could also explain the hypothesis to be tested. In the Keynesian world, individuals' expectations (and spending decisions) are highly dependent on the *current state* of the economy. A favorable macroeconomic environment can be said to trigger the "animal spirits" of both consumers and companies. According to our statistical analysis of the descriptive statistics, since contractions preceded by real depreciations generate a more favorable macroeconomic outcome, individuals' expectations about future income improve so that they dare to spend more and save less. It should be mentioned, however, that this Keynesian explanation also has a neoclassical counterpart. In Lucas's (1973) island model, the *current state* of the economy also affects agents' decisions (due to imperfect information) and thereby output and consumption in the short run.

The Consumption Function

We use the consumption function derived in Muellbauer and Lattimore (1994). It is based on microeconomic foundations where individuals maximize utility subject to their intertemporal budget constraint and takes uncertainty, credit constraints, habits and error correction mechanisms into account:

$$\Delta \ln c_{it} = \alpha_0 + \alpha_1(\ln y_{it} - \ln c_{it-1}) + \alpha_2 \Delta \ln y_{it} + \alpha_3 \theta_{it} + \alpha_4 r_{it} + \alpha_5 \left(\frac{A_{it-1}(1 + r_{it-1})}{y_{it}} \right) + \alpha_6 (E_{it} \ln ym_{it+1} - \ln y_{it}) + \varepsilon_{it}. \quad (1)$$

The variables we use for our panel are: c_{it} = real per capita private consumption; y_{it} = real per capita disposable non-property income;[21] $(\ln y_{it} - \ln c_{it-1})$ is an error correction term; θ_{it} is a variable which should reflect uncertainty and here we follow Muellbauer and Lattimore (1994) by using the *change in the unemployment rate* as a proxy for uncertainty; r_{it}, $(1 + r_{it-1})$, A_{it-1} where we use the *ex-post* real short interest rate for r_{it}. The

[20]It is worth noting, however, that real depreciations in general imply lower future income—individuals became relatively poorer, lower productivity growth, etc. This goes against the effects of lower future taxes due to permanently lower government spending.

[21]Definition of y_{it}: GDP + net factor payments from abroad − capital consumption allowance − indirect taxes − corporate profits − social security contributions + government transfers to individuals − personal tax payments.

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main composition of the assets, A_{it}, are bonds, shares and houses. In practice, data concerning all these variables are not available for our panel of 19 countries over the period 1970–1997. Data on the stock index are available, however, and are used as a proxy for A_{it-1}. The value of bonds, shares and houses moves in the same direction due to the negative correlation with real interest rates; see Giavazzi and Pagano (1990). Thus the share index can serve as a good proxy; $(E_t \ln ym_{it+1} - \ln y_{it})$: $\ln ym_{it+1}$ is a forward-looking moving average of $\ln y_{it+1}$, $\ln y_{it+2}$, etc. We follow a common strategy in the literature and use a vector autoregressive (VAR) model to construct the forecast $\ln y_{it+i}$.[22]

Dummy Variables

Based on the theoretical discussion above, we add three dummies to the consumption function in (1):

- $CON = 1$ if a contraction period, zero otherwise. This dummy concerns the issue of whether contraction periods *in general* improve expectations about future income so that private consumption growth is higher (after controlling for current income and interest rates, etc.) during such periods, as suggested by the standard neoclassical model.[23]
- $DEPR = 1$ if a year is associated with real depreciations, zero otherwise. This dummy concerns the issue of whether periods of real depreciations, after controlling for the direct effects on income, interest rates, etc., exhibit higher or lower private consumption growth as compared to periods of real appreciations. We check the sensitivity of the results by

[22] We set up a VAR for each country:

$$\mathbf{x}_t' = [\ln y_t \quad \ln c_t \quad U\,rate_t \quad \Delta(l_t^i - l_t^{GER})]$$

including a constant and a time trend, and calculated forecasts of $\ln y_t$. $\Delta(l_t^i - l_t^{GER})$ is the change in the long-term interest differential against Germany. For simplicitly we only include four forecasts in $E_t ym_{t+1}$ using the following weights:

$$E_t \ln ym_{t+1} = \frac{\ln \hat{y}_{t+1}}{2} + \frac{3(\ln \hat{y}_{t+2})}{10} + \frac{3(\ln \hat{y}_{t+3})}{20} + \frac{1(\ln \hat{y}_{t+4})}{20}.$$

The weights are necessarily ad hoc with the realistic restriction of decreasing weights as $t + i$ increases.

[23] Of course, we can never know whether individuals believe that the contraction will be permanent (as required by the neoclassical model). However, this is not the main focus here as this dummy is compared with the third dummy (representing contraction periods preceded by real depreciations).

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applying different limits of real depreciations (>0%, >4% and >8%).[24]

- *CON-DEPR* = 1 if a contraction period is preceded by a depreciation, zero otherwise. The main focus in this paper is to see if this dummy is significantly different from the first dummy (*CON*) as described by our theoretical hypothesis. That is, does a preceding depreciation improve individuals' expectations about future income?

The reference case is non-contraction periods with real appreciations. We also include the full set of country and year dummies. The country dummies control for average consumption growth in the different countries and the year dummies control for year-specific effects such as the stock market crash in 1987. Moreover, we add a lagged dependent variable as this eliminates autocorrelation.[25] Lagged and current growth in the money supply M2 are also included. Although the structural consumption function should control for the potential "direct" effects of money growth, the variables control for any other effects not taken care of (e.g. myopia). Most importantly, we want to see whether the effects of preceding real depreciations (i.e., the comparison between the *CON* and *CON-DEPR* dummies) are sensitive to the inclusion of money growth, as they coincided to some extent in the statistical analysis of the macroeconomic outcome in Section II. Taking the above-mentioned extensions of (1) into account, our bottom line is:

$$\begin{aligned}\Delta \ln c_{it} = {} & \delta_0 + \delta_1 \Delta \ln c_{it-1} + \delta_2(\ln y_{it} - \ln c_{it-1}) + \delta_3 \Delta \ln y_{it} + \delta_4 \Delta U\,rate_{it} \\ & + \delta_5 r_{it} + \delta_6 \left(\frac{A_{it-1}(1 + r_{it-1})}{y_{it}} \right) \\ & + \delta_7 (E_{it} \ln ym_{it+1} - \ln y_{it}) + \delta_8 \Delta \ln M2_{it} \\ & + \delta_9 \Delta \ln M2_{it-1} + \delta_{10} CON + \delta_{11} DEPR + \delta_{12} CON\text{-}DEPR \\ & + \beta_i country_i + \gamma_t year_t + \varepsilon_{it}, \end{aligned} \tag{2}$$

[24]We also tested the inclusion of one and two lags of this dummy, but the results were unaffected (these results can be obtained from the author on request).

[25]Here we use the Fisher test for autocorrelation; see Stuart and Ord (1994, p. 567):

$$z = \frac{\sqrt{NT - N - T - K}}{2} \ln\left(\frac{1 + r}{1 - r}\right), \quad r = \frac{\sum_{i=1}^{N} \sum_{t=2}^{T} \hat{\varepsilon}_{it} \hat{\varepsilon}_{it-1}}{\sum_{i=1}^{N} \sum_{t=2}^{T} \hat{\varepsilon}_{it}^2},$$

where N = no. of countries, T = no. of time periods, K = no. of explanatory variables.

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where $i = 1, \ldots, 19$ and $t = 1974, \ldots, 1997$. There is an obvious problem of endogeneity in the equation to be estimated. Thus, the disturbances and some RHS variables are probably correlated. We therefore use instrumental variable estimation.[26]

Results

Note, first, that the dependent variable in the regressions (private consumption growth) as well as all variables that are expressed in percentages are denoted in *decimal* terms (e.g. 3 percent growth is denoted as 0.03).[27] We can further note that all variables in Table 3 (when excluding the dummies) are of expected sign.[28] Lagged private consumption growth (δ_1), the error correction term (δ_2), growth in disposable income (δ_3, except in one regression), change in the unemployment rate (δ_4) and the growth of M2 in t (δ_8) are all significant at the 5 or 10 percent level in all regressions.[29] The real interest rate (δ_5), wealth (δ_6), expected income growth (δ_7) and growth in M2 in $t-1$ (δ_9) are not significant, but the results are not sensitive to the inclusion of these variables.

We now focus on the dummies in the regressions displayed in Table 3.[30] Based on our discussion above, the key question is: do preceding real depreciations improve individuals' expectations so that private consumption growth is higher as compared to contractions preceded by real appreciations? That is, is the *CON-DEPR* dummy significantly greater than the *CON* dummy?

In the first two regressions, we have divided the contraction periods into

[26]The instruments used are: year dummies; country dummies; the contraction dummies; the rest of the RHS variables lagged twice and *interacted* with country dummies. This interaction has been proven useful in previous research; see Giavazzi and Pagano (1996). Following Campbell and Mankiw (1991) we use *two* lags among the instruments to avoid the potential problem of using time-averaged data. The results are not sensitive to the use of instruments.

[27]Earlier versions of this paper used *percentage* terms (e.g. 3.0 for 3 percent growth); Hjelm (1999, 2000).

[28]The theoretical sign on the interest rate variable is, however, dependent on how the utility function is specified. Coefficients on year and country dummies are not shown in the regression tables, but may be obtained on request. *p*-Values of joint significance of the country and year dummies, respectively, are shown. The year dummies are always jointly significant, while the country dummies are not.

[29]The rather low coefficient on PDI growth (δ_3) is due to its correlation with change in the unemployment rate (δ_4).

[30]The sum of the three dummies (*CON*, *DEPR* and *CON-DEPR*) is the additional effect on private consumption growth of contractions preceded by depreciations. As can be seen from the *p*-values displayed in Table 3, we cannot reject that the sum of the three dummies (*CON*, *DEPR* and *CON-DEPR*) is zero. Hence, private consumption growth is not higher in general for contractions preceded by depreciations as compared to non-contraction periods.

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Table 3. *Test of the importance of preceding changes in REER for private consumption growth during fiscal contractions*

		Size of preceding depreciation (percent)					
Variables	Coeff.	>0	>0	>4	>4	>8	>8
Constant	δ_0	0.030*	0.033*	0.030*	0.031*	0.030*	0.032*
		(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)
$\Delta \ln c_{it-1}$	δ_1	0.244*	0.191*	0.239*	0.185*	0.245*	0.189*
		(0.069)	(0.073)	(0.069)	(0.073)	(0.007)	(0.073)
$(\ln y_{it} - \ln c_{it-1})$	δ_2	0.051*	0.050*	0.048*	0.048*	0.050*	0.050*
		(0.018)	(0.019)	(0.018)	(0.019)	(0.018)	(0.019)
$\Delta \ln y_{it}$	δ_3	0.082**	0.070	0.090*	0.081**	0.087**	0.076**
		(0.046)	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)
$\Delta U\ rate_{it}$	δ_4	−0.870*	−0.758*	−0.874*	−0.746*	−0.910*	−0.785*
		(0.162)	(0.170)	(0.160)	(0.168)	(0.162)	(0.170)
r_{it}	δ_5	0.034	0.022	0.031	0.020	0.032	0.020
		(0.034)	(0.035)	(0.034)	(0.035)	(0.034)	(0.035)
$\left(\frac{A_{it-1}(1+r_{it-1})}{y_{it}}\right)$	δ_6	0.001	0.004	0.001	0.003	0.001	0.004
		(0.001)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$(E_{it} \ln ym_{it+1} - \ln y_{it}$	δ_7	0.006	0.006	0.005	0.006	0.006	0.006
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$\Delta \ln M2_{it}$	δ_8		0.042*		0.044*		0.043*
			(0.020)		(0.020)		(0.020)
$\Delta \ln M2_{it-1}$	δ_9		−0.009		−0.008		−0.008
			(0.021)		(0.021)		(0.021)

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Dummies							
CON	δ_{10}	−0.010*	−0.011*	−0.009*	−0.009*	−0.006	−0.006
		(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)
DEPR	δ_{11}	0.001	0.001	−0.000	0.000	0.003	0.002
		(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
CON-DEPR	δ_{12}	0.008	0.008**	0.008	0.008**	0.002	0.003
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Test of equality of *CON* and *CON-DEPR* (*p*-values):		0.06	0.04	0.04	0.03	0.30	0.26
Test if: *CON* + *DEPR* + *CON-DEPR* = 0 (*p*-values):		0.69	0.70	0.68	0.77	0.93	0.95
Joint sign. of country and year dummies (*p*-values):							
Country	β_i	0.12	0.07	0.17	0.10	0.20	0.13
Year	γ_t	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2		0.50	0.50	0.50	0.50	0.50	0.49

Notes: Dependent variable: growth in private consumption (in decimal terms). Instrumental variable regression of equation (2) using a panel of 19 countries over the period 1974–1997. Variables are defined in Section III. Instruments are listed in fn. 26. Standard errors in parentheses. *, ** denote significance at the 5 and 10 percent level, respectively.

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those preceded by real depreciations (>0) and those preceded by real appreciations. It turns out that contraction periods *in general* (the *CON* dummy) experience about 1 percent (*CON* equals −0.01 and −0.011, respectively) significantly *lower* private consumption growth compared to the reference case (non-contraction periods with real appreciations). This is, of course, a huge difference. It appears that contraction periods in general imply *worse*, not better, expectations about future income. Most importantly, however, there is a significant difference between contraction periods preceded by real depreciations and those preceded by real appreciations (the *CON* and *CON-DEPR* dummies). *p*-Values of 0.06 and 0.04 are generated when testing the equality of these dummies and the absolute difference between the two dummies is 1.8 and 1.9 percentage points, respectively! Clearly, contractions preceded by real depreciations improve individuals' expectations about future income compared to contractions preceded by real appreciations.

We also consider two other thresholds for the magnitude of depreciation. The significant difference between the dummies remains when using the 4 percent limit (*p*-values of 0.04 and 0.03 and an absolute difference of 1.7 percentage points in both regressions), while the significance disappears when applying the 8 percent limit, even though the sign of the difference is the same (about 0.8 to 0.9 percentage points). Note also that none of the results mentioned is sensitive to the inclusion of M2 growth (this is also true when using M1 growth, not shown in the table).

In conclusion, we can note first that contraction periods *in general* worsen individuals' expectations about future income (i.e., the *CON* dummy is negative) which contradicts the neoclassical prediction—although, of course, we cannot be sure in the sense that we cannot know if individuals believed that the contractions would be permanent. Second, in accordance with our discussion in Section III, the regression results support both Keynesian and neoclassical models.

IV. Concluding Remarks

This study concerns the importance of exchange-rate and money-supply movements, before and during periods of fiscal contractions, for the macroeconomic outcome. There are two main findings in the paper. First, contraction periods associated with a favorable macroeconomic outcome have exhibited significantly higher *preceding* real depreciations. Money-supply growth *during* contraction periods might also play a role. Moreover, it appears that a favorable outcome is associated with greater emphasis on expenditure cuts as compared to increases in taxes, although the difference is not always significant.

Second, contraction periods preceded by real depreciations have signifi-

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cantly higher private consumption growth compared to contraction periods associated with real appreciations. As we control for the direct effects of e.g. fiscal, exchange-rate and money-supply movements using a structural consumption function, it can be said that individuals' expectations about future income improve if the contraction period is preceded by real depreciations. As Lambertini and Tavares (2000) have found that preceding depreciations were also important in order to achieve a permanent reduction in the debt ratio, the conjecture of several researchers regarding the importance of preceding exchange rate movements seems to be correct.

We conclude by commenting on some policy implications that may be drawn from this analysis. As mentioned, we find that preceding depreciations in the real exchange rate are important for the macroeconomic outcome of fiscal contractions. Although the real exchange rate is not a policy instrument, in our view, the policy mix of preceding devaluations and fiscal tightening can be successful. The reason is that a nominal devaluation without fiscal tightening may only lead to a devaluation cycle.[31] That is, without a fiscal tightening, wages and prices rise so that the effect of the nominal depreciation on competitiveness may be eliminated or even reversed. Sweden is a good example of this pattern; see e.g. Jakobsson (1997). If, instead, the nominal devaluation (e.g. as in the case of Denmark's successful period in the first half of the 1980s) is followed by a substantial fiscal tightening, there appears to be a greater chance of a better macroeconomic outcome. A real depreciation fuels the economy and fiscal tightening prevents wages and prices from destroying improved competitiveness.

Our results also have some implications for (becoming) members of the EMU. It is obvious that a government within the EMU cannot use a similar policy mix as e.g. Denmark and Ireland, i.e., perform a nominal devaluation preceding a fiscal contraction. Instead, the entire change in the real exchange rate has to be due to relative price movements which are far from controllable by politicians. Moreover, the finding that higher money-supply growth appears to be associated with contractions generating a favorable macroeconomic outcome suggests that participation in the EMU makes such an outcome harder to achieve as the money supply is not in the hands of individual countries.

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[31] I thank an anonymous referee for this point.

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