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* Views expressed are those of the individual authors and do not necessarily reflect official positions of De Nederlandsche Bank.

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Using data for 17 OECD countries from 1983 to 2003, this paper establishes a non-linear relationship between private consumption and the level of government debt. In countries with a high level of government debt, a fiscal expansion is partly crowded out by a fall in private consumption. In contrast, in low debt countries, private consumption is insensitive to changes in government debt. This means that fiscal policy will be less effective in stabilising business cycle fluctuations at higher levels of government debt.

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1. Introduction

Economic growth in the euro area is disappointingly low. In the words of the French president Chirac, Europe needs “a more dynamic and ambitious strategy to promote growth, competitiveness and jobs”. Such statements may be popular among certain parts of the population, but can fiscal stimulus really boost domestic demand? At first glance, the three major economic blocks of the OECD - i.e. Japan, the U.S., and Europe - provide a mixed picture. Since the 1990s, these blocks have pursued quite different fiscal policies: The Japanese government has run high deficits to stimulate the economy. It left Japan with a public debt ratio of over 150%, but private consumption failed to pick up markedly in response to the expansionary fiscal policy. Fiscal policy was exceptionally loose in the U.S. (with the 2000 fiscal surplus of 1.6% turning into a deficit of -4.6% in 2003), and according to conventional belief, this fiscal stimulus has helped to pull the U.S. out of recession (cf. Johnson, Parker, and Souleles, 2004). Lastly, European policymakers may have wanted to stimulate the economy, but the scope for fiscal stimulus was limited due to higher debt levels and constraints posed by the Stability and Growth Pact. Leaving aside the legal constraints of the SGP: would more fiscal stimulus have stirred up private spending in EMU?

In this paper we assess the extent to which the level of government debt can explain observed differences in private consumer reactions to fiscal policy. From a theoretical perspective, the evidence is mixed. In modern intertemporal macroeconomics, significant movements in net wealth are associated with movements in consumer spending (Lettau and Ludvigson, 2001). However, from Barro’s Ricardian point of view, government debt does not add to the household sector’s net wealth, at least in a closed economy, since government bonds simultaneously represent an asset for the owners of bonds and a liability for tax payers (Barro, 1974). This implies that there will be no role for government debt as a determinant of private consumption. It is well-known, though, that Ricardian equivalence only applies under strict assumptions, which are unlikely to hold in practice.¹ For example, Linnemann and Schabert (2004) present a sticky-price model in which government expenditures and private consumption enter the representative agent’s utility function. They show that in some cases, (positive) government expenditure shocks can crowd in private consumption. So, whether or not there is a role of government debt in explaining private consumption is essentially a matter of empirical testing.

Recent empirical studies of the relationship between government debt and private consumption have also produced mixed results. Peersman and Pozzi (2004) find that the observed excess sensitivity of private consumption to current income in the US depends positively on government debt. An explanation for this

¹ See, for instance, Elmendorf and Mankiw (1999) and Ricciuti (2003).

result is that an increasing government debt implies higher future tax liabilities for households so that, due to their increased risk of default, banks may give them less credit. As a result, households are less able to smooth consumption. Pozzi, Heylen and Dossche (2004) present similar evidence for a panel of OECD countries. Using a common trends framework, Becker (1997) shows that in the US a temporary drop in the holdings of government bonds results in a transitory increase in private consumption. This is consistent with the empirical finding that a fall in the government deficit tends to lower the interest rate, which stimulates consumption. Hogan (2004) demonstrates for 18 industrial countries that if public consumption is reduced in response to a fiscal crisis (as defined by a high level of debt), private consumption tends to increase. De Mello, Kongsrud and Price (2004) focus on the mirror images of private consumption and government debt, ie. private and public savings. They show that private savings offset about 50 percent of a change in public saving in the short term, and approximately 75 percent in the long term. Offsetting movements in private and public savings turn out to be stronger when the debt to GDP is below a threshold of about 70 percent of GDP.

This paper contributes to the existing literature by assessing the impact of government debt on private consumption empirically within a well-articulated consumption function. To our knowledge, this is the first paper that relates private consumption to disposable income, equity wealth, and housing wealth, and then assesses whether government debt has an additional role to play as a determinant of private consumption. We use yearly data for a panel of 17 OECD countries, and we apply the panel data technique developed by Pesaran, Shin and Smith (1999) to take into account the time series properties of the data.

The remainder of this paper is structured as follows. Section 2 discusses the model and the data. Section 3 presents the empirical results. Section 4 concludes.

2. Model and Data

Lettau and Ludvigson (2001) show that in a representative agent economy in which all wealth, including human capital, is tradable, consumption, labour income, and household wealth move together over the long term. Basically, this follows from a first order approximation of the consumers' budget constraint². We focus on two main components of household wealth (equity wealth and housing wealth) and assess whether the level of government debt can play a role as an additional determinant of private consumption.³ An identical form of the long run consumption function is assumed for all countries in our sample, where the long run

² We refer to Lettau and Ludvigson (2001) for further details.

³ The impact of equity wealth and housing wealth on consumption has received increased attention in recent years, see Ludwig and Sløk (2002), and the references therein.

relationship between consumption, labour income, equity wealth, housing wealth and government debt is given by

$$c_{i,t} = a_i + \beta_1 y_{t,i}^d + \beta_2 w_{t,i}^e + \beta_3 w_{t,i}^h + \beta_4 g_{t,i} + \epsilon_{t,i}, \quad i = 1, 2, \dots, N, t = 1, 2, \dots, T, \quad (1)$$

and the subscripts i and t denote the country and time, respectively. c is the log of private per capita real consumption, y^d is the log of per capita real disposable household income, w^e is the log of real per capita equity wealth, w^h is the log of real per capita housing wealth, and g refers to the log of the real per capita level of government debt⁴. e is the error term. Following Pesaran et al.'s (1999) suggestion, we restrict the coefficients on the right hand side of equation (1), except for the intercept, to be equal across countries. This has been done to reduce bias, see Pesaran et al. (1999).⁵ Deviations from the long run relationship (1) are possible in the short run, and we assume that the short run dynamics differ across countries. For this purpose, equation (1) is embedded in an autoregressive distributed lag (ADRL) model. In error correction form, the ADRL model can be written as follows

$$\Delta c_{i,t} = \alpha_i (c_{i,t-1} - a_i - \beta_1 y_{t-1,i}^d - \beta_2 w_{t-1,i}^e - \beta_3 w_{t-1,i}^h - \beta_4 g_{t-1,i}) + G_{0,i}(L) \Delta c_{i,t-1} + G_{1,i}(L) \Delta y_{i,t-1}^d + G_{2,i}(L) \Delta w_{i,t-1}^e + G_{3,i}(L) \Delta w_{i,t-1}^h + G_{4,i}(L) \Delta g_{i,t-1} + u_{t,i}, \quad i = 1, 2, \dots, N, t = 1, 2, \dots, T, \quad (2)$$

where $G_{j,i}(L)$ ($j=0, \dots, 4$) denote polynomials in the lag-operator. Below, we will use the Schwarz Bayesian Criterion (SBC) to determine the lag length of each variable for each country.

Due to data availability, we use stock market and housing prices as proxy variables for the wealth components.⁶

Our analysis covers 17 OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Spain, Sweden, the UK, and the US. The sample runs from 1983 to 2003, except for Austria (1983-2002). The coverage is similar to that of Ludwig and Sløk (2002). Data on per capita real household disposable income, per capita real private consumption, and per capita gross general government debt are taken from the OECD. We obtained indices on house prices and stock prices from BIS and Thomson Financial respectively. We calculated real per capita series by deflating

⁴ The variables are deflated by total population to make them comparable across countries.

⁵ Pesaran et al. (1999) argue that homogeneity is very likely to be rejected in empirical applications. Pooling might still make sense, though. For example, if individual country regressions are biased on account of omitted variables, such biases may average to zero across countries. In that case, pooling provides for a more reliable estimate of the true coefficients. For this reason, we attach little importance to the LR test for the homogeneity restriction of the long run coefficients.

⁶ However, stock market prices and equity wealth tend to be highly correlated, see Ludwig and Sløk (2002).

the former prices with the private consumption deflator and with total population (both from the OECD). Unless stated otherwise, all series are in logarithms and in local currency.

As a preliminary step, we first examine the time series on stationarity and cointegration. Im, Pesaran and Shin's (2003) t-bar and Choi's (2001) Fisher-type panel unit root tests indicate that all variables are $I(1)$ ⁷, see table 1. Furthermore, results for Pedroni's (1999) group adf-statistic indicate that a cointegrating relation exists among private consumption, disposable income, house prices, stock prices and government debt, while cointegration is lost when private consumption is dropped. This means that we are in a position to apply Pesaran's (1999) pooled mean group estimator.

3. Empirical results

In the base specification, private consumption is related to disposable household income, equity wealth, housing wealth, and government debt for our panel covering 17 countries, and the sample runs from 1983 to 2003. The second column in Table 2 presents the main results. Heterogeneous short run coefficient estimates are calculated under the restriction of long run homogeneity. The table shows the short run coefficients averaged over the countries.

In the long run, private consumption is positively related to disposable household income, equity wealth, and housing wealth (all at 5 percent level). This corroborates the findings of Ludwig and Sløk (2002). In addition, the long run impact of an increase in equity wealth is about twice as large as the impact of an increase in housing wealth. An important finding is that the level of government debt has a significant negative impact on private consumption. This means that – within the OECD - a fiscal expansion which results in an increase in the level of government debt, will in part be crowded out by a fall in private consumption. The adjustment coefficient is comparatively large, indicating a swift return to equilibrium. This explains why many of the (average) short run coefficients are insignificant. To gauge the fit of our model, for each individual country we calculated the adjusted R^2 . The last row in Table 2 shows the median of the country numbers. Our model explains about 30 percent of the variation in private consumption across time and across countries.

There are good reasons, though, to suspect that the relationship between private consumption and the level of government debt might be non-linear. For instance, at high levels of debt consumers are more likely to

⁷ The t-bar test suggests that stock prices might actually be stationary. This result appears to be driven to a large extent by developments in the Italian and Spanish stock markets. On the basis of the cointegration tests, we conclude that the fact that private consumption, house price, stock price, disposable income and government debt are cointegrated does not reflect the (possible) near-stationarity of stock prices.

question the sustainability of government debt⁸. They are increasingly aware that government debt should ultimately be paid back. Consequently, crowding out may be more of an issue at high levels of debt. Also, at high levels of debt so-called expansionary fiscal contraction effects may be at play. If tax increases *unexpectedly* stabilise debt now, this may avoid a later and more painful stabilisation involving larger tax increases. On account of more benign expectations concerning future taxation, current consumption may expand, cf. Bertola and Drazen (1993). This effect may also occur when distortions increase non-linearly with the level of taxes. In a situation of high debt, a tax increase can avert the need for a much more distorting tax increase in the future. This reduces total expected deadweight loss and may have an expansionary effect, cf. Blanchard (1990). In contrast, at low debt levels consumers may not bother at all about government debt; neither will they be inclined to update their views about future fiscal policy. Sutherland (1997) considers that debt tends to accumulate until a threshold is reached at which a major stabilisation policy is started. Consumers don't care about debt as long as it is far below the threshold. At high levels of debt however, further debt increases may prove contractionary as the next debt stabilisation poses an imminent threat to consumers. What is considered a high debt may differ between countries. In particular, the threshold above which stabilisation policies were initiated in the past may be country-specific.

To account for a non-linear relationship between private consumption and government debt, we subdivide the countries into three groups. Countries with an average debt-to-GDP ratio in the sample period below 55% are classified as low-debt countries. High debt countries are countries with an average debt-to-GDP ratio in excess of 75%. The remaining countries are called 'middle-debt' countries. The note below Table 2 shows which countries are in each group. We select the thresholds for the debt-to-GDP ratio with an eye to getting country groups of approximately equal size. We re-estimate our model for each group of countries. The results are shown in the last three columns in Table 2. The results indicate that the relationship between the level of government debt and private consumption is indeed non-linear. In low debt countries, the level of government debt has no significant impact on private consumption, while in high debt countries government debt has a significant negative impact.

We perform a number of sensitivity analyses to verify the robustness of our results. Varying – to a limited extent – the size of the various countries groups left the main estimation results unchanged. Adding back data did change the results. When we include observations from the 1970s, the relationship between private consumption and the level of government debt is no longer significant. This result does not come as a surprise. In the 1970s, the level of government debt was fairly low in most countries, and hence not an issue for consumers. This actually was the main motivation for excluding the 1970s from our base specification.

⁸ We acknowledge the fact that for some countries debt sustainability may be an issue even at a low debt level. However, we think this issue is of less relevant to the OECD countries that we study in this paper.

4. Conclusion

In this paper we have analysed the role of government debt as a determinant of private consumption. Interestingly, the results show that in a panel of OECD countries, the relationship between private consumption and government debt is non-linear. In low debt countries, the level of government debt is not relevant for private consumption. But, in high debt countries, the level of government debt has a significant negative impact on private consumption. This means that a fiscal expansion will be partly crowded out by private consumption. We therefore conclude that in high debt countries fiscal policy may be less effective in stabilising business cycle fluctuations.

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Table 1. Panel unit root and cointegration test

	IPS t-bar	Fisher test
house price	-1.601	-0.453
stock price	-1.903**	0.326
private consumption	-0.961	5.125
disposable income	-1.411	3.759
government debt	-1.550	1.324

	Group adf-statistic
y = private consumption	-18.113**
x = house price	
stock price	
disposable income	
government debt	
y = house price	-12.339
x = stock price	
disposable income	
government debt	

Note: (***) indicate significance at the 10 (5) percent level. IPS t-bar denotes Im, Pesaran and Shin's (2003) t-bar panel unit root test. The order of the autoregressive process for each country is determined by sequentially dropping insignificant lags. The Fisher test refers to Choi's (2001) Fisher-type Z-test. The Group adf-statistic - developed by Pedroni (1999) - tests for the null of no cointegration among the respective y and x variables, allowing for heterogeneity in the long-run cointegrating vectors. The results are for the sample period of 1983-2002.

Table 2. Private consumption and government debt, 1983-2003

	All countries	Low debt	Middle debt	High debt
Long run coefficients				
y^d	0.67** (0.04)	0.58** (0.03)	0.84** (0.11)	0.76** (0.07)
w^e	0.07** (0.01)	0.08** (0.01)	0.07** (0.01)	0.12** (0.01)
w^h	0.03** (0.01)	0.17 (0.01)	0.01 (0.03)	-0.08** (0.03)
g	-0.03** (0.01)	0.07** (0.01)	-0.06** (0.02)	-0.10** (0.03)
Average short run coefficients				
Adjustment coefficient	-0.48** (0.10)	-0.50** (0.18)	-0.42** (0.17)	-0.51** (0.21)
? y^d_{t-1}	0.05 (0.08)	0.10 (0.12)	0.11 (0.11)	-0.05 (0.15)
? w^e_{t-1}	-0.02* (0.01)	0.01 (0.02)	-0.00 (0.00)	-0.02 (0.02)
? w^h_{t-1}	0.04 (0.03)	0.00 (0.06)	0.10** (0.04)	0.00 (0.00)
? g_{t-1}	-0.03 (0.02)	0.03 (0.04)	-0.02 (0.02)	-0.02 (0.02)
Intercept	0.65** (0.13)	0.62 (0.20)	1.19** (0.50)	0.65** (0.24)
LR test (p-value)	454 (0.00)	253 (0.00)	129 (0.00)	122 (0.00)
R^2 -adj	0.309	0.289	0.302	0.332

Note: LR test tests for the homogeneity restriction of the long run coefficients. R^2 -adj denote the median of the adjusted R^2 's of the individual country equations. Heterogeneous short run coefficient estimates are obtained under the restriction of long run homogeneity. Standard errors are in parentheses. *(**) indicate significance at the 10 (5) percent level. In low (high) debt countries, the debt to gdp ratio is on average below (above) 55 (75) percent. Low debt countries are: Australia, Austria, France, Finland, Germany, Norway, and the UK. Middle debt countries are: Canada, Denmark, Spain, Switzerland, and the US. High debt countries are: Belgium, Ireland, Italy, Japan, and the Netherlands.

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