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Fiscal multipliers and time preference

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Abstract

This paper explores the links between fiscal multipliers and household discount rates. We report evidence of a large and statistically significant relationship between reported rates of time preference across countries and the government expenditure multiplier. This study uses recent cross-country data on reported rates of time preferences gathered by Wang, Rieger and Hens (2011). We find that a higher reported rate of time preference is strongly associated with a larger government expenditure multiplier. Our findings may help to explain some of the differences in view over the optimal path for fiscal consolidation in Europe today, between the Germanic and Northern European countries (whose representatives appear to favour a faster fiscal retrenchment) and those in the South (who would like their required fiscal adjustment to occur less rapidly).

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1. Introduction

There is a growing consensus that multipliers vary significantly over time and across countries (DeLong and Summers, (2012)). Factors which appear to affect multipliers include the degree of openness of an economy, its size relative to the world economy, the exchange rate regime and whether an economy is experiencing a financial or sovereign debt crisis. One factor which theory suggests might have a significant effect on fiscal multipliers is the average rate of time preference of citizens. But there is surprisingly little evidence on this.

Wang, Rieger and Hens (2011) have recently constructed a consistent estimate of average rates of time preference for a sample of 45 countries. They find that reported rates of time preferences differ significantly across countries. We use that data to assess whether differences in rates of time preference help explain cross-country variation in fiscal multipliers. We find strong confirmation of this hypothesis.

The paper is organized as follows. In section 2 we review the evidence on variation in, and determinants of, fiscal multipliers. Section 3 considers the link between time preference and multipliers using a simple theoretical model to illustrate conditions under which variation across countries in rates of time preference causes variability in fiscal multipliers. Section 4 describes the data we use on time preference and multipliers and the estimation methods to assess the link between them. Section 5 presents the results and section 6 draws conclusions.

2. The government expenditure multiplier

The government expenditure multiplier is defined as the change in output that results from a change in government expenditure. The effectiveness of government expenditure programmes in stimulating economic activity depends crucially on whether households decide to consume or save transfers received, either directly or indirectly, from the government. Consumers might take account of the government's inter-temporal budget constraint and expect an offsetting reduction in their future after-tax income as a result of an increase in net-of-tax transfers to them today. If the government borrows to spend more now, consumers would expect higher taxes in the future and save more now to help pay for them. Barro (1974) formalised this idea, originally put forward by Ricardo.

There is a great deal of empirical work assessing the size of fiscal multipliers and the degree to which Ricardian equivalence holds (see, for example, Bayoumi and Sgherri, (2006)). Empirical studies, however, face great challenges in measuring multipliers because of the difficulties of identifying exogenous fiscal shocks and controlling for other factors that might affect output responses.

Galí, López-Salido and Vallés (2007) report that the response of consumption to an exogenous increase in government spending has been estimated to vary from being large and statistically significant to being small and insignificant. Ilzetzki, Mendoza and Vegh (2011) report generally positive government expenditure multipliers, although they do report mildly negative multipliers for open economies. As in other VAR-based studies they identify exogenous shocks relying on the assumption that government expenditure is slow to react to changes in economic circumstances. A different approach is taken by Acconcia, Corsetti and Simonelli (2011) who exploit evidence from a quasi-experiment using data on Italian provinces. As Italian law can force local administrations to be dismantled in the event that Mafia infiltration is identified, they can isolate unexpected suspensions of public expenditure programmes that are not offset by fiscal policy or tax cuts. Their estimates of expenditure multipliers range from 1.2 to 1.8. In a survey of empirical work relying on VAR and narrative approaches, Ramey (2011) reports that a range which includes the majority of estimates for the government expenditure multiplier lies between 0.8 and 1.5.

But a literature that began with Giavazzi and Pagano (1990), and finds recent support in Alesina and Ardagna (2010), points to evidence of 'expansionary fiscal contractions'. This literature stresses that multipliers depend on the circumstances in which fiscal policies are implemented. Evidence of 'expansionary fiscal contractions' appears to coincide with episodes of significant stress in the public finances of the countries being analysed. Romer and Romer (2010) suggest these estimates of negative fiscal multipliers are likely to be the result of errors in the identification of fiscal shocks. But there is there is a growing consensus that multipliers are highly context dependent (DeLong and Summers, 2012). This might help to explain the wide range of estimates found in the literature.

One factor which the Ricardian logic suggest might be a fundamental and underlying determinant of fiscal multipliers is the average rate of time preference of households – the more impatient are households the more likely they are to face constraints that make their spending respond negatively to current tax rises, and positively to current tax cuts or increases in benefits. We explore this link more formally in the next section. We then use a newly constructed cross-country data set of estimates of household discount rates collected by Wang, Rieger and Hens (2011) to assess the link between household rates of time preference and the fiscal multiplier.

3. Time preference and the fiscal multiplier

We develop a simple model of multiple countries which differ in the rates of time preference of their households and use it to explore variations in fiscal multipliers. The model is in the spirit of Buiter (1981) who developed a Diamond-style overlapping generations model with two countries that are identical in all respects with the exception of their rates of pure time preference. In that model the country where individuals value more consumption early will run a current account deficit, offset by a surplus in the country where individuals have a lower rate of time preference. The marginal propensity to consume in early periods is greater in the country with a higher pure rate of time preference. Buiter did not focus on fiscal multipliers but the link between the marginal propensity to consume and multipliers is clear. Galí, López-Salido and Vallés (2007) introduce a fraction of hand-to-mouth consumers in a population that otherwise behaves in a Ricardian fashion. The introduction of hand-to-mouth consumers is motivated by studies such as Campbell and Mankiw (1990). The interaction of a fraction of consumers that routinely spend their entire current income and sticky prices within a new Keynesian DSGE model can generate a positive response of consumption to an increase in government spending. The presence of rule-of-thumb consumers reduces the negative wealth effect from an increase in future taxes, hence increasing the sensitivity of consumption to current income.

Bayoumi and Sgherri (2006) break Ricardian equivalence in a Blanchard-Yaari framework introducing a higher discount rate for consumers to reflect the probability of 'death'. Death is defined as any event that makes previous consumption plans irrelevant such as winning the lottery or any large, sudden and unexpected change in economic circumstances. If consumers discount at a faster rate than the government can borrow at, then the value of current tax rebates will be greater than that of future tax increases required to balance the government's budget meaning that a tax cut has a positive impact on consumption.

A simple model:

To illustrate the link between rates of time preference and fiscal multipliers we consider a set of countries which differ only in the rates of time preference of their citizens. Within each country people either all have a relatively high rate of time preference (ρ_h) or a relatively low rate of rate of time preference (ρ_l). Agents live two periods. Within each period they receive an endowment of 1 unit of a consumable, non-durable commodity. Agents can lend or borrow from other agents – either within their own country or with agents in another country. Agents enter into binding contracts to lend or borrow units of the consumption good at a real interest rate (r). Agents may have a bequest motive, with a bequest intensity (that is a weight attached to the utility of the next generation) of β. We will assume that the number of high time preference countries is equal to the number of low time preference countries and that this number is large. We consider what happens when a government in one country which has neither taxed nor spent embarks on a one-off fiscal transfer to the young financed by a tax on the young of the next generation. If as a result spending is higher the fiscal multiplier is positive.

We assume log preferences. Using an obvious notation, the utility that a household born in period t gets from consumption over its own (two period) life is:

$$\mathrm{U}(\rho_i) = \ln(C_1) + \ln(C_2)/(1+\rho_i) \qquad (1)$$

where i =*l,h*.

The overall welfare of a household born in period t is:

$$\mathrm{V}(\rho_i) = \mathrm{U}(\rho_i) + \beta/(1+\rho_i)[\mathrm{V}(\rho_i)_{+1}] \qquad (2)$$

Where V_{+1} is the overall welfare of the next generation.

If a household receives a bequest from a previous generation it comes at the end of the first period of their life, which is when the previous generation dies. Denote the bequest received by B_1. If a bequest is made it comes at the end of the second (and final) period of a household's life and is denoted B_2. There is a one period real interest rate of r at which people can borrow and lend, provided that at the start of the second period they are able to repay any debt from the first period out of their endowment (of 1) and any bequest received. Negative bequests are ruled out. The budget constraint is:

$$C_2 = 1 + B_1 + (1-C_1)(1+r) - B_2 / (1+r) \qquad (3)$$

The first order conditions are:

$$(1+r) / (1+\rho_i) = C_2 / C_1 \qquad (4)$$

and

$$C_{2,+1}/ C_2 \geq \beta (1+r) / (1+\rho_i) \quad \text{with equality if } B_2 > 0 \qquad (5)$$

$C_{2,+1}/ C_2$ is the ratio of second period consumption (of the elderly) of the next generation to the consumption of today's elderly.

With no negative bequests $B_1 \geq 0;\ B_2 \geq 0$

In a steady state $B_1 = B_2$ and $C_{2,+1} = C_2$

If the bequest motive is weak there will be no bequests in steady state. In this case the young of the country with a high rate of time preference (the impatient) will only be able to borrow from the young of the country with more patient citizens. The young of neither country can borrow from (or lend to) the old because the old consume all their resources and would not lend to the young from whom repayments could only be left as bequests.

In this situation of zero bequests it is straightforward to show that the equilibrium interest rate is given by:

r = $\{2\ /\ [\ 1\ /\ (\ 1 +\ 1/(1+\rho_h))\ \ +\ 1\ /\ (\ 1 +\ 1/(1+\rho_l))\ ] - \ 1\}^{-1}$ - 1 (6)

In this equilibrium young impatient households borrow from young people in more patient countries. Debt is repaid in the second period helping to finance the second period consumption of the patient which is higher than consumption by those patient households when they were young. In equilibrium the borrowing by the young in the typical impatient country must be equal to the lending of the young in the typical more patient country (since we are assuming there are an equal, and large, number of countries of each type).

For this to be an equilibrium we require that

β / (1+ρ_l) < $2\ /\ [\ 1\ /\ (\ 1 +\ 1/(1+\rho_h))\ \ +\ 1\ /\ (\ 1 +\ 1/(1+\rho_l))\ ]$ (7)

For there to be no bequests the bequest motive, relative to the time preference *of the more patient agents*, has to be below the threshold given by the right hand side of (7). If we start from a world where the bequest motive is this weak, and then gradually increase its intensity, we will move into a regime where the patient wants to leave a bequest. In such a steady state $C_{2,+1} = C_2$ in both countries but equation (5) holds with equality in the country with patient households. We then have that:

r = (1+ ρ_l) / β – 1 (8)

so that the interest rate is completely determined by the bequest motive and the rate of time preference of the more patient households. Note that it is not possible for households who are less patient to wish to make bequests in a steady state. This is because equation (5) cannot hold with equality for both the patient and impatient.

If we are in a steady state with bequests made in the more patient countries (which implies they are not made in the less patient countries) what is the impact of a government in a single country making a one-off allocation to the young financed by a tax on the young of the next generation? To answer this question we assume that the government has to pay whatever the global interest rate is on the debt it issues, and that this rate is not affected by its borrowing. (This is a natural assumption since we have assumed there are many countries, only one of which embarks on an expansionary fiscal policy). If this fiscal policy is followed in a country with patient households the answer is obvious and immediate: there is no impact on the spending of the young. They simply save the proceeds of the government handout and use that saving (with accumulated interest) to increase the bequest to the next generation so that they will be able to pay the taxes levied on them and enjoy the same consumption they would have. This is Ricardian equivalence which holds in a world where there are bequests. But if the fiscal action comes in a country with relatively impatient households consumption there will rise. This is because equation (5) must be a strict inequality in a country with less patient households. (It is an equality for households in patient countries, who are assumed to differ only in their rate of time preference). It immediately follows that consumption will be higher as a result of the fiscal policy. Today's young in the country with impatient households find their budget constraint relaxed because they can, effectively, pass on a negative bequest to the next generation who will face the taxes needed to pay off the government debt. The impatient young would treat a transfer from the government, to be paid by future taxes levied on a future generation, in the same way as a pure increase in their endowment. That would increase their immediate consumption by a multiple of $\frac{1}{\left(1+\frac{1}{1+\rho_h}\right)}$ of the transfer. Thus the fiscal multiplier in an impatient country is positive – and is increasing in the rate of time preference – while that in a patient country is zero.

It might be helpful to illustrate the nature of equilibria by making explicit assumptions about rates of time preference and bequest motives. Let us assume that each period in life lasts 30 years. If the annual rate of time preference for the patient is 2% and for the impatient is 7% then so long as the bequest parameter is less than 0.56 then there will be no bequests in any country. In this case the equilibrium interest rate (given by equation (6)), expressed at an annual rate, is very close to 4%. In this case the consumption of the young in impatient countries is about 116% of their endowment and that of the patient young is 84% of their endowment. If the bequest motive is above 0.56 then bequests will arise in economies with more patient households. If the bequest motive is, for example, 0.75 the equilibrium interest rate will fall from 4.0% (no bequest level) to 3.0%. The stock of bequests in patient countries is around 60% of the total endowment of the young. The impatient young now consume about 125% of their endowment. If the bequest parameter (β) is 1, so people care as much about their children's happiness as their own, the real interest rate falls to the rate of time preference of the patient (see equation (8)) – in our example 2%. In this case the stock of bequests is about 95% of the endowment of the young. It is of course possible for the bequest intensity to exceed unity – so that people attach more weight to the happiness of their children than to their own. If the bequest intensity is 1.34 the equilibrium real interest rate falls to 1%; if it is as high as 1.8 the interest rate falls to zero.

In all cases where the bequest motive is operative in more patient countries the fiscal multiplier is positive in impatient countries. With an annual rate of time preference of 0.07, and a period equal to 30 years, the consumption of the young in impatient countries rises by a multiple 0.88 of any fiscal transfer they receive (0.88 = 1/(1+1/(1.07^30))).

4. Empirical strategy

The empirical evidence on fiscal multipliers comes from studies of four main types (DeLong and Summers, (2012)). The first relies on estimates obtained using structural models. The second aims to exploit natural experiments where significant changes in fiscal policy occur as a result of factors unrelated with the economic conjuncture, typically military build-ups coinciding with wars as in Ramey and Shapiro (1998). The third type of study estimate structural VARs, following the lead of Blanchard and Perotti (2002) and Fatás and Mihov (2001)[1]. Another type of evidence comes from studies that estimate "local multipliers", typically measured at a lower level than national aggregates such as in Nakamura and Steinsson (2011) who exploit the regional variation in spending for military projects in the US so as to isolate the effect of fiscal spending from any monetary policy response.

We will adopt the strategy used by Corsetti, Meier and Muller (2012) in their study of how the effects of government spending can vary depending on the economic environment. They employ a two-step estimation process inspired by Perotti (1999). The first step consists of estimating a policy rule that is used to identify exogenous shocks to government spending. In the second step, the spending shocks are used as an explanatory variable in a model for output or other macroeconomic variables of interest. The key advantage of this technique is that it allows us to control for the effects of a wide range of factors that have been identified as having an impact on the multiplier.

In the first-step regression government expenditure in country i ($g_{t,i}$) is regressed on its past values ($g_{t-z,i}$), two lags of log per-capita GDP ($y_{t-z,i}$), one lagged value of a forward-looking indicator of economic conditions (cli_{t-1}), the debt to GDP ratio at the beginning of the period ($b_{t-1,i}$), a trend and a constant. Dummy variables capture characteristics of the economy including the exchange rate regime, strained public finances and the presence of a financial crisis:

$$g_{t,i} = \phi_i + \eta_i trend_t + \vartheta_{i,1} g_{t-1,i} + \vartheta_{i,2} g_{t-2,i} + \sigma_{i,1} y_{t-1,i} + \sigma_{i,2} y_{t-2,i} + \omega_i cli_{t-1,i} + \mu_i b_{t-1,i} + \rho_{i,1} peg_{t-1,i} + \rho_{i,2} strain_{t-1,i} + \rho_{i,3} crisis_{t-1,i} + e_{t,i} \quad \textbf{(9)}$$

[1] See for example Corsetti and Müller (2006), Kim and Roubini (2008).

$\hat{e}_{t,i}$ is therefore interpreted as a fiscal shock. In the second step the estimated fiscal shock $\hat{e}_{t,i}$ is used to measure the impact of government expenditure on output and other macroeconomic variables. We will estimate a version of their second-step model where we also include current and lagged values of an interaction term made up of the fiscal shock $\hat{e}_{t,i}$ multiplied by country specific measures of the rate of time preference (τ_i). The model we estimate takes the following form:

$$x_{t,i} = \alpha_i + \beta x_{t-1,i} + \gamma \hat{e}_{t,i} + \gamma_1 \hat{e}_{t-1,i} + \gamma_2 \hat{e}_{t-2,i} + \gamma_3 \hat{e}_{t-3,i} + \delta(\hat{e} * d_{t,i}) + \delta_1(\hat{e}_{t-1,i} * d_{t-1,i}) + \delta_2(\hat{e}_{t-2,i} * d_{t-2,i}) + \delta_3(\hat{e}_{t-3,i} * d_{t-3,i}) + \theta(\hat{e} * \tau) + \theta_1(\hat{e}_{t-1,i} * \tau_i) + \theta_2(\hat{e}_{t-2,i} * \tau_i) + \theta_3(\hat{e}_{t-3,i} * \tau_i) + \varphi d + \varphi_1 d_{t-1,i} + \varphi_2 d_{t-2,i} + \varphi_3 d_{t-3,i} + u_{t,i} \quad \textbf{(10)}$$

where $x_{t,i}$ indicates the macroeconomic variable of interest (either output or private consumption) and $d_{t,i}$ is a dummy variable signalling a certain feature of the economic environment (presence of a financial crisis, weak public finances and whether the exchange rate is pegged).

In Corsetti, Meier and Müller (2012) equation (10) is estimated using a simple least squares dummy variable (LSDV) estimator. We check that a fixed effects specification is preferable over a pooled OLS model and also use a Hausman test to assess whether a random effects model is more efficient.

Nickell (1981) shows that the LSDV estimator is not consistent in finite T for autoregressive panel-data models such as (10). This inconsistency arises because the autoregressive term in the model is correlated with the error term in the regression. Judson and Owen (1996) estimate that in a panel where T is around 30, as in our case, the bias of estimated coefficients typically lies between 3% and 20%. A number of solutions have been proposed since Nickell's contribution. Some rely on Generalised Method of Moments (GMM) techniques. Judson and Owen (1996) compare LSDV and GMM approaches and recommend using corrected LSDV estimates unless T is very large because GMM's performance improves much more rapidly as T increases. Given that a T of 30 is not very large we will follow the procedure outlined by Bruno (2005) to obtain bias-corrected estimates of the LSDV coefficients (LSDVC). For completeness we also report point estimates and standard errors obtained using GMM as they are found to be significantly more reliable than simple LSDV. We find that GMM estimates differ only marginally from the LSDVC estimates.

Data

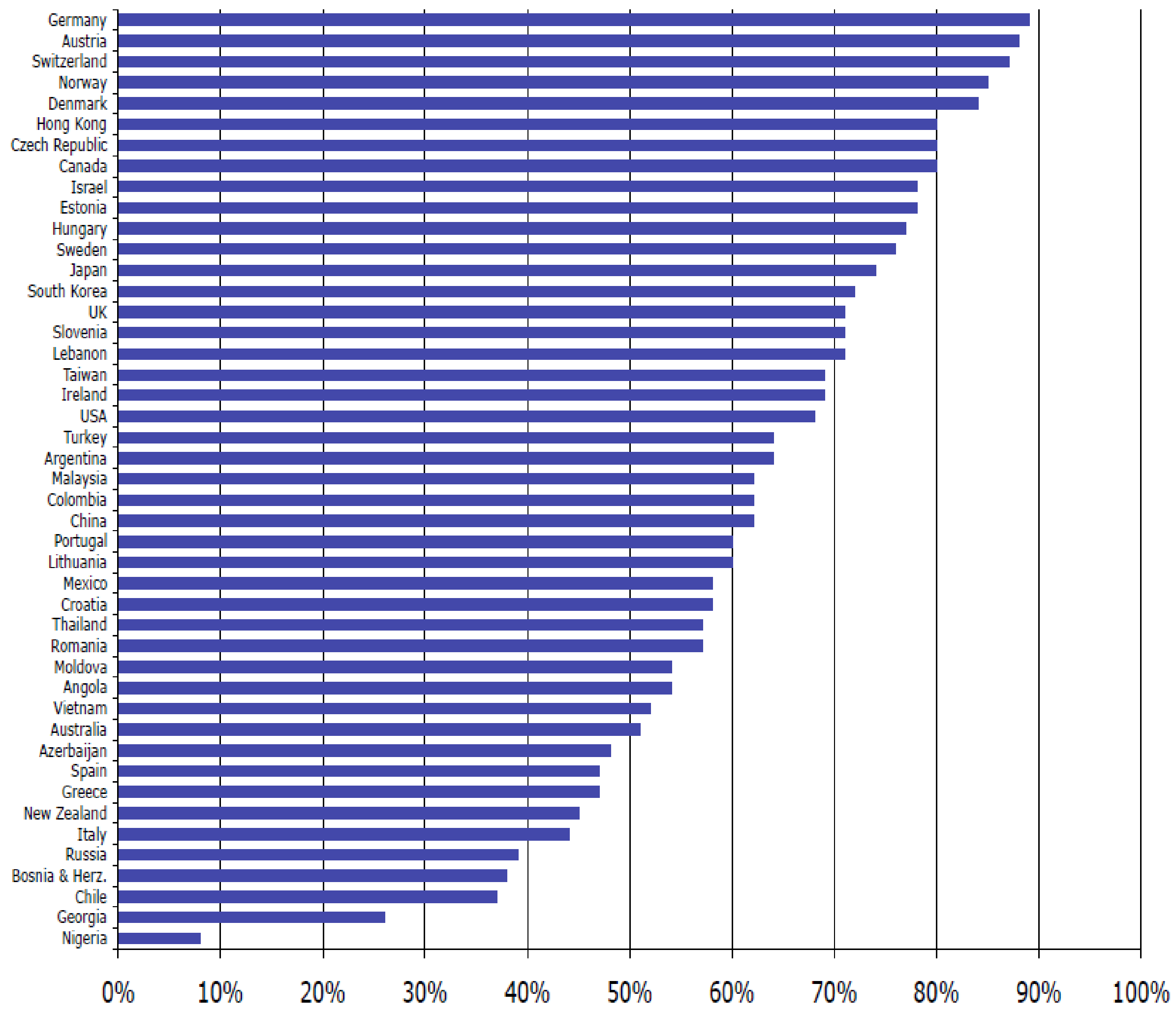
Date on country specific rates of time preference are from Wang, Rieger and Hens (2011). They conducted a large-scale survey across 45 countries, asking common questions to around 6000 young people. The proportion of patient respondents was calculated using the answers to the following question:

"Which offer would you prefer?"

A – a payment of $3400 this month

B – a payment of $3800 next month

Chart 1 – Percentage of survey participants who choose to wait



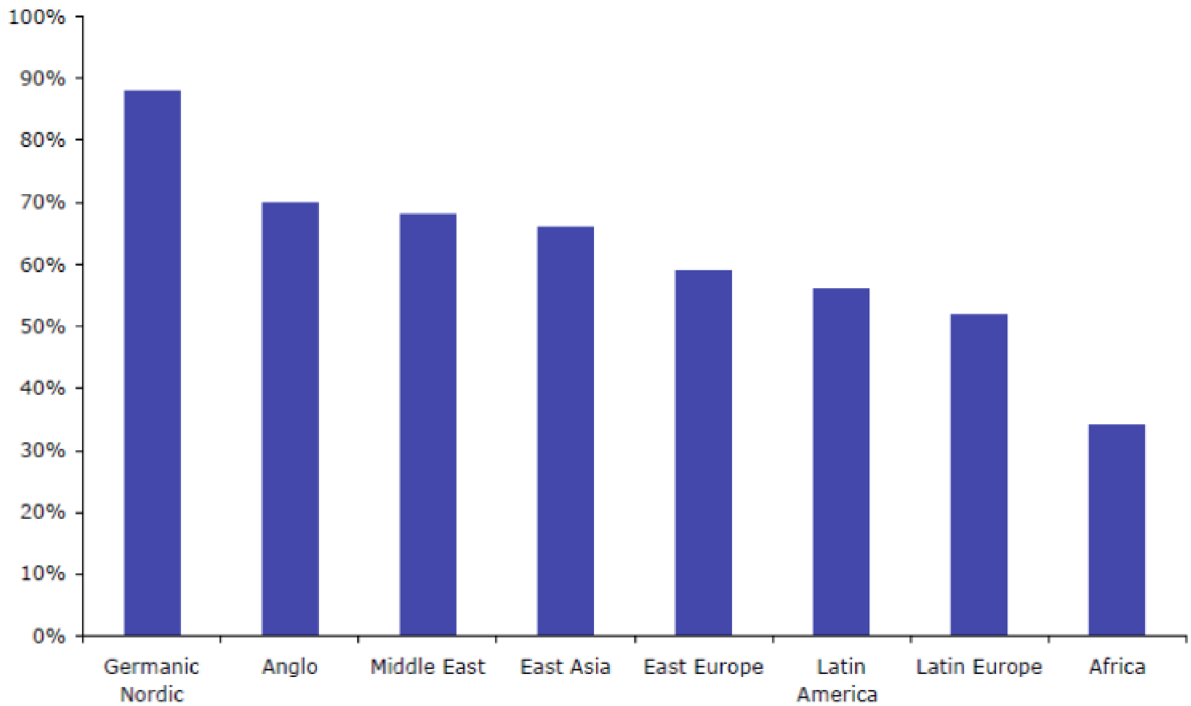
Source: Wang, Rieger and Hens (2011)

The implied rate of return from waiting was nearly 12% over one month, which translates into an annualised return of 280%. This is enormously higher than interest rates that any investor could reasonably expect to achieve in the countries we focus on, where monthly interest rates at the time of the survey were very low and fairly similar. Because of this similarity in nominal interest rates across the developed countries we focus on it is very unlikely that the differences in survey responses across countries significantly reflect differences in rates of return available on bank deposits or loans.

The data from the survey show a substantial heterogeneity of responses across countries. Chart 1 shows the percentage of participants in each country who choose to wait (that is prefer option B). Germany and Austria are at the top of the ranking with nearly 90% of patient respondents. In Italy and Spain there are less than 50% of patient respondents. The four countries had similar short-term interest rates and their longer term sovereign bond yields differed by minimal amounts at the time of the surveys (in 2010).

Wang, Rieger and Hens (2011) perform multivariate regressions where the dependent variable is the proportion of respondents who choose to wait. They attempt to explain its variability using economic variables (inflation, the interest rate and GDP growth), individual characteristics (individualism, uncertainty avoidance and long term orientation) and cultural origin. They find that belonging to different cultural groups, as defined by Chhokar, Brodbeck and House (2007)[2], has a large and statistically significant relationship with the proportion of respondents choosing to wait after controlling for a range of macroeconomic and demographic factors, including access to credit (see Chart 2).

Chart 2 – Percentage of 'patient' respondents by region



Source: Wang, Rieger and Hens (2011)

[2] The cultural groups are: Africa, Anglo/American, Germanic/Nordic, East Asia, Latin America, Latin Europe, Eastern Europe, Middle East.

Wang, Rieger and Hens' (2011) survey contains other results that we use. Survey respondents were asked the following questions:

Please consider the following alternatives

A. a payment of $100 now
B. a payment of $X in one year from now.

X has to be at least $___ , such that B is as attractive as A.

Please consider the following alternatives

A. a payment of $100 now
B. a payment of $X in ten years from now.

X has to be at least $___ , such that B is as attractive as A.

With these questions about 87% of respondents reported an implicit discount rate which was higher over the 1-year period than over 10-year, in line with previous empirical findings[3]. This violates the assumption of the classical utility model which assumes that time preference between adjacent time periods is constant. The quasi-hyperbolic discount model can better account for these observations. It is typically defined as follows:

$$u(x_0, x_1, \dots, x_T) = u(x_0) + \sum_{t=1}^{T} \beta\delta^t u(x_t) \tag{11}$$

where β measures the degree of 'present bias' and δ is a long-term discount factor. When both lie between 0 and 1 people tend to be more patient in the long run than in the immediate future. Wang, Rieger and Hens' (2011) use responses about the reported future value of cash payments at the 1 and 10-year horizon to derive the values of β and δ from the following expressions:

$$100 = \beta\delta X_{1year}, \tag{12}$$

$$100 = \beta\delta^{10} X_{10year} \tag{13}$$

We will use the estimated (country averages) of β *and* δ in our empirical work.

We note that it is not possible to distinguish between survey answers that simply reflect pure time preferences and responses that might also reflect a lack of trust in the questioner. But for our purposes that may not be crucial. Suppose that higher reported time preferences (as measured by the proportion of impatient respondents) were in part being driven by a lack of trust in the promise

[3] See for example Thaler (1981) and Benzion, Rapoport and Yagil (1989).

to provide a higher payment at a later date. In terms of the impact on multipliers any discounting of future possible tax rises or tax cuts that comes from scepticism about government promises might have a similar affect to discounting the impact due simply to a high rate of time preference.

Other data employed

We use the panel dataset employed by Corsetti, Meier and Müller (2012) where full sources for the macroeconomic data used is given. We include 13 countries: Australia, Austria, Canada, Denmark, Ireland, Italy, Japan, Norway, Portugal, Spain, Sweden, the United Kingdom, and the United States. The time-period covered is 1975-2008. The number of countries is constrained by data availability because a minimum of 20 yearly observations is required to obtain reliable estimates of fiscal shocks in the first-step regression. The aggregate expenditure variables are expressed in logs; the trade balance as a % of GDP; inflation and the interest rates are in percent.

The classification of exchange rate regimes are from Iltzezki, Mendoza and Vegh (2011). Financial crises are identified by Reinhart and Rogoff (2008) and Reinhart (2010). Weak public finances are defined as a government debt to GDP ratio of 100% or a budget deficit of 6% as in Corsetti, Meier and Müller (2012).

In order to verify whether the relationship we estimate between reported time preferences and the government expenditure multiplier are robust to the technique and dataset employed, we also used multiplier estimates from the OECD (Economic Outlook Interim Report 2009). OECD staff conducted a survey of multiplier estimates for a cross-section of countries provided by central banks, governments and academic sources. The averages obtained were adjusted for the degree of openness of the country on the basis of sensitivity estimates made by the OECD.

5. Empirical results

The key results are summarised in Table 1. (Full tables of results are shown in Appendix tables A.2-A.4).

We initially estimate (10) including the proportion of patient respondents as the measure of time preference. The sign on the coefficients on current and lagged values of the interaction term of fiscal shocks multiplied by the proportion of patient respondents ($\hat{e}_{t,i} * \tau_i^w$) suggests that the more patient a country's population is the smaller the government expenditure multiplier will be.

Both the dependent variable (private consumption or output) and the explanatory variable of interest (fiscal shocks multiplied by the proportion of patient respondents) are expressed in log levels[4] and therefore the coefficients estimated can be interpreted as elasticities. A simple linear combination of the coefficients on current and lagged values of $\hat{e}_{t,i} * \tau_i^w$ suggests that the effect of a change in the share of patient respondents by 10 percentage points would result in the ratio $\frac{\sum_{j=0}^{4} \Delta C(t+j)}{\sum_{j=0}^{4} \Delta G(t+j)}$ being higher by about 0.35 according to the LSDVC and GMM estimates. A simple F-test for the joint significance of the coefficients easily rejects the null that their sum is equal to zero at the 95% confidence level.

When we estimate a version of the model replacing private consumption with output as the dependent variable, we find that the 4-year cumulative government expenditure multiplier (defined as $\frac{\sum_{j=0}^{4} \Delta Y(t+j)}{\sum_{j=0}^{4} \Delta G(t+j)}$), would be 0.4-0.5 higher as a result of a change in the share of patient respondents by 0.1. In this model specification all the coefficient estimates on the time preference interaction terms are both jointly and individually statistically significant with the exception of the furthest lag. These results suggest that if a typical country has a government expenditure multiplier of 1 and a share of patient respondents of 0.7, then a country that is identical but has a share of patient respondents of 0.6 would be expected to have a multiplier of 1.4-1.5. Given that the standard deviation of the share of patient respondents in the sample of 45 countries surveyed is 0.17, this sensitivity is substantial[5].

Wang, Rieger and Hens (2011) obtained country-level estimates of the present bias and long-term discount factors employing a semi-hyperbolic discount model. We find that the impact of present bias on the multiplier is large and significant whilst the coefficients on the long-term discount factor are not significant individually or jointly. Hence we drop the long-term discount factor from the version of the model we discuss here but report a summary of the relevant coefficients estimated for both specifications in Table 1. We estimate that a present bias discount factor lower by 0.1 (meaning that individuals display more present bias) is associated with the private consumption response to a change in government expenditure being greater by nearly 1 (a whole unit). The government expenditure multiplier is estimated to increase by nearly 0.8 when the present bias discount factor falls by only 0.1.

[4] To be clear, the fiscal shock is expressed in logs and then multiplied by the share of patient respondents.

[5] The subsample we used in our estimates had a mean of 0.69 and S.D. of 0.15. Please see Appendix Table A.1 for a range of summary statistics.

These magnitudes might seem large but it helps to relate the results to the simulations carried out by Galí, López-Salido and Vallés (2007). One might think of the share of impatient respondents in the survey results we use as being an estimate of the proportion of hand-to-mouth consumers. Galí, López-Salido and Vallés (2007) estimate that a 10 percentage points increase in the share of hand-to-mouth consumers would cause the consumption multiplier to be higher by about 0.07 in a model with competitive labour markets and 0.3 when labour markets are assumed to be less competitive. These are estimates of impact multipliers and should be compared with the coefficient on the first lag of the time preference interaction term. Our results fall somewhere in between these two estimates. Our estimated coefficient on the share of patient respondents interaction term implies that a 10 percentage points shock to time preferences changes the multiplier by just over 0.1.

We also assessed the relationship between time preferences and the OECD estimates of fiscal multipliers. The main problem in doing so is the scarcity of fiscal multiplier estimates for a wide range of countries. Matching the data on reported time preferences and that on fiscal multipliers we obtain a cross-section dataset of 21 observations.

We estimated the following cross-section model using OLS:

$$M = \alpha + \beta \times \omega + \varepsilon \qquad \textbf{(14)}$$

Where M is a vector of OECD estimated fiscal multipliers, ω is a vector of the shares of patient respondents, and α is a constant.

Both theory and empirical evidence suggests that the magnitude of the multiplier depends on other factors that are not controlled for in (4). For example, the textbook Mundell-Fleming model suggests that government spending can be successful in stimulating output under fixed exchange rates but ineffective under flexible exchange rates and the empirical work of Iltzetzki, Mendoza and Vegh (2011) supports this view. In light of this we also estimated a richer specification:

$$M = \alpha + \beta \times \omega + \gamma \times FOREX + \delta \times OPEN + \varepsilon \qquad \textbf{(15)}$$

FOREX is a dummy variable that takes a value of 1 where the economy is under a fixed exchange rate regime. OPEN is a dummy variable that takes the value of 1 when the imports to GDP ratio is greater than 0.3.

Table 1 – Summary of estimation results for the time preference terms

	Consumption							Output						
	LSDV			LSDVC	GMM			LSDV			LSDVC	GMM		
	Point est.	SE	P>|t|	Point est.	Point est.	SE	P>|z|	Point est.	SE	P>|t|	Point est.	Point es	SE	P>|z|
$\hat{e}_{t,i} * \tau_i^w$	-1.26	0.85	0.14	-1.53	-1.57	0.69	0.02	-1.41	0.85	0.10	-1.51	-1.75	0.68	0.01
$\hat{e}_{t-1,i} * \tau_i^w$	-1.24	0.81	0.13	-1.44	-1.48	0.66	0.02	-1.11	0.81	0.17	-1.14	-1.47	0.64	0.02
$\hat{e}_{t-2,i} * \tau_i^w$	-0.85	0.81	0.30	-0.99	-0.99	0.64	0.12	-0.86	0.81	0.29	-1.22	-1.38	0.63	0.03
$\hat{e}_{t-3,i} * \tau_i^w$	0.60	0.81	0.46	0.49	0.57	0.67	0.40	-0.24	0.81	0.77	-0.33	-0.53	0.66	0.43
	Consumption							Output						
	LSDV			LSDVC	GMM			LSDV			LSDVC	GMM		
	Point est.	SE	P>|t|	Point est.	Point est.	SE	P>|z|	Point est.	SE	P>|t|	Point est.	Point es	SE	P>|z|
$\hat{e}_{t,i} * \tau_i^{pb}$	-3.32	1.22	0.01	-3.62	-3.59	1.00	0.00	-4.21	1.21	0.00	-4.68	-4.83	0.97	0.00
$\hat{e}_{t-1,i} * \tau_i^{pb}$	-2.87	1.24	0.02	-2.95	-2.91	1.01	0.00	-2.60	1.23	0.04	-2.23	-2.64	0.98	0.01
$\hat{e}_{t-2,i} * \tau_i^{pb}$	-2.00	1.22	0.10	-2.64	-2.60	0.99	0.01	-0.88	1.20	0.47	-1.64	-1.70	0.96	0.08
$\hat{e}_{t-3,i} * \tau_i^{pb}$	-0.80	1.19	0.50	-0.96	-0.99	1.00	0.32	-0.06	1.17	0.96	0.13	0.12	0.97	0.90
$\hat{e}_{t,i} * \tau_i^{lt}$	1.51	3.86	0.70	-0.58	-1.01	3.16	0.75	-2.25	3.81	0.56	-4.21	-5.12	3.08	0.10
$\hat{e}_{t-1,i} * \tau_i^{lt}$	-1.72	3.74	0.65	-2.76	-3.15	3.06	0.30	-7.17	3.68	0.05	-6.81	-7.19	2.98	0.02
$\hat{e}_{t-2,i} * \tau_i^{lt}$	1.31	3.68	0.72	-0.15	0.08	2.98	0.98	0.38	3.63	0.92	-2.07	-1.92	2.91	0.51
$\hat{e}_{t-3,i} * \tau_i^{lt}$	-2.70	3.50	0.44	-3.72	-3.45	3.00	0.25	-4.23	3.45	0.22	-4.19	-3.59	2.92	0.22

Where τ_i^w is the share of patient respondents in country i; τ_i^{pb} is the present bias parameter, which corresponds to β in (11); τ_i^{lt} is the discount factor which corresponds to δ in (11).

	Consumption							Output						
	LSDV			LSDVC	GMM			LSDV			LSDVC	GMM		
	Point est.	SE	P>|t|	Point est.	Point est.	SE	P>|z|	Point est.	SE	P>|t|	Point est.	Point es	SE	P>|z|
$\hat{e}_{t,i} * \tau_i^{pb}$	-1.26	0.85	0.14	-1.53	-1.57	0.69	0.02	-1.41	0.85	0.10	-1.51	-1.75	0.68	0.01
$\hat{e}_{t-1,i} * \tau_i^{pb}$	-1.24	0.81	0.13	-1.44	-1.48	0.66	0.02	-1.11	0.81	0.17	-1.14	-1.47	0.64	0.02
$\hat{e}_{t-2,i} * \tau_i^{pb}$	-0.85	0.81	0.30	-0.99	-0.99	0.64	0.12	-0.86	0.81	0.29	-1.22	-1.38	0.63	0.03
$\hat{e}_{t-3,i} * \tau_i^{pb}$	0.60	0.81	0.46	0.49	0.57	0.67	0.40	-0.24	0.81	0.77	-0.33	-0.53	0.66	0.43

Table 2 shows the results from the estimation of the two specifications of the model. The coefficient on the proportion of respondents who choose to wait is negative and statistically significant. This indicates that the higher the degree of patience reported in a given country the lower a fiscal multiplier we can expect to observe. The magnitude of the coefficient estimated however implies that a 10pp difference in the share of respondents choosing to wait is associated with a multiplier being only 0.03-0.04 higher. This impact is considerably smaller than that we estimated earlier.

TABLE 2

	Equation (14)	Equation (15)
Wait	-.3933**	-.3235**
FOREX		-.0757**
OPEN		-.1621**
_constant	.7371**	.8374**
R-squared	.22	.77
Adj. R-squared	.18	.73
F-stat	5.39	18.8

**Indicates statistical significance at the 95% confidence level.

The coefficient on the degree of openness of the economy is also negative and statistically significant at the 95% confidence level, in line with our expectations. It is somewhat more puzzling to observe that the presence of a fixed exchange rate regime appears to lower the size of the multiplier.

6. Conclusions

We estimate a large and statistically significant relationship between reported time preferences and the impact of government expenditure on private consumption and on output. We find that where consumers have a higher rate of time preference and are less patient the estimated multiplier effect tends to be greater. The magnitude of the impact of time preferences on the fiscal multiplier we have estimated are economically very substantial. It may be no accident that within Europe, and in the wake of the financial crisis and resulting sovereign debt crisis, those countries whose representatives seem most in favour of rapid fiscal consolidation – crudely speaking the Germanic and Northern European countries – are those where rates of time preference appear to be lowest.

The results reported here suggest that fiscal multipliers in those countries might also be low, and so the cost of fiscal consolidation there is also relatively low. But the countries in Europe where fiscal deficits and debt levels are highest are largely in the south, where average rates of time preference seem to be greatest and where fiscal multipliers – and so the cost of reducing deficits rapidly – would tend to be larger.

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Appendix

Table A.1 – Summary statistics for the time preference variables of the countries included in our regressions

	Mean	**Standard deviation**	**Minimum value**	**Maximum value**
Share of 'patient' respondents	0.69	0.15	0.44	0.88
Long-term discount factor	0.84	0.03	0.78	0.90
Present bias factor	0.73	0.1	0.60	0.97

Table A.2– Estimates for model specification using the proportion of patient respondents as measure of time preference

DEPENDENT VARIABLE →	Consumption							Output						
	LSDV			LSDVC	GMM			LSDV			LSDVC	GMM		
	Point est.	SE	P>|t|	Point est.	Point est.	SE	P>|z|	Point est.	SE	P>|t|	Point est.	Point est.	SE	P> |z|
$x_{t-1,i}$	0.99	0.01	0.00	0.99	0.99	0.01	0.00	0.98	0.01	0.00	0.99	0.98	0.00	0.00
$\hat{e}_{t,i}$	0.90	0.67	0.18	0.99	1.02	0.55	0.06	1.09	0.67	0.10	1.17	1.36	0.54	0.01
$\hat{e}_{t-1,i}$	0.90	0.64	0.16	0.96	1.00	0.51	0.05	0.76	0.64	0.24	0.76	1.03	0.51	0.04
$\hat{e}_{t-2,i}$	0.42	0.64	0.51	0.49	0.50	0.50	0.32	0.47	0.64	0.46	0.73	0.87	0.49	0.08
$\hat{e}_{t-3,i}$	-0.40	0.65	0.54	-0.40	-0.46	0.53	0.38	0.18	0.65	0.78	0.25	0.34	0.52	0.51
$\hat{e} * d^{c}_{t,i}$	1.06	0.35	0.00	1.16	1.11	0.29	0.00	0.66	0.35	0.06	0.70	0.65	0.28	0.02
$\hat{e}_{t-1,i} * d^{c}_{t-1,i}$	0.12	0.36	0.73	0.21	0.18	0.28	0.53	0.11	0.36	0.77	0.14	0.14	0.28	0.61
$\hat{e}_{t-2,i} * d^{c}_{t-2,i}$	0.25	0.36	0.49	0.31	0.28	0.28	0.31	0.42	0.36	0.23	0.47	0.39	0.27	0.16
$\hat{e}_{t-3,i} * d^{c}_{t-3,i}$	-0.04	0.33	0.90	0.07	0.03	0.29	0.90	0.17	0.33	0.61	0.16	0.18	0.28	0.51
$\hat{e} * d^{bp}_{t,i}$	-0.17	0.25	0.49	-0.14	-0.12	0.19	0.53	-0.30	0.25	0.23	-0.38	-0.34	0.19	0.08
$\hat{e}_{t-1,i} * d^{bp}_{t-1,i}$	0.18	0.25	0.47	0.29	0.30	0.19	0.12	-0.20	0.25	0.41	-0.09	-0.08	0.19	0.68
$\hat{e}_{t-2,i} * d^{bp}_{t-2,i}$	0.54	0.23	0.02	0.33	0.33	0.19	0.08	0.66	0.23	0.01	0.42	0.44	0.19	0.02
$\hat{e}_{t-3,i} * d^{bp}_{t-3,i}$	0.47	0.24	0.05	0.61	0.61	0.19	0.00	0.17	0.24	0.47	0.30	0.27	0.18	0.15
$\hat{e} * d^{peg}_{t,i}$	-0.04	0.23	0.85	-0.01	-0.05	0.19	0.80	0.15	0.23	0.53	0.12	0.10	0.19	0.59
$\hat{e}_{t-1,i} * d^{peg}_{t-1,i}$	-0.06	0.23	0.79	0.00	-0.05	0.19	0.80	0.07	0.23	0.75	0.07	0.01	0.18	0.97
$\hat{e}_{t-2,i} * d^{peg}_{t-2,i}$	-0.19	0.23	0.40	-0.15	-0.17	0.18	0.33	-0.26	0.22	0.25	-0.27	-0.31	0.17	0.08
$\hat{e}_{t-3,i} * d^{peg}_{t-3,i}$	-0.07	0.23	0.75	-0.01	-0.01	0.19	0.96	-0.05	0.23	0.82	-0.11	-0.06	0.18	0.73
$d^{c}_{t,i}$	-0.01	0.00	0.03	-0.01	-0.01	0.00	0.00	-0.01	0.00	0.06	-0.01	-0.01	0.00	0.01
$d^{c}_{t-1,i}$	-0.01	0.01	0.13	-0.01	-0.01	0.00	0.02	-0.01	0.01	0.12	-0.01	-0.01	0.00	0.02
$d^{c}_{t-2,i}$	0.00	0.01	0.86	0.00	0.00	0.01	0.49	0.00	0.01	0.75	0.00	0.00	0.01	0.82
$d^{c}_{t-3,i}$	0.01	0.01	0.26	0.00	0.00	0.00	0.31	0.01	0.01	0.19	0.01	0.01	0.00	0.12
$d^{bp}_{t,i}$	-0.01	0.00	0.08	-0.01	-0.01	0.00	0.05	-0.01	0.00	0.06	-0.01	-0.01	0.00	0.10
$d^{bp}_{t-1,i}$	0.00	0.01	0.54	0.00	0.00	0.00	0.88	0.00	0.01	0.53	0.00	0.00	0.00	0.26
$d^{bp}_{t-2,i}$	0.00	0.01	0.41	0.00	0.00	0.00	0.51	0.00	0.01	0.67	0.00	0.00	0.00	0.54
$d^{bp}_{t-3,i}$	0.00	0.00	0.41	0.00	0.00	0.00	0.24	0.00	0.00	0.41	0.00	0.00	0.00	0.40
$d^{peg}_{t,i}$	-0.01	0.01	0.45	0.00	0.00	0.01	0.86	0.00	0.01	0.91	0.01	0.00	0.01	0.89
$d^{peg}_{t-1,i}$	-0.01	0.02	0.37	-0.02	-0.02	0.01	0.19	-0.01	0.02	0.58	-0.02	-0.02	0.01	0.23
$d^{peg}_{t-2,i}$	0.02	0.02	0.12	0.03	0.03	0.01	0.03	0.00	0.02	0.88	0.00	0.00	0.01	0.99
$d^{peg}_{t-3,i}$	-0.01	0.01	0.24	-0.02	-0.01	0.01	0.17	0.00	0.01	0.70	0.00	0.00	0.01	0.82
$\hat{e}_{t,i} * \tau^{w}_{i}$	-1.26	0.85	0.14	-1.53	-1.57	0.69	0.02	-1.41	0.85	0.10	-1.51	-1.75	0.68	0.01
$\hat{e}_{t-1,i} * \tau^{w}_{i}$	-1.24	0.81	0.13	-1.44	-1.48	0.66	0.02	-1.11	0.81	0.17	-1.14	-1.47	0.64	0.02
$\hat{e}_{t-2,i} * \tau^{w}_{i}$	-0.85	0.81	0.30	-0.99	-0.99	0.64	0.12	-0.86	0.81	0.29	-1.22	-1.38	0.63	0.03
$\hat{e}_{t-3,i} * \tau^{w}_{i}$	0.60	0.81	0.46	0.49	0.57	0.67	0.40	-0.24	0.81	0.77	-0.33	-0.53	0.66	0.43
Constant	0.19	0.06	0.00	n/a	0.3	0.05	0	0.23	0.06	0.00	n/a	0.30	0.05	0.00

Where $d^{c}_{t,i}$ is a dummy variable taking the value of 1 where a country is experiencing a financial crisis; $d^{bp}_{t,i}$ is a dummy variable taking the value of 1 where a country is experiencing weak public finance conditions (as defined in the text); $d^{peg}_{t,i}$ indicates the presence of a fixed exchange rate regime; τ^{w}_{i} is the share of patient respondents in country i. τ^{pb}_{i} is the present bias parameter, which corresponds to β in (11); τ^{lt}_{i} is the discount factor which corresponds to δ in (11).

Table A.3 - Estimates for model specification using the present bias as a measure of time preference

DEPENDENT VARIABLE →	Consumption							Output						
	LSDV			LSDVC	GMM			LSDV			LSDVC	GMM		
	Point est.	SE	P>|t|	Point est.	Point est.	SE	P>|z|	Point est.	SE	P>|t|	Point est.	Point est.	SE	P> |z|
$x_{t-1,i}$	0.98	0.01	0.00	0.99	0.99	0.01	0.00	0.98	0.00	0.00	0.98	0.97	0.00	0.00
$\hat{e}_{t,i}$	2.34	0.89	0.01	2.37	2.39	0.74	0.00	2.98	0.88	0.00	3.25	3.28	0.72	0.00
$\hat{e}_{t-1,i}$	1.87	0.89	0.04	1.82	1.84	0.72	0.01	1.47	0.88	0.10	1.23	1.55	0.71	0.03
$\hat{e}_{t-2,i}$	1.22	0.88	0.16	1.65	1.67	0.70	0.02	0.46	0.87	0.60	0.98	1.03	0.69	0.14
$\hat{e}_{t-3,i}$	0.53	0.86	0.54	0.52	0.58	0.72	0.42	-0.15	0.86	0.86	-0.28	-0.34	0.70	0.63
$\hat{e} * d^{c}_{t,i}$	1.10	0.35	0.00	1.15	1.05	0.28	0.00	0.72	0.34	0.04	0.69	0.53	0.28	0.06
$\hat{e}_{t-1,i} * d^{c}_{t-1,i}$	0.20	0.35	0.57	0.27	0.21	0.28	0.45	0.16	0.35	0.64	0.15	0.05	0.28	0.85
$\hat{e}_{t-2,i} * d^{c}_{t-2,i}$	0.28	0.35	0.43	0.36	0.31	0.28	0.26	0.40	0.35	0.25	0.45	0.30	0.27	0.27
$\hat{e}_{t-3,i} * d^{c}_{t-3,i}$	-0.13	0.33	0.69	-0.04	-0.07	0.28	0.82	0.04	0.32	0.89	-0.06	-0.12	0.28	0.68
$\hat{e} * d^{bp}_{t,i}$	-0.04	0.24	0.88	0.01	0.01	0.19	0.95	-0.17	0.24	0.46	-0.26	-0.22	0.19	0.25
$\hat{e}_{t-1,i} * d^{bp}_{t-1,i}$	0.27	0.24	0.25	0.42	0.40	0.19	0.03	-0.11	0.23	0.64	0.01	0.02	0.18	0.92
$\hat{e}_{t-2,i} * d^{bp}_{t-2,i}$	0.63	0.22	0.01	0.40	0.40	0.19	0.03	0.72	0.22	0.00	0.47	0.48	0.18	0.01
$\hat{e}_{t-3,i} * d^{bp}_{t-3,i}$	0.41	0.22	0.06	0.59	0.58	0.18	0.00	0.20	0.22	0.35	0.32	0.29	0.17	0.09
$\hat{e} * d^{peg}_{t,i}$	-0.01	0.23	0.96	0.00	-0.02	0.19	0.92	0.14	0.23	0.54	0.06	0.07	0.19	0.70
$\hat{e}_{t-1,i} * d^{peg}_{t-1,i}$	0.01	0.23	0.96	0.07	0.06	0.18	0.73	0.12	0.23	0.59	0.11	0.08	0.18	0.65
$\hat{e}_{t-2,i} * d^{peg}_{t-2,i}$	-0.13	0.22	0.56	-0.10	-0.11	0.18	0.51	-0.20	0.22	0.37	-0.21	-0.23	0.17	0.17
$\hat{e}_{t-3,i} * d^{peg}_{t-3,i}$	-0.11	0.22	0.64	-0.06	-0.06	0.18	0.76	-0.09	0.22	0.70	-0.16	-0.11	0.18	0.55
$d^{c}_{t,i}$	-0.01	0.00	0.01	-0.01	-0.01	0.00	0.00	-0.01	0.00	0.04	-0.01	-0.01	0.00	0.01
$d^{c}_{t-1,i}$	-0.01	0.01	0.19	-0.01	-0.01	0.00	0.04	-0.01	0.01	0.13	-0.01	-0.01	0.00	0.03
$d^{c}_{t-2,i}$	0.00	0.01	0.82	0.00	0.00	0.01	0.43	0.00	0.01	0.67	0.00	0.00	0.01	0.73
$d^{c}_{t-3,i}$	0.00	0.01	0.36	0.00	0.00	0.00	0.46	0.01	0.01	0.27	0.01	0.01	0.00	0.20
$d^{bp}_{t,i}$	-0.01	0.00	0.12	-0.01	-0.01	0.00	0.13	-0.01	0.00	0.08	-0.01	-0.01	0.00	0.15
$d^{bp}_{t-1,i}$	0.00	0.01	0.48	0.00	0.00	0.00	0.99	0.00	0.01	0.73	0.00	0.00	0.00	0.32
$d^{bp}_{t-2,i}$	0.00	0.00	0.50	0.00	0.00	0.00	0.72	0.00	0.00	0.64	0.00	0.00	0.00	0.50
$d^{bp}_{t-3,i}$	0.00	0.00	0.41	0.00	0.00	0.00	0.25	0.00	0.00	0.36	0.00	0.00	0.00	0.29
$d^{peg}_{t,i}$	-0.01	0.01	0.40	0.00	0.00	0.01	0.93	0.00	0.01	0.93	0.01	0.00	0.01	0.82
$d^{peg}_{t-1,i}$	-0.01	0.02	0.38	-0.02	-0.02	0.01	0.24	-0.01	0.02	0.55	-0.02	-0.02	0.01	0.25
$d^{peg}_{t-2,i}$	0.02	0.02	0.11	0.03	0.03	0.01	0.02	0.00	0.02	0.93	0.00	0.00	0.01	0.86
$d^{peg}_{t-3,i}$	-0.01	0.01	0.22	-0.02	-0.01	0.01	0.10	0.00	0.01	0.67	0.00	0.00	0.01	0.81
$\hat{e}_{t,i} * \tau^{pb}_{i}$	-3.38	1.20	0.01	-3.54	-3.55	0.97	0.00	-4.13	1.19	0.00	-4.44	-4.48	0.95	0.00
$\hat{e}_{t-1,i} * \tau^{pb}_{i}$	-2.71	1.21	0.03	-2.76	-2.78	0.98	0.01	-2.19	1.20	0.07	-1.88	-2.28	0.96	0.02
$\hat{e}_{t-2,i} * \tau^{pb}_{i}$	-2.08	1.20	0.08	-2.71	-2.73	0.96	0.00	-0.94	1.19	0.43	-1.64	-1.67	0.94	0.08
$\hat{e}_{t-3,i} * \tau^{pb}_{i}$	-0.65	1.17	0.58	-0.73	-0.84	0.97	0.39	0.25	1.16	0.83	0.47	0.49	0.95	0.60
Constant	0.19	0.06	0.00		0.18	0.06	0.00	0.24	0.06	0.00		0.31	0.05	0.00

Where $d^{c}_{t,i}$ is a dummy variable taking the value of 1 where a country is experiencing a financial crisis; $d^{bp}_{t,i}$ is a dummy variable taking the value of 1 where a country is experiencing weak public finance conditions (as defined in the text); $d^{peg}_{t,i}$ indicates the presence of a fixed exchange rate regime; τ^{w}_{i} is the share of patient respondents in country i. τ^{pb}_{i} is the present bias parameter, which corresponds to β in (11); τ^{lt}_{i} is the discount factor which corresponds to δ in (11).

Table A.4 - Estimates for model specification using the present bias and long term discount rate as a measure of time preference

DEPENDENT VARIABLE →	**Consumption**							**Output**						
	LSDV			LSDVC	GMM			LSDV			LSDVC	GMM		
	Point est.	SE	P>|t|	Point est.	Point est.	SE	P>|z|	Point est.	SE	P>|t|	Point est.	Point est.	SE	P> |z|
$x_{t-1,i}$	0.98	0.01	0.00	0.99	0.98	0.01	0.00	0.98	0.01	0.00	0.98	0.97	0.00	0.00
$\hat{e}_{t,i}$	0.99	3.59	0.78	2.93	3.27	2.94	0.27	4.96	3.54	0.16	7.05	7.94	2.87	0.01
$\hat{e}_{t-1,i}$	3.47	3.51	0.32	4.34	4.64	2.88	0.11	7.94	3.46	0.02	7.34	8.00	2.80	0.00
$\hat{e}_{t-2,i}$	0.02	3.40	1.00	1.72	1.50	2.79	0.59	0.09	3.35	0.98	2.75	2.72	2.72	0.32
$\hat{e}_{t-3,i}$	2.97	3.23	0.36	3.89	3.66	2.79	0.19	3.73	3.18	0.24	3.59	3.06	2.72	0.26
$\hat{e} * d^{c}_{t,i}$	1.08	0.35	0.00	1.14	1.05	0.28	0.00	0.74	0.34	0.03	0.69	0.55	0.28	0.05
$\hat{e}_{t-1,i} * d^{c}_{t-1,i}$	0.21	0.36	0.55	0.31	0.26	0.29	0.36	0.28	0.35	0.43	0.25	0.17	0.28	0.54
$\hat{e}_{t-2,i} * d^{c}_{t-2,i}$	0.27	0.36	0.45	0.38	0.32	0.29	0.26	0.41	0.36	0.26	0.51	0.36	0.28	0.19
$\hat{e}_{t-3,i} * d^{c}_{t-3,i}$	-0.10	0.33	0.76	0.00	-0.05	0.29	0.86	0.06	0.33	0.87	-0.06	-0.15	0.29	0.60
$\hat{e} * d^{bp}_{t,i}$	-0.02	0.25	0.94	0.02	0.02	0.20	0.92	-0.19	0.25	0.45	-0.27	-0.26	0.20	0.18
$\hat{e}_{t-1,i} * d^{bp}_{t-1,i}$	0.24	0.25	0.32	0.38	0.36	0.20	0.07	-0.21	0.24	0.39	-0.07	-0.09	0.19	0.66
$\hat{e}_{t-2,i} * d^{bp}_{t-2,i}$	0.66	0.23	0.00	0.43	0.43	0.20	0.03	0.76	0.23	0.00	0.47	0.46	0.19	0.02
$\hat{e}_{t-3,i} * d^{bp}_{t-3,i}$	0.36	0.23	0.11	0.55	0.54	0.18	0.00	0.15	0.22	0.51	0.30	0.27	0.18	0.13
$\hat{e} * d^{peg}_{t,i}$	0.04	0.25	0.89	-0.01	-0.03	0.21	0.90	0.12	0.25	0.64	-0.05	-0.06	0.21	0.78
$\hat{e}_{t-1,i} * d^{peg}_{t-1,i}$	-0.05	0.24	0.84	-0.01	-0.01	0.20	0.97	-0.05	0.24	0.85	-0.03	-0.07	0.19	0.73
$\hat{e}_{t-2,i} * d^{peg}_{t-2,i}$	-0.08	0.24	0.72	-0.09	-0.10	0.19	0.59	-0.18	0.23	0.45	-0.24	-0.27	0.18	0.14
$\hat{e}_{t-3,i} * d^{peg}_{t-3,i}$	-0.16	0.24	0.49	-0.14	-0.15	0.20	0.45	-0.20	0.23	0.38	-0.28	-0.24	0.19	0.20
$d^{c}_{t,i}$	-0.01	0.00	0.01	-0.01	-0.01	0.00	0.00	-0.01	0.00	0.04	-0.01	-0.01	0.00	0.01
$d^{c}_{t-1,i}$	-0.01	0.01	0.20	-0.01	-0.01	0.00	0.04	-0.01	0.01	0.12	-0.01	-0.01	0.00	0.02
$d^{c}_{t-2,i}$	0.00	0.01	0.88	0.00	0.00	0.01	0.43	0.00	0.01	0.73	0.00	0.00	0.01	0.66
$d^{c}_{t-3,i}$	0.01	0.01	0.32	0.00	0.00	0.00	0.46	0.01	0.01	0.20	0.01	0.01	0.00	0.18
$d^{bp}_{t,i}$	-0.01	0.00	0.15	-0.01	-0.01	0.00	0.16	-0.01	0.00	0.17	0.00	0.00	0.00	0.18
$d^{bp}_{t-1,i}$	0.00	0.01	0.46	0.00	0.00	0.00	0.93	0.00	0.01	0.90	0.00	0.00	0.00	0.37
$d^{bp}_{t-2,i}$	0.00	0.01	0.46	0.00	0.00	0.00	0.75	0.00	0.00	0.59	0.00	0.00	0.00	0.30
$d^{bp}_{t-3,i}$	0.00	0.00	0.47	0.00	0.00	0.00	0.29	0.00	0.00	0.38	0.00	0.00	0.00	0.27
$d^{peg}_{t,i}$	-0.01	0.01	0.46	0.00	0.00	0.01	1.00	0.00	0.01	0.85	0.01	0.00	0.01	0.96
$d^{peg}_{t-1,i}$	-0.01	0.02	0.36	-0.02	-0.02	0.01	0.19	-0.01	0.02	0.47	-0.02	-0.02	0.01	0.18
$d^{peg}_{t-2,i}$	0.03	0.02	0.09	0.03	0.03	0.01	0.02	0.00	0.02	0.94	0.00	0.00	0.01	0.87
$d^{peg}_{t-3,i}$	-0.02	0.01	0.17	-0.02	-0.02	0.01	0.08	0.00	0.01	0.92	0.00	0.00	0.01	0.99
$\hat{e}_{t,i} * \tau^{pb}_{i}$	-3.32	1.22	0.01	-3.62	-3.59	1.00	0.00	-4.21	1.21	0.00	-4.68	-4.83	0.97	0.00
$\hat{e}_{t-1,i} * \tau^{pb}_{i}$	-2.87	1.24	0.02	-2.95	-2.91	1.01	0.00	-2.60	1.23	0.04	-2.23	-2.64	0.98	0.01
$\hat{e}_{t-2,i} * \tau^{pb}_{i}$	-2.00	1.22	0.10	-2.64	-2.60	0.99	0.01	-0.88	1.20	0.47	-1.64	-1.70	0.96	0.08
$\hat{e}_{t-3,i} * \tau^{pb}_{i}$	-0.80	1.19	0.50	-0.96	-0.99	1.00	0.32	-0.06	1.17	0.96	0.13	0.12	0.97	0.90
$\hat{e}_{t,i} * \tau^{lt}_{i}$	1.51	3.86	0.70	-0.58	-1.01	3.16	0.75	-2.25	3.81	0.56	-4.21	-5.12	3.08	0.10
$\hat{e}_{t-1,i} * \tau^{lt}_{i}$	-1.72	3.74	0.65	-2.76	-3.15	3.06	0.30	-7.17	3.68	0.05	-6.81	-7.19	2.98	0.02
$\hat{e}_{t-2,i} * \tau^{lt}_{i}$	1.31	3.68	0.72	-0.15	0.08	2.98	0.98	0.38	3.63	0.92	-2.07	-1.92	2.91	0.51
$\hat{e}_{t-3,i} * \tau^{lt}_{i}$	-2.70	3.50	0.44	-3.72	-3.45	3.00	0.25	-4.23	3.45	0.22	-4.19	-3.59	2.92	0.22
Constant	0.19	0.06	0.00		0.19	0.06	0.001	0.24	0.06	0.00		0.33	0.05	0.00

Where $d^{c}_{t,i}$ is a dummy variable taking the value of 1 where a country is experiencing a financial crisis; $d^{bp}_{t,i}$ is a dummy variable taking the value of 1 where a country is experiencing weak public finance conditions (as defined in the text); $d^{peg}_{t,i}$ indicates the presence of a fixed exchange rate regime; τ^{w}_{i} is the share of patient respondents in country i. τ^{pb}_{i} is the present bias parameter, which corresponds to β in (11); τ^{lt}_{i} is the discount factor which corresponds to δ in (11).