BANK OF GREECE
EUROSYSTEM

Working Paper

Fiscal policy and financial market movements

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JULY 2010

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Printed in Athens, Greece
at the Bank of Greece Printing Works.

ISSN 1109-6691

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ABSTRACT

This paper estimates a fiscal policy reaction function in order to investigate the links between financial and real estate market movements and fiscal policy outcomes. An increase in asset prices affects in a positive and significant manner primary balances, with the response reflecting both an increase in government revenues and a fall in government spending. The most important impact on fiscal balances is due to changes in residential property prices. Changes in equity and commercial property prices are also important determinants of fiscal balances. Our findings suggest that the steepening of the slope of the yield curve contributes to expenditure based fiscal discipline.

*Keywords***:** Asset prices, slope of the yield curve, fiscal policy, reaction functions.

*JEL classification***:** E61, E62, H61, H62, E32

Acknowledgements: I would like to thank Michael Artis, Claudio Borio, Heather Gibson, Peter Kurrild-Klitgaard, Pok-sang Lam, Ike Mathur, William F. Shughart, Ludger Schuknecht, and Joel Slemrod. The views of the paper are my own and do not necessarily reflect those of the Bank of Greece.

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1. Introduction

In the midst of the on-going macroeconomic and financial market crisis, fiscal policy making has been at the forefront. Several governments around the globe have decided to undertake a significant fiscal impulse to boost economic activity. These actions involved both discretionary demand boosting measures, as well as measures to restore financial stability in the banking sector i.e., equity injections, subsidies, asset purchases, loan guarantees etc. Moreover, monetary authorities around the world, in response to the crisis, have engaged in an unprecedented monetary easing.

The recent economic and financial market developments go hand in hand with a significant fall in asset prices, which in several asset classes and countries resemble the case of an asset price bust, following several years of asset price boom (e.g., house price developments in Ireland, the UK, Spain and the US). These developments had significant implications for fiscal balances, both through automatic and discretionary fiscal policy responses.

Given that the links between the real economy and the financial sector could pose risks to economic and financial stability, one of the issues arising is to better understand the feedback loops between government activity and financial and real estate markets. The IMF (2009a) states that "continued favourable treatment of housing in many countries has supported high housing prices, while mortgage interest relief—where it remains—may have encouraged heavy household leverage. [1] The risks in distorting a market so central to financial stability reinforce long-standing efficiency and equity arguments for more neutral taxation." Finally, the IMF (2009a) concludes that "tax measures can have significant effects on asset price dynamics, but are unlikely to be the best way to deal with bubbles". However, early alleviation of tax distortions could have contributed to reducing the impact of factors that have facilitated excessive leveraging and led to high debt levels, paving, thus, the way for the recent financial crisis (IMF, 2009a). As pointed out by Wolswijk (2010), fiscal instruments may be useful either for preventing or for correcting some housing market disequilibrium. Moreover, "structural fiscal measures such as reducing mortgage interest relief and increasing reliance on quick adjustments of tax

[1] IMF (2009a) discusses links between tax policy issues, excessive leveraging and the development of asset price bubbles.

bases to market price developments appear to be useful options for governments for limiting growth rates of mortgages and house prices". [2]

Furthermore, as economic conditions improve[3] the policy focus will shift to the sustainability of fiscal balances implying that governments will start withdrawing the sizeable fiscal policy stimulus packages and the financial sector support schemes. In view of the forthcoming gradual economic recovery, asset prices have started to improve (see BIS, 2009; IMF, 2010), which provides a boost to public finances, through the revenue channel. However, given that uncertainty remains high and that the recovery might be more gradual than expected, this could have significant effects, in terms of volatility, on asset markets and asset prices, which have a negative feedback effect on fiscal balances and the fiscal consolidation effort.[4]

The on-going crisis is a very rare episode in terms of its severe and world wide implications and because of the strong and coordinated policy responses that followed it. However, it could certainly imply that fiscal policy makers might put more of their attention on financial and real estate market developments and might try to avert analogous events in future years. Moreover, although governments have not (prior to the current crisis) publicly announced measures or their intention to stabilize the financial system and asset price movements, it could be the case that over the course of recent years they have gradually paid more attention to financial and real estate market developments. Therefore, it is of real interest to better understand fiscal responses to asset price changes, as well as to economic shocks, and how the two interrelate and constrain government reaction.

[2] Ireland has recently used tax measures to bolster house prices (removed tax duty on first time buyers and extended mortgage interest relief), the 2003 cuts in dividend taxation and capitals gains tax in the US is estimated to have increased share prices by about 6 percent (IMF, 2009a), whereas Korea took measures to curb house price increases in 2005 (national level progressive property tax) and 2007 (progressive capital gains tax).

[3] On July 7, 2010 the IMF pubished updated World Economic Outlook projections pointing to rebounding economic activity, stronger than previously anticipated. Moreover, financial markets recovered faster than expected, helped by strengthening economic activity.

[4] According to the 2010 Global Risk report of the World Economic Forum " the risk of an asset price collapse remains the strongest risk" which "illustrates the continuing uncertainty about the resilience of the global economy and the effectiveness of fiscal and monetary responses, governance and regulation". Furthermore, as stated by the G20 Finance Ministers at the June 2010 meeting in the Republic of Korea "the global economy continues to recover faster than anticipated", however, "the recent volatility in financial markets reminds us that significant challenges remain" and that "the recent events highlight the importance of sustainable public finances and the need for countries to put in place credible, growth-friendly measures, to deliver fiscal sustainability".

In addition, as noted by Cottarelli and Viñals (2009), the design and implementation of strategies for the management of private sector assets acquired by governments during the crisis should also support fiscal exit strategies, i.e., fiscal consolidation strategies. As the authors point out: " Policies should also ensure adequate recovery of the value of assets acquired by the public sector during the crisis." In this regard, the design and implementation and success of fiscal consolidation strategies can both affect and be affected by asset price developments.[5]

While there has been an extensive literature on the appropriate monetary policy making in response to asset price movement (e.g., see Borio and Lowe 2002; Detken and Smetts 2004; Miskin and White 2003; Bordo and Jeanne 2002a, 2002b), the literature on the appropriate fiscal policy response is far less developed. In addition, there is only limited empirical evidence on the linkages between government finances and asset prices and on whether fiscal policy has been affected by asset prices changes.

A series of recent contributions investigate the effects that financial market movements and in particular asset price changes have on fiscal balances (e.g., Eschenbanch and Schuknecht 2002, Jaeger and Schuknecht 2004, Morris and Schucknecht 2007). These were motivated by the asset price boom of the late 1990s and the windfall revenues it generated, which were then deemed as being of a structural nature leading to permanent improvement in fiscal positions. However, the subsequent burst of the asset price bubble led to a significant deterioration of fiscal balances, hindering the sustainability of fiscal positions and limiting the budgetary room for maneuver during the downturn of the early 2000s. Therefore, most contributions focus on whether fiscal revenues should be adjusted both for the economic and the asset price cycle. Another class of studies like Honohan and Kliengebiel (2003), Schuknect and Eschenbanch (2004), Reinhart and Rogoff (2009) and European Commission (2009) discuss in detail the fiscal implications of past financial and banking crises.

[5] Cottarelli and Viñals (2009) point out that "country authorities may occasionally face trade-offs between rapidly reselling assets to the private sector as soon as acquired banks or companies return to profitability, against a more gradual approach that might ultimately yield larger gains to the government's budget". See also IMF (2009b) for a broader discussion, on crisis-related measures in the financial system and sovereign balance sheet risks.

The present paper builds on these earlier contributions and investigates the links between financial market movements and fiscal policy developments. It goes beyond the aforementioned studies (i.e., on whether government revenues should be adjusted both for the economic and the asset price cycle) in that it investigates, by means of fiscal policy reaction functions whether there is any evidence that fiscal balances (primary balances, current expenditure and current revenue) have been affected by or responded to financial and real estate market movements (i.e., changes in residential, commercial property and equity prices and changes in the slope of the yield curve).

Following several studies in the literature (e.g., Gali and Perotti 2003, Celasun et al 2006, Celasun and Kang 2006, Golinelli and Momigliano 2009, Afonso and Hauptmeir 2009), we estimate fiscal policy reaction functions or fiscal policy rules in order to identify a stable relationship between the fiscal policy variable of interest and financial market variables and to better understand whether financial market developments might shape and be correlated with policy makers' decisions and their debt sustainability and cyclical stabilization motives. Therefore, we try to understand how fiscal policy responds to or is affected by financial and real estate market changes (e.g. asset price changes) and real economy developments and how the two interrelate and constrain or reinforce government reaction.[6]

These issues are particularly relevant and should be taken on board by policy makers because financial market developments (like a steeper yield curve) might reflect market concerns regarding the sustainability of a country's fiscal position. Furthermore, asset price movements are relevant for the following reasons: (1) they should be controlled for in order for the policy maker to have a better grasp of the actual cyclically adjusted fiscal stance[7]; (2) they could carry information on cyclical economic conditions, on top of the information provided by economic activity

[6] For example, if a government wants to engage in pro-cyclical fiscal tightening when the economy is still below trend (as in the current juncture) and asset prices increase fast, then fiscal balances will be affected positively. However, if this asset price increase is reverted then the consolidation effort would be disrupted both due to an automatic response and because there might be wider implications for the financial system, warranting discretionary fiscal action.

[7] For example, the measures of fiscal policy stance (cyclically adjusted primary balances or structural balance) used for policy analysis and fiscal surveillance by international institutions (see e.g., IMF,2010; OECD, 2008; European Commission, 2009) are only corrected for the economic cycle (output gap movements) and, at times, one-off policy changes.

variables. This would imply that fiscal policy makers should build up fiscal buffer (e.g., by using windfall revenues) for rainy days to come when economic conditions are good and when asset prices are booming.

Our findings suggest that financial market variables play a very important role. An increase in asset prices affects in a positive and significant manner primary balances, with the response reflecting both an increase in government revenues and a cut in government spending. The most important impact on fiscal balances is due to changes in residential property prices. Equity price changes and commercial property price changes were also found to be important determinants of fiscal balances. The importance of residential property and equity prices as determinant of primary balances has increased over the course of the years. The effect of residential property prices, in recent years, reflects an automatic rather than a discretionary response of cyclically adjusted fiscal balances. In the case of equity prices, there is both an automatic and a discetionary response. The steepening of the slope of the yield curve contributes to fiscal discipline, in particular in recent years, by inducing expenditure cuts.

Section 2 summarizes previous findings and discusses potential channels of interaction between financial and real estate market movements and budgetary outcomes. Section 3 discusses methodological issues and presents the data and the empirical model. Section 4 presents the main findings. Robustness analysis is conducted in section 5. The last section summarizes the main findings and concludes.

2. Financial markets movements and interactions with budgetary outcomes: previous work and theoretical background

2.1 Previous work

As stated beforehand, earlier contributions focus on whether fiscal balances and in particular government revenues should be adjusted both for the economic and the asset price cycle or discuss the fiscal implications of past financial and banking crises. In this section, we summarize the most relevant papers related to the current study.

Jaeger and Schuknecht (2004), focusing on three asset classes - equities, residential property and commercial property - examine the effect of boom and bust phases in asset prices on fiscal policy behavior. After identifying boom and bust phases in asset prices, they examine whether these coincide with output gap and output growth developments. They found that (i) expansions and contractions in economic activity during such boom-bust phases in asset prices tend to be highly persistent, (ii) conventional estimates of tax elasticities are not accurate, leading to a biased assessment of the fiscal stance and the underlying fiscal position in boom-bust phases, (iii) boom-bust phases exacerbate existing pro-cyclical policy biases, and political economy biases toward higher spending and public debt ratios.

On the other hand, Morris and Schucknecht (2007) investigate the impact that asset prices have on fiscal revenues. They estimate short and long-run revenue elasticities with respect to equity and real estate price indices for 16 OECD countries. For a sub-sample of euro area countries, they use these elasticities to investigate the impact of asset prices on budget balances and the assessment of the fiscal stance by adjusting existing estimates of cyclically adjusted balances for the asset price "cycle". Asset prices changes are found to be a major factor behind unexplained changes in cyclically adjusted balances. Tujula and Wolswijk (2004) investigate what determines overall, non-cyclically adjusted, fiscal balances in 22 OECD countries. The empirical analysis shows that asset prices (housing and equity prices) affect budgetary outcomes, but their effect is limited in normal times.

Eschenbanch and Schuknecht (2002) examine econometrically the effect of asset prices on fiscal balances via the revenue channels, i.e., via direct, indirect and capital turnover taxes. They find that a 10% change in stock and real estate prices affects the fiscal balance by on average 0.4% of GDP in most industrialized OECD countries with values ranging from 0.1% to 0.8% of GDP depending on the country. Schuknecht and Eschenbanch (2004) investigate the effect that asset prices have on fiscal balances via expenditure and government financial activities by focusing on specific countries (UK and Sweden) that have experienced strong asset price fluctuations, financial instability and government bailouts. They conclude that financial instability increases the variability of fiscal balances. Sweden and the UK experienced in the late 1980s-early 1990s a dramatic deterioration in fiscal balances

by 9% and 16%, respectively. According to Schuknect and Eschenbanch (2004) 40-50% of this deterioration was due to asset price and financial instability related effects on revenues and financial sector bail-out costs. Moreover, the authors report that financial instability led to significant debt ratio increases in six industrialized countries (Sweden, Finland, Japan, France, UK, Switzerland) ranging from 11 to 50% of GDP.

Honohan and Kliengebiel (2003) and European Commission (2009) discuss in detail the fiscal implications of past financial and banking crises. Laeven and Valencia (2008) construct a new dataset of systemic banking crises. According to these papers, excluding the on-going crisis which is not covered by our sample, past banking and financial crisis that affected OECD countries and required public intervention occurred in Australia in 1989-1992, in Finland in 1991-1994, in France in 1994-1995, in Japan in 1992-2005, in Sweden in 1991-1994, in the US in 1981-1991 and 1998, and in Norway in 1987.

Moreover, as is shown by Reinhart and Rogoff (2009), financial and banking crisis have substantial implications. First of all, the collapse of asset markets is deep and prolonged. Reinhart and Rogoff (2009) find that "on a peak-to-trough basis, real housing price declines average 35 percent stretched out over six years, while equity price collapses average 55 percent over a downturn of about three and a half years." The unemployment rate rises by about 7 percentage points over the four years of the down phase of the cycle and output falls by about 9 percent, but the duration of the downturn last only two years. In the aftermath of several financial crises the real value of government debt (not the debt to GDP ratio) rose on average by 86 percent in a panel of developed and developing economies. According to Reinhart and Rogoff (2009) "the big drivers of debt increases are the inevitable collapse in tax revenues that governments suffer in the wake of deep and prolonged output contractions, as well as often ambitious countercyclical fiscal policies aimed at mitigating the downturn". Moreover, the authors find in a companion paper

(Reinhart and Rogoff, 2008) that the widely cited costs of bailing out and recapitalizing the banking system are not the main cause of debt explosions.[8]

2.2 Theoretical background: potential channels of interaction between financial market movements and budgetary outcomes

As has been discussed by relevant literature, e.g., Eschenbach and Schuknecht (2002), Honohan and Kliengebiel (2003), Schuknecht and Eschenbach (2004), (Reinhart and Rogoff, 2008, 2009) and European Commission (2009) , financial markets and in particular asset prices can affect the budget via a series of channels. Directly via certain revenue categories, e.g., capital gains-losses related taxes. These affect direct taxes on households and corporations. Moreover, the government raises revenues via transactions in assets, the so-called turnover taxes[9]. Indirectly, via a feedback loop from asset prices to the real economy. Higher asset prices raise consumer confidence and consumption, via the wealth effect, and increase the collection of indirect taxes. Moreover, in case of asset price busts and ailing financial institutions, the state might be asked to intervene bearing some of the costs. The government's intervention to bailout financial institutions affects public finances via several channels. In the case that they take the form of budgetary subsidies or expenditures, they directly affect the budget deficit. However, if they take the form of financial transactions, e.g., purchase of assets or equity injections, they will affect only the debt ratio. In case of guarantees extended to the private sector, the government will be burdened only at the time that the guarantees on loans are called in.

There is an additional indirect channel, i.e., if the asset price bust leads to financial instability and induces a negative feedback loop on economic activity, the

[8] Ardagna (2009) adopts a somewhat different perspective investigating the behavior of financial markets around large changes in fiscal stance. Whereas, Tagkalakis (2009) investigates the impact of asset price changes on the probability to initiate and successfully conclude a fiscal consolidation effort. Ardagna (2009) shows that stock market prices surge around times of substantial fiscal tightening and plunge in periods of very loose fiscal policy. Hence, financial markets appear to welcome fiscal consolidation efforts and punish governments that have a loose fiscal stance, i.e., they seem to react in anticipation of the future path of government debt-to-GDP ratio. In addition, Ardagna (2009) shows that fiscal adjustments that occur in country-years with high levels of government deficit, that are implemented by cutting government spending, and that generate a permanent and substantial decrease in government debt are associated with larger increases in stock market prices. Tagkalakis (2009) finds that a pick up in asset prices increases the probability of initiating a fiscal adjustment. However, this does not always lead to a sustainable correction of fiscal imbalances.

[9] See also Appendix 1.

government might have to undertake expansionary fiscal measures to avert the danger of a full blown economic recession, leading to a deterioration of its budgetary position (see e.g., European Commission, 2009).[10]

Turning now to the yield curve, we know that (usually) it has a positive slope (the difference between the long and short-term nominal interest rates), which implies that yields rise as maturity lengthens (see James and Webber 2001, Cairns 2004). A positive slope reflects that economic prospects will improve and that inflation will further rise in the future, which means that there are expectations of tighter monetary policy in the future to dampen inflationary pressures.[11] This means that investors will require a higher risk premium associated with future inflation uncertainty. This will be reflected in higher long-term interest rates. In addition, the fact that an economy faces more uncertainty about future events, which are likely to impact on investments, can lead to higher long-term rates. Moreover, if financial markets perceive that there will be greater risks in the future in terms of the long-term sustainability of public finances, then this will be translated into higher spread between long-term and short-term nominal interest rates.[12]

Therefore, an increase in the differential between long and short-term nominal interest rates (or the slope of the yield curve) can have significant implications for fiscal balances to the extent that it implies an increase in debt servicing costs and the debt ratio.[13] This market disciplining effect is likely to contribute to fiscal consolidation.

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[10] The performance of financial and real estate market movements can affect public pension reserve funds, which support social security systems, to the extent they have invested in these asset classes. This could affect the viability of social security systems, in case asset prices deteriorate sharply, which could impact on social security spending and related benefits (lowering pension related expenditures), as well as on the level of contributions paid by employers and employees (increasing the contributions paid to improve the viability of the system). According to OECD (2010), public pension reserve funds in some countries were hit badly by the financial crisis during 2008. However thanks to the rebound in equity prices that started in March 2009 they experience a strong recovery in performance in 2009, which largely made up for the losses suffered in the previous year.

[11] According to the arbitrage pricing theory, if investors expect a future rise in the risk free rate, then it is better to postpone their investment in order to receive a better rate in the future. Those investors willing to invest now will have to be compensated for the future rate rise.

[12] The slope of the yield curve is also influenced by current demand and supply factors for debt instruments in different maturities irrespective of market's views about future events. For example, if the demand for long-term government bonds exceeds their supply their yield can fall.

[13] However, in cases of rising long-term interest rates, governments usually tend to substitute away from long-term debt instruments to medium and short-term debt instruments in order to alleviate the impact of rising rates on debt servicing. Therefore, an increase in the differential between the long and short-term interest rates might not increase immediately debt servicing costs. This strategy cannot be pursued for long, as it will reduce the average duration of outstanding debt, increasing the uncertainty and volatility of debt servicing.

3. DATA, methodological issues and the empirical model

3.1 Data

We used a yearly unbalanced panel data set (1970-2005) of 17 OECD economies: Australia, Belgium, Canada, Germany, Denmark, Spain, Finland, France, United Kingdom, Ireland, Italy, Japan, Netherlands, Norway, New Zealand, Sweden, and the United States. The macroeconomic variables used extend from 1970 to 2005 and are taken from the OECD Economic Outlook (2008). The definitions used are: primary balance as a percent of GDP (PBY), cyclically adjusted primary balance as a percent of GDP (CAPBY), debt ratio as a percent of GDP (Debt), current expenditure excluding interest payments as a percent of GDP (CDXY), current revenue excluding interest receipts as a percent of GDP (CRXY), output gap (ygap), the short-term nominal interest rate, the long-term nominal interest rate, and the GDP deflator. The difference between the long and short-term nominal interest rates is used as a proxy for the slope of the yield curve. The inflation variable reported is the GDP deflator based inflation rate.

Following previous studies, e.g,. Borio and Lowe (2002), Detken and Smetts (2004), Jaeger and Schuknecht (2004) our asset price indicators are taken from the Bank for International Settlements (BIS). The main indicator is the growth rate of the annual aggregate real asset prices (AP), which covers 1970-2005 for 17 industrial countries and combines price indices for three asset classes - equities, residential property and commercial property – by weighting the components using shares of the asset classes in private sector wealth. The private consumption deflator is used to convert nominal to real asset prices. In addition, we consider also the growth rates of the three disaggregated asset price indicators, i.e., real commercial prices (CP), real residential prices (RP) and real equity prices (EP).[14]

3.2 Methodological issues

Following earlier studies (e.g., Gali and Perotti, 2003; Celasun et al 2006; Celasun and Kang, 2006; Golinelli and Momigliano, 2009; Afonso and Hauptmeir,

[14] See Appendix 2 for additional information on data sources, definitions and descriptive statistics.

2009), we aim to identify the factors that might shape and be correlated with policy makers' decisions. In our case we estimate fiscal policy reaction functions augmented with asset price variables, this way we explore whether asset price swings have influenced the fiscal policy stance, as well as whether they have been taken into account by policy makers in their effort to stabilize the economy.

Fiscal policy reaction functions usually have been examined for two reasons: (1) to investigate whether authorities are driven by debt stabilization and sustainability motives; and (2) to examine the cyclical stabilization properties of fiscal policy. In the first case, this would imply a positive response of budget balances (primary balance or the cyclically adjusted primary balance) to the debt to GDP ratio. Several studies have found positive evidence on this, e.g., Celasun et al (2006), Afonso and Hauptmeir (2009), Golinelli and Momigliano (2009). In the second case, one would expect that budget balances would react negatively to either the output gap or the GDP growth rate, i.e., that fiscal policy would be countercyclical. Evidence is mixed here. For example, Bernoth et al. (2008) using the measurement error made in the real time evaluation of the output gap find a countercyclical fiscal policy response. Forni and Momigliano (2004) working with real time output gap data find a countercyclical response when output gaps are negative. According to Celasun et al. (2006), primary balances react in a countercyclical manner to output gap, but they attribute this to the worsening of fiscal balances in recessions, rather than improvements during booms. Afonso and Hauptmeir (2009) find an acyclical response, whereas Gali and Perotti (2003) find a pro-cyclical response before Maastricht and an acyclical response in the post-Maastricht period. Candelon et al (2010) cast doubt on the findings reported by Gali and Perotti (2003) and present evidence of a procyclical fiscal policy in the post-Maastrich era.[15] Golinelli and Momigliano (2009) find evidence in favor of a pro-

[15] Beetsma and Giuliodori (2010) based on real time data differentiate between fiscal plans and their implematation for OECD countries over the period 1995-2006 and find that there are marked differences in behavior between the planning and implementation stages, as well as between the fiscal policy of EU countries and other OECD countries. Planned fiscal policy is acyclical for EU countries and countercyclical for the other OECD countries. However, in the implementation stage, the EU countries react procyclically to unexpected changes in the output gap, while the responses of the other OECD countries are a-cyclical.

cyclical response and present an extensive discussion of earlier studies where it is shown that in most cases fiscal policy is either pro-cyclical or acyclical.[16]

Fiscal policy reaction functions have been examined for additional reasons. For example, Claeys (2006) examines, on top of the debt sustainability and cyclical stabilization motives of a fiscal policy maker, whether there is any interaction with the setting of monetary policy. To this end he augments the fiscal reaction function with the short-term interest rate (central bank rate), while also taking into account the deviation of inflation from target in line with Benigno and Woodford (2003). The assumption employed by Claeys (2006) is that reactions to the central bank rate are backward looking, because fiscal policy is set infrequently, whereas monetary policy can react immediately, anticipating any fiscal policy response. In some of the countries examined (e.g., Austria, the Netherlands), fiscal policy is found to be set as a substitute to monetary policy, i.e., an interest rate hike of 1% lowers primary surpluses by about 0.3% of GDP. Moreover, Claeys (2006) reports that a pick up in inflation leads to a tighter fiscal stance in these countries, implying that in the context of the EMU fiscal policy plays a role in targeting inflation and stabilizing the economy. [17]

Celasun et al. (2006) examine primary surplus behavior and risks to fiscal sustainability in emerging market economies. On top of the typical determinants of primary balances, e.g., the outstanding level of public debt and the gap between actual and trend output, they consider factors that are likely to be important drivers of primary balances such as, the real oil price, institutional quality, whether the country is in a state of sovereign default and whether it is committed to an IMF program. According to the findings of the paper, a pick-up in real oil prices contributes positively to primary balances. Countries in default (with restricted market access) and those involved in IMF supported programs run higher surpluses. Improvements

[16] According to Iltzeki and Végh (2008) fiscal policy is procyclical in developing countries. Interestingly enough and contrary to the typical finding in the literature they also find substantial evidence of procyclicality in high-income countries. Moreover, the authors find a significant expansionary effect of government consumption on output in developing countries. This provides empirical support for the when-it-rains-it-pours hypothesis: procyclical government consumption in developing countries implies that fiscal policy exacerbates the business cycle. The authors also find some support for this channel in high-income countries.

[17] According to Claeys (2006) the relevance of fiscal policy interactions with monetary policy variables extents beyond the EMU. The hypothesis that interest rates and inflation are not significant elements in the fiscal rule cannot be rejected in Japan, Germany and France, but it is rejected in the US, Italy, the UK, Spain, Netherlands, and Austria.

in institutional quality (which imply decreases in borrowing costs) are accosiated with lower fiscal effort.

3.3 The empirical model

We estimate a fiscal policy reaction function as in (1), where i (i=1…N) stands for country and index t (t=1..T) indicates period:

$$S_{it} = \alpha_1 S_{it-1} + \alpha_2 ygap_{it} + \alpha_3 D_{it-1} + \alpha_4 X_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (1)$$

η_i and λ_t stand for unobserved country and time effects, respectively. Time effects are used in order to reduce the omitted variable bias from the simple specification used (see Afonso and Hauptmeier 2009, Golinelli and Momigliano 2009). S_t is the ratio of the primary balance to GDP, $ygap_t$ is the cyclical indicator (output gap), D_{it-1} stands for the lagged debt to GDP ratio, and X_t are financial market variables. In principle, one should have used the term $E_{t-1}ygap_{it}$, which is the output gap at time t expected at time t-1, reflecting the fact that, usually, fiscal policy decisions for the next year (the budget law) are taken in the autumn of t-1. As stated in Gollineli and Momigliano (2009), by using the contemporaneous value of the output gap, one refers to the year in which budgetary actions are in effect, whereas using its lagged value (t-1) reflects the time when budgetary decisions are taken. However, as pointed out by the authors, both options "lead to similar results, since values of the output gap are highly persistent". The response to the cyclical component captures the systematic discretionary and automatic responses; ε_{it} is the random component, which could be perceived as reflecting the non-systematic policy response or the fiscal policy shocks, which are independent across countries.[18]

Our fiscal policy variable of interest is the ratio of the primary balance to GDP (as in e.g., Clayes 2006, Balassone et al. 2008, Afonso and Hauptmeir 2009) and not its cyclically adjusted value. This is done for two reasons: (1) to avoid the caveats in estimating cyclically adjusted balances, i.e., defining trend/potential output (see, Tujula and Wolswijk 2008); and (2) because policy makers are often more concerned

[18]According to Blanchard and Perotti (2002) and Gali and Perotti (2003), fiscal policy actions are decomposed into: (1) the automatic responses of spending and taxes to cyclical economic conditions; (2) the systematic discretionary response of fiscal variables to macroeconomic developments; and (3) the shock component or unanticipated discretionary fiscal policy actions.

with, and can observe contemporaneously only, the headline or non cyclically adjusted figures.[19]

Nevertheless, the distinction between the discretionary and cyclical (or automatic) fiscal policy responses is a relevant one. In the case of the non-adjusted primary balance, the coefficient on the output gap will reflect both the automatic response and the discretionary response to the economic cycle (output gap). In the case of the cyclically adjusted primary balance, the coefficient on the output gap will reflect only the discretionary response to the economic cycle. This distinction could also interact and affect the response of the fiscal policy makers to asset price changes. To this end, and as a robustness test, we will also examine the impact of asset price changes on cyclically adjusted primary balances.

A significant effect of asset price changes on cyclically adjusted primary balances would suggest that asset prices affect fiscal balances independently and on top of variations in cyclical economic conditions (output gap). Therefore, this implies that the policy maker explicitly responds to asset price changes. Alternatively, if the policy maker does not take into account asset prices and does not respond intentionally to their movements, then the significant impact of asset prices on cyclically adjusted primary balances merely reflects the fact that the policy maker does not have a full grasp of his or her main policy instrument (the fiscal stance).[20] This limits his or her ability to effectively stabilize economic activity and to address debt sustainability concerns. Hence, the fiscal policy maker should take into account asset price changes when forming his or her policy decisions (e.g., by correcting fiscal balances for asset price movements).

Later on we will also investigate the effect of asset price movements on government revenue and spending. A significant and positive effect on government revenue following a pick up in asset prices will most likely reflect an automatic (non-discretionary) fiscal policy response. On the other hand, a significant impact effect

[19] As stated in Golinelli and Momigliano (2009), "the use of the primary balance instead of the overall balance reflects the fact that the reaction to interest payments should be essentially captured by the debt variable" .

[20] This could be the case because the discretionary fiscal policy stance we are using (and is also used by fiscal policy makers and international institutions like the IMF, the OECD and the European Commission to assess fiscal policy developments and to conduct fiscal policy surveillance) is only net out of the effect of the output gap, whereas it is not net out of the automatic effect of asset price changes, which mainly comes from the revenue side. See for example, OECD (2008), European Commission (2009), IMF (2010), where the biggest focus is on cyclically adjusted primary balances (or structural balance), where no account is taken of asset price movements.

on government spending will most likely reflect a discretionary fiscal policy response to asset price changes (given that there no spending items that respond contemporaneously and in an automatic manner to asset price movements).

Following previous studies (e.g., Gali and Perotti 2003, European Commission 2006, Clayes 2006), we use the output gap in levels as indicator of the cyclical conditions. By focusing on the output gap we are interested in whether the economy is above or below trend (its potential); the use of output growth would hint at whether the economy is in upturn or downturn. However, the economy could register positive growth rates and still be below trend, which makes the output gap more relevant for assessing cyclical economic conditions.

We use the growth rate of each asset price indicator because we want to investigate the abrupt changes in asset prices and their impact on fiscal balances. In any case, investigating whether asset prices are above or below trend and defining their trend value is highly contentious. In principle, this should not only involve simple statistical techniques like applying Hodrick-Prescott filters, but it should investigate whether asset prices are above or below the value which is justified by economic fundamentals. Moreover, policymakers and economic actors care more about the implications of, and observe, the abrupt changes in asset prices rather than whether they are above or below trend.

Given the fact that there is a feedback from cyclical economic activity to financial markets, e.g., asset prices, it would be important to net out this effect to the extent possible. Although the correlation coefficients between the output gap and the changes in asset price variables are not very big (the biggest one is 0.45 for residential property prices; see Appendix 2, Table 18), it might be the case that part of the fiscal policy response to the asset price variable is due also to variations in cyclical economic conditions (to the feedback from output gap movements to asset price changes), i.e., the asset price variable captures part of the output gap effect. Multicollinearity between the two variables could possibly render insignificant and reduce substantially the size of the coefficient estimate on the output gap. To address this concern, we regress each asset price variable on the contemporaneous and the first and second lagged values of the output gap variable. In a similar vein to Buch et

al. (2010), we then use as our asset price variables the residuals from these four regressions (respectively for aggregate asset prices (RAP), residential (RRP), commercial property (RCP) and equity prices (REP)).[21] Each of these new asset price variables will be practically uncorrelated (orthogonal) with the output gap (see Appendix 2, Table 18) and their coefficient estimates will solely reflect their impact on fiscal balances (cyclically or non cyclically adjusted), independent of any output gap movements.

The presence of a lagged dependent variable implies that estimating equation (1) with fixed effect OLS and IV estimators render the coefficient estimates inconsistent. Following Celasun et al. (2006) and Gollineli and Momigliano (2009), we take into account the possibility of endogeneity of the output gap with contemporaneous fiscal shocks. To this end, we instrument it with variables exogenous to the idiosyncratic primary balance shocks. The most appropriate estimation technique is to employ a dynamic panel data one-step system GMM estimator (see Blundell and Bond 1998, Roodman, 2009b) in line with Celasun et al. (2006) and Golinelli and Momigliano (2009). In addition, as is pointed out by Celasun and Kang (2006) "if other regressors in the fiscal reaction function such as the output gap are potentially endogenous to contemporaneous primary balance shocks and would need to be instrumented", then the Arellano and Bond (1991) and Blundell and Bond (1998) GMM estimators are "the best performing estimator for the coefficients of the endogenous variables". Celasun and Kang (2006) conclude that "tests of fiscal policy countercyclicality would preferably be based on GMM methods using exogenous instruments for the output gap."[22] Following Gollinelli and Momigliano (2009) and Celasun et al. (2006) we are using a subset of the available instrument matrix, i.e., we use the t-2 to t-4 lags of the primary balance to GDP ratio, of the output gap and of the respective financial market variable used, and the t-3 to

[21] Buch, Carstensen and Schertler (2010) apply the same principle in a panel VAR context where they investigate whether banks' foreign assets respond to macroeconomic shocks. To this end, they use as interest rate, price and GDP shocks the disturbances retrieved from a three variable VAR (using interest rates, prices and GDP). Note that asymptotic efficiency and consistency of the standard errors of these variables comes from the orthogonality condition (the disturbances of the three equation VAR model are transformed into structural shocks by means of a Choleski decomposition).

[22] Although Arellano and Bover (1995) have shown that GMM estimators based on orthogonal deviations might perform better than IV estimators in the case of dynamic panel data, there is still some debate in the literature as regards the properties of the two estiamtors. Specifically, Harris and Matyas (2004) have shown that GMM estimators might be biased when the sample size is finite.

t-5 lags of the debt to GDP ratio.[23,24] The specific decision on the subset of instruments to be used in each case that will be presented below, takes into account the performance of the Sargan test of overidentifying restrictions and the absence of second order autocorrelation in first difference errors (i.e., that moment conditions are valid). [25,26]

4. Findings

Our starting point is a benchmark regression which includes no financial market variables (see Table 1, column 1). However, the findings for the lagged dependent variable, the lagged debt ratio and the output gap are comparable in all variants of the estimated model in Table 1 (see columns 1 – 13). The coefficient estimate of the lagged dependent variable is positive and highly significant, implying that a 1 percentage point (pp) increase in the ratio of primary balance to GDP at t-1 will lead to a 0.8 percentage point (pp) increase in the ratio of primary balance to GDP at time t. This persistence in the reaction of the primary balance might reflect the lengthy parliamentary processes and related sunk decisions, which make the fiscal instrument react gradually to its target (Claeys 2006). An increase in the debt ratio leads to higher primary surpluses in line with the debt stabilization motive, but its coefficient estimate is small and not significant.[27] On the other hand, fiscal policy appears to be very reactive to cyclical developments. An increase in the output gap

[23] Candelon et al. (2010) use a GMM estimator to address the lagged dependent variable problem, but instrument the euro area output gap with lagged values of the US output gap.

[24] The system GMM estimator is less affected by the weak instrument problem compared to the differenced GMM (Arellano and Bond 1991). See the discussion in Celasun and Kang (2006), Hayakawa (2007) and Gollineli and Momigliano (2009). Omitting the more distant lags might not lead to significant loss of information, see Bond (2002) and Roodman (2009a) on the implication of using too many instruments.

[25] When we specify that lagged levels of the left and right hand side variables dated t-a to t-b are used as instruments in the difference equation, then in the level equation we use as instruments the first difference dated at t-a+1 of the left and right hand side variables. For example, in the difference equation when we use as instruments the t-2 to t-4 lags of PBY, ygap and RAP and the t-3 to t-5 lags of Debt. In the level equation we use as instruments : the first lag (dated at t-1) of the first difference of PBY(t-1), RAP(t-1), ygap(t-1) and Debt(t-2).

[26] In all specifications, the test on overidentifying restrictions indicates that the hypothesis that the instruments are valid cannot be rejected and that there is no higher-order autocorrelation. In some of the models that will be presented below, wider subsets of instruments were used than the one presented above.

[27] In line with Afonso and Hauptmeier (2009) we have investigated whether the level of the debt ratio matters. Specifically we have constructed a dummy taking value 1 if the ratio is above 60% of GDP and 0 otherwise. We then interact the dummy with the debt variable. Our findings indicate that high debt appears to matter more for fiscal balances; however, the results are still not statistically significant.

by 1% leads to a close to 0.2pp increase in the ratio of primary surplus to GDP, pointing to a countercyclical response. This positive effect captures both the automatic response of fiscal policy, as well as the systematic discretionary fiscal policy response to the cycle. This finding is in line with those reported by Celasun et al. (2006) and Claeys (2006) (for the US and Japan), Bernoth et al. (2008), Forni and Momigliano (2004).

[Table 1 around here]

Turning to the financial market variables, it should be stressed that we are investigating how fiscal policy responds to or is affected by their changes. We examine two specifications, in the first case the asset price variables enter contemporaneously in the fiscal reaction function, while in the second case we use their lagged value. The coefficient estimate of the financial market variables will reflect whether these variables are important drivers of the primary balance. It will capture both the automatic and the systematic discretionary response of the fiscal policy maker to their changes, on top of any response to the business cycle (the coefficient of the output gap). Therefore, the response to the business cycle should not be affected to a great extent in terms of magnitude and statistical significance when we include in the regression each financial market variable (given that asset prices have been orthogonalized to output gap). Essentially, this would imply that our findings are not affected by multicollinearity. Findings reported in Table 1 indicate that there is no such problem. In addition, as noted before, we address any ommitted variable problem by adding time dummy variables.

Primary balances are affected in a positive and quite significant manner by asset price changes (Table 1, columns 2-11). A pick up in aggregate asset prices by about 1% increases the ratio of primary balances to GDP by about 0.04 percentage points (column 2). The lagged impact of aggregate asset price changes to primary balances diminishes to just above 0.01pp (column 3). Turning to the disaggregated asset price data, it is primarily residential property prices that exert a positive and quite significant contemporaneous effect on fiscal balances. A 1% increase in residential property prices at time t leads to close to a 0.05pp increase in the ratio of primary balances to GDP (column 4), whereas its lagged impact is about 0.02pp

(column 5). Equity price changes have a positive and significant contemporaneous impact on fiscal balance, which is about 0.015pp of GDP (columns 6). Similarly, changes in commercial property prices have a positive and significant impact on primary balnces but only at time t, with their magnitude being just above 0.01pp (column 8).

These findings are verified when we control simultaneously for the disaggregated asset price variables (see columns 10 and 11). Residential property and equity price changes have a positive and significant contemporanoues impact of fiscal balances, but it is only residential property price changes that have a significant lagged effect. The coefficient estimate of commercial property prices is insignificant. The coefficient estimate of the output gap remains positive and very significant at all times, with its magnitude remaining close to 0.2 as in the case with no asset price variable. It is worth noting, that the response to the asset price changes or the impact of the asset prices changes to primary balances, although relevant it is of secondary importance compared to that of cyclical economic developments captured by the output gap.

Finally, an increase in the difference between long and short-term nominal interest rates (i.e., a steeper yield curve), which can also be perceived as reflecting future debt sustainability concerns, leads to a tigher fiscal stance, but its coefficient estimate is not particularly significant (see Table 1, columns 12 and 13).[28]

4.1 Spending or revenues

The next thing to ask is what drives these developments in fiscal balances, is it primarily current revenues as one might expect in case of asset price changes or is it also current spending? Alternatively, is it an automatic response, which should reflect, most likely, the current revenue channel (on top of any cyclical variation captured by the output gap variable), because some of the revenue components are affected instantaneously by asset prices changes (e.g. stamp duty and taxes related to property, taxes related to income from financial transactions and equity holdings

[28] In constructing the yield curve variable we are using the difference between nominal long and short-term interest rates. Nominal interest rates implicitly incorporate information on expected inflation rates, in addition to information related to liquidity and riskiness factors of different debt instruments.

etc)? Or is it a systematic discretionary response of the fiscal policy maker, which could include changes in current expenditure?

4.1.1 Current expenditure

To complement our analysis, and following European Commission (2006) and Afonso and Hauptmeier (2009), we estimate fiscal reaction functions for current expenditure excluding interest payments. These are formulated in essentially the same manner as the fiscal reaction function for the primary balance :

$$G_{it} = b_1 G_{it-1} + b_2 R_{it-1} + b_3 ygap_{it} + b_4 D_{it-1} + b_5 X_{it} + b_{6i} + year_t + u_{it} \quad (2)$$

G represents expenditure, $ygap_{it}$ is the output gap defined as before, D_{it-1} is the debt ratio X_{it} stands for financial variables, b_{6i} captures fixed effects and $year_t$ time effects, and R_{it-1} represents current revenue excluding interest receipts. [29] The lagged value of this last variable is included in the regression to depict that expenditure decisions are typically implemented taking also into account revenue developments. The lagged value of the expenditure variable reflects the fact that expenditure decisions could be persistent, or that expenditure reaches its targeted level at a gradual pace. The output gap variable will capture whether current expenditure is sensitive to cyclical fluctuations, either because of automatic responses (which are typically very small and usually involve unemployment benefits) or due to systematic discretionary responses.

The lagged dependent variable has a positive and very significant effect. There is significant variability in the different specifications considered, so a 1% increase in the ratio of current expenditure to GDP at t-1 leads to additional spending by about 0.5-0.98pp of GDP at time t (see Table 2, columns 1-13). There is some evidence that higher revenues at time t-1 lead to additional spending at time t, i.e., a 1pp increase in the revenue to GDP ratio at time t-1 leads to additional spending equal to about 0.3-0.6pp of GDP at time t (see columns 4, 8, 10 and 11). However, in most cases the impact effects is insignificant and at times has a negative sign. The debt

[29] Two alternative estimation techniques have been considered, i.e. one-step difference and system GMM estimators following Arellano and Bond 1991, Arellano and Bover (1995) and Blundell and Bond (1998). The estimations presented in Table 2 are those performing the best in terms of the second order residual auto-correlation and the Sargan test of over-identifying restrictions.

ratio does not exert any significant restraining impact on spending decisions. An increase in the output gap leads to a fall in current expenditure, but the coefficient estimates are not very significant with the exception of columns 4 and 10 (and to a lesser extent 3 and 6). A 1% increase in the output gap reduces current expenditure by about 0.2-0.4pp of GDP, this reflects both the automatic response (e.g., lower unemployment related spending) and any possible systematic discretionary response to the business cycle. Hence, spending reacts counter-cyclically, with both automatic and discretionary responses working in the same direction.

After having controlled for all these factors we see that asset price changes have a negative, not very pronounced, but significant effect on government spending decisions (Table 2, columns 2-11). An increase in aggregate asset prices by 1% contemporaneously lowers current expenditure by about 0.056pp of GDP (column 2), whereas the lagged impact is slightly bigger but insignificant (column 3). Changes in residential property prices have the most pronounced impact on spending (by about -0.137pp of GDP; see column 4), with the second biggest impact coming from changes in commercial property prices (by about -0.087pp of GDP, see column 8). Equity price changes exert no significant impact on spending decisions; moreover, the contemporaneous and lagged effects provide a mixed picture (see columns 6 and 7).

Controlling simultaneously for the disaggregated asset price variables (see columns 10 and 11), we verify the finding reported beforehand. Residential and commercial property price changes have a negative contemporaneous impact on fiscal balances, with the effect of residential property prices being the most pronounced. However, changes in commercial property prices have also a significant negative lagged effect. The coefficient of equity price changes is always insignificant. Looking at column 10, it is worth-noting that, although the response to the asset price changes or the impact of asset prices changes on current spending is significant and quite relevant (it is -0.139 for residential and -0.037 for commercial property prices), it is of secondary importance in terms of magnitude compared to that of cyclical economic developments captured by the output gap coefficient estimate (which is about -0.26).

A very important finding relates to the impact of the steepening of the yield curve, which, among other things, can reflect concerns about debt sustainability. A 1pp (100 basis points) increase in the differential between long and short-term nominal interest rates reduces spending by about 0.19-0.22pp of GDP (see Table 2, columns 12 and 13). To the extent that this steepening of the yield curve reflects bond and money market developments which are driven by market participants' concerns about fiscal sustainability, then we can say that market pressure can serve as a significant disciplining device, and can contribute to expenditure based fiscal consolidation.

[Table 2 around here]

4.1.2 Current revenue

In line with European Commission (2006) and Davig and Leeper (2009)[30] we estimate the following fiscal reaction function for current revenues excluding interest revenues:

$$R_{it} = c_1 R_{it-1} + c_2 G_{it-1} + c_3 ygap_{it} + c_4 D_{it-1} + c_5 X_{it} + c_{6i} + year_t + u_{it} \quad (3)$$

As before revenue decisions are implemented taking also into account past expenditure developments; past revenue performance and decisions are relevant in forming current revenue decisions, whereas cyclical stabilization and debt sustainability are considered to be the main objectives of policy makers.

The lagged dependent variable has a positive and very significant effect, its coefficient estimate reaches 0.94, highlighting the persistence inherent in revenue related performance and decisions (Table 3, columns 1-13).[31] Interestingly, higher expenditure at time t-1 generates additional revenue needs at time t, i.e., a 1pp increase in the current expenditure to GDP ratio at t-1 leads to additional revenue of 0.05pp (in column 1) to 0.08pp (in column 10) of GDP at time t. Note, that this is practically much smaller compared to what we found in the case of the expenditure reaction functions (i.e., a 1pp increase in revenue at t-1 leads to additional spending

[30] Davig and Leeper (2009) refer to lump sum taxation.
[31] Blundell et al. (2000) have shown that the moment conditions in the system GMM estimator remain informative as the coefficient of the lagged dependent variable approaches unity.

at time t equal to about 0.3-0.6pp of GDP in the significant cases in Table 2). Hence, governments typically spend a bigger part of the additional revenues generated, compared to their ability to raise extra revenues to cover additional expences. For example, ceteris paribus, if revenues increase at time t-2 by 10% of GDP, then at time t-1 the government will spend about 4.5pp of GDP (mid point between 3-6pp of GDP used) out of it, but at time t it will be able to raise revenues of only 0.225-0.585pp of GDP (i.e., 0.05-0.08 times 4.5) to finance last year's expenditure. This ratcheting up behavior can lead to deficit bias and significant debt accumulation.[32]

The debt ratio is insignificant at all times and enters with a wrong sign. Revenues behave procyclically, a 1% increase in the output gap raises revenues by about 0.07-0.08pp of GDP. This reflects the workings of both the automatic stabilizers and systematic discretionary responses. The coefficient of the output gap is always significant, contrary to the cases of current expenditure. However, it is worth-noting that when significant in the current expenditure case it is more sizeable, suggesting a more forceful respone of expenditure to cyclical developments.

An increase in the aggregate asset price by 1% increases current revenues contemporaneouly by about 0.021pp of GDP (Table 3, column 2), which is lower than the reduction in current expenditures (-0.056pp). This effect is driven by changes in residential property prices, which contemporaneously increase revenues by about 0.03pp of GDP (column 4), reflecting the important role of stamp duty and residential property taxes. It is worth noting that the contemporaneous impact of residential property prices on revenue is lower than on expenditure (about -0.137pp). Equity and commercial property prices were found to exert a significant contemporanous impact on current revenues of about 0.01pp (with the effect of commercial property prices being a bit bigger). Columns 10 and 11 that control simultaneously for the disaggregated asset price variables verify these findings. Residential property price changes have the most significant positive and sizeable contemporaneous impact on fiscal balances, followed by equity prices changes. On

[32] This could be driven by the so–called voracity effects (see, Tornel and Lane 1999) where additional (windfall) revenues are appropriated by powerful interest groups leading to additional spending. As Hercowitz and Strawczynski (2004) have shown the prolonged rise in the spending/GDP ratio is partially explained by cyclical upward ratcheting due to asymmetric fiscal behavior, i.e., the ratio increases during recessions and is only partially reduced in expansions, contributing to deficit bias.

the contrary, commercial propery prices have no significant contemporaneous impact, and their lagged effect is actually negative.

Overall, the findings for the asset price variables reflect the automatic and systematic discretionary responses of the policy maker, on top of his or her responses to indicators of cyclical economic developments, such as the output gap. The coefficient estimate of the output gap remains positive and significant at all times and its magnitude remains close to 0.07. As noted previously, the response to asset price changes or the impact of asset prices changes on current revenues, on average, is of secondary importance in terms of magnitude compared to the response to output gap. Interestingly, it is both current revenue and current spending responses that shape the primary balance response to asset price changes

Contrary to the findings reported in the case of current expenditure the steepening of the yield curve (an increase in the differential between long and short-term interest rates) does not act as a disciplining device and does not lead to higher revenues (see Table 3, column 12 and 13). This explains why the overall effect on primary balances (Table 1, columns 12 and 13) is not that significant and not as pronounced as the one for government expenditure. To the extent that the steepening of the yield curve reflects market concerns about fiscal sustainability, it might be the case that it also reflects market pressure on expenditure (rather than revenue) based fiscal consolidation, which has been shown to produce more credible and tangible effects (see Alesina and Perotti 1995, 1997, and Alesina and Ardagna 1998).

[Table 3 around here]

4.2 Stability of fiscal policy responses

It is widely acknowledged that there has been a surge in financial development since the 1980s and 1990s, which implies that easier access to credit on the households' side would diminish the effectiveness of fiscal policy as a countercyclical policy tool (see Perotti, 1999; Gali et al., 2007; Tagkalakis, 2008). In

this case fiscal policy makers might become less responsive to all types of cyclical fluctuations.[33]

On top of that, over the course of the last 15-20 years (prior to the 2008-2009 financial crisis), the volatility of economic cycles had fallen either due to smaller shocks or due to better policies.[34] For example, as we see in Table 14 (in Data Appendix), the average volatility of the output gap over the whole sample period is 2.35, whereas it was 2.36 in 1970-1990 (Table 15) and diminished to 2.30 in 1991-2005 (Table 16). This implies that discretionary and automatic responses to cyclical fluctuations could be more subdued, affecting also the behaviour or the response of fiscal balances to asset price swings and financial market changes.

On the other hand, the experience of the current financial crisis, which was initiated by, and led to asset price busts (e.g., house prices in the US, UK, Ireland, Spain) had significant implications on fiscal balances, both through an automatic and a discretionary fiscal policy response. This took the form of both ad hoc measures and systematic responses to restore the functioning and safeguard the stability of the financial system. This is a very rare episode, but it could imply that fiscal policy makers will put more of their attention on financial market developments and might try to avert analogous events in future years. Moreover, although governments have not (prior to the current crisis) publicly announced measures or their intention to stabilize the financial system and asset price movements, it could be the case that over the course of recent years they increasingly paid more attention to financial market developments.

Therefore, we need to investigate whether the potential determinants of fiscal policy have had any differential impact on the ratio of primary balance to GDP over the course of the years. To this end, we will consider two sub-samples, the first one being 1970-1990 and the second 1991-2005. The split date is chosen in order to have about the same data points in the two sub-samples given that we employ an

[33] The stability of the results across periods has been an issue for several studies. For example, Blanchard and Perotti (2002), Kirchner et al. (2010) report evidence of changing effects of fiscal policy. Hence, the response to the fiscal policy shocks in the US and Euro area member states has become weaker in the post 1980-1990s period. This could be due to financial innovation and a different response to rising debt ratios. In the EU the formation of Economic and Monetary Union has been in itself a structural change affecting policy makers behavior.

[34] See relevant literature e.g., Cogley and Sargan (2001, 2005), Benati and Mumtaz (2007), Gali and Gambetti (2009), Benati and Surico (2009), on the so-called issue of the "Great Moderation".

unbalanced panel data set. Moreover, the effects of financial liberalization and the development of new and complex financial instruments which are based on different asset classes are more visible since the 1990s.

4.2.1 Primary Balance

Comparing the findings over the two sub-samples we see that the coefficient of the debt ratio is positive and (at times) significant in the first sub-sample, whereas it is insignificant and wrongly signed in the second (see Tables 4 and 5). The lagged dependent variable is slightly more important in recent years (see Tables 4 and 5), which implies that the fiscal instrument adjusts more gradually to its target.

The most important difference between the two sub-samples is the response of fiscal balances to cyclical fluctuations in economic activity as measured by the output gap. Fiscal policy has been countercyclical (positive coefficient on the output gap) over the course of the period 1970-1990 (see Table 4) and switched to becoming acyclical or even procyclical (negative coefficient on the output gap) in the more recent period 1991-2005 (see Table 5). This implies that, on average, there was no cyclical stabilization motive on fiscal policy makers' responses in the latter part of the sample.[35] It should be kept in mind that this finding does not distinguish between the automatic and systematic discretionary response to cyclical fluctuations, instead it represents the combined effect.

What could explain this asymmetric behaviour over the course of the years? Although the volatility of the output gap fell (from 2.36 to 2.30), so did its average value, from -0.30 in 1970-1990 to -0.87 in 1991-2005, which implies that, on average, economic activity moved further below trend in more recent years for the OECD countries examined. On the contrary, the primary balance, starting from an average deficit on -0.59% of GDP in 1970-1990 and an average volatility of 3.04% of GDP, switched to a surplus of 1.07% of GDP and an average volatility of 3.45% of GDP in 1991-2005. Hence, fiscal policy has become less responsive to economic fluctuation. Although output fell further below trend in recent years, primary

[35] Candelon et al (2010) find a procyclical fiscal policy response in the post-Maastrich era, whereas Golinelli and Momigliano (2009) find evidence in favour of an acyclical response.

surpluses increased. This procyclical response probably reflects a global tendency towards fiscal prudence (see Gali and Perotti 2003) [36] and concerns about the long-term sustainability of fiscal balances.[37][38]

Turning now to the real asset price variables we see that fiscal policy has been affected by or reacted to asset price movements in both periods (column 2, Tables 4 and 5). Looking at the disaggregated data we obtain more valuable information. The importance of residential property and equity prices as determinants of primary balances has increased over the course of the years. An 1% increase in residential property prices led to a close to 0.033pp increase in primary balance to GDP ratio in 1970-1990, while more recently this increase was bigger, reaching 0.051pp of GDP. The same applies in the case of equity price changes, with the contemporaneous impact being significant and of bigger magnitude in the latter part of the sample. However, equity prices have a significant but smaller lagged effect in the first sub-sample.

We find exactly the opposite in the case of commercial property prices. In the first sub-sample they had a very significant impact, with their coefficient estimate being close to 0.03; in the second part of the sample their impact on primary balances and their statistical significance diminished substantially, with their lagged impact turning negative. When considering simultaneously all asset price changes (Column 10, Tables 4 and 5), it is commercial property prices that matter most (they have a positive effect) in the first period, and residential property and equity prices in the second part of the sample. Commercial property prices have negative contemporaneous and lagged effects on primary balances in the second part of the sample.

What could be behind this response? Examining the summary statistics of the (corrected) disaggregated asset price series, one can see that, while their volatility has remained the same or slightly decreased, their average value has changed

[36] The effects of the creation of the EMU and the nessecity to abide by the rules of the Stability and Growth Pact after the Maastricht Treaty in 1992 for the Euro area member states are picked up by the time dummy variables.
[37] However, this tendency to fiscal prudence is driven mainly by revenue developments, with the average value of current revenue excluding interest receipts increasing from 38.9% of GDP in 1970-1990 to 42.9% of GDP in 1991-2005, whereas current spending excluding interest payments on average increased from 37.1% to 40.5% of GDP in the second sub-sample.
[38] Nevertheless, fiscal policy has been found less responsive to rising outstanding debt ratios, whose average value increased from 49.7% of GDP in the first sub-sample to 68.3% of GDP in the second sub-sample

substantially.[39] The average value of the change in real equity prices increased from -0.44% in the first sub-sample to 0.48% in the second sub-sample, and that for residential property prices increased from -0.92% to 0.98%. On the contrary, the average value of real commercial property prices fell substantially over the course of the years, reaching -1.81% in 1991-2005 from 2.08% in 1970-2005.[40] [41] Hence, in the first part of the sample developments in real estate and equity markets contributed to increasing primary balances. An asset price boom was perceived as signaling good economic times and improved fiscal balances either automatically or by means of discretionary action. In the second sub-sample, developments in residential property and equity markets had a positive effect on primary balances, whereas developments in commercial property markets have had a negative impact on primary balances. The fact that residential property and equity price changes were on average positive contributed to improving fiscal balances both automatically and possibly by means of additional discretionary actions (if developments in these markets signaled good economic times). However, this does not appear to be the case for commercial property prices.

One important difference between the two subsamples relates to the behavior of the differential between long and short-term nominal interest rates (see Tables 4 and 5, columns 12 and 13). Its coefficient has switched sign, i.e., from negative in the first period to positive in the second period, and has increased in terms of statistical significance, though in absolute terms it is still insignificant. This implies that over the course of the years the steepening of the slope of the yield curve has

[39] The standard deviation of the changes of real residential, commercial property and equity prices has fallen from 7.1%, 12.6% and 20.9% in 1970-1990, to 5%, 9,2% and 17.3% in 1991-2005, respectively. However, the GDP deflator based inflation rate was more than halfed in the same period (though starting from a much smaller value), i.e., from 4.7% it diminished to 2.0% in the latter sub-sample.

[40] As a comparison it should be noted that the average value of the GDP deflator based inflation rate fell dramatically over the course of the years, reaching 2.2% in 1991-2005 from 8.2% in 1970-1990. This could be linked to smaller shocks (e.g., less volatile economic activity) and to better policies, i.e., the improved ability of monetary policy makers to rein inflation, enhanced also by the improved institutional framework in which they operate (i.e. the establishment of independent central banks). See reference in footnote 22.

[41] This is also the case when we consider the actual asset price series, i.e. their volatility remains the same or decreases slightly, and the mean values of equity and residentical property prices changes are always positive but increase in the second part of the sample, whereas the one for commercial property prices decreases and turns negative.

played an increasing role in disciplining fiscal policy making and raising primary balances.[42]

[Tables 4 and 5 around here]

4.2.2 Current expenditure.[43]

The lagged dependent variable has a sizeable impact throughout the sample period. The lagged value of revenue to GDP ratio has a positive and significant effect on government spending in the first sub-sample, in the second part of the sample it is insignificant and its coefficient estimate switches sign (see Tables 6 and 7). It appears that in the earlier years governments used to spend a certain fraction of the extra revenues generated in previous periods; however, this attitude appears to have changed in the latter part of the sample. A 1% increase in the debt ratio at time t-1 reduces government spending at time t (in a quite significant manner) by about 0.01pp in the first part of the sample. On the contrary, in the period 1991-2005 the coefficient of the debt ratio has changed sign, being positive and at highly insignificant.

Current expenditure is particularly responsive to cyclical fluctuations in economic activity in the period 1970-1990, with the coefficient of the output gap being about -0.12 (Table 6). In the second part of the sample expenditure still shows a countercyclical response, but the coefficient estimate of the output gap is insignificant (only in columns 12 and 13 it is on the borderline of significance; see Table 7).

The aggregate asset price index has no significant effect on expenditure. Residential property price changes exert a negative effect on expenditure in the second part of the sample (-0.2pp of GDP). Equity price changes have a significant

[42] This also relates to the fact that in the first sub-sample the long-short-term nominal interest rate differential was on average marginally negative, i.e., -4 basis points (-0.04pp), whereas it turned positive and increased substantially to about 100 basis points (1pp) in the second part of the sample, in line also with the pick up in average debt ratio to 68.3% from 49.7% of GDP in the first sub-sample. Nevertheless, as one can see in Tables 18-21 both short and long-term interest rates fall in the second part of the sample, with the fall in short term rates was of bigger magnitude contributing to the widening of the long–short interest rate differential.

[43] Two alternative estimation techniques have been considered, i.e. one-step difference and system GMM estimators following Arellano and Bond 1991, Arellano and Bover (1995) and Blundell and Bond (1998). The estimations presented in Tables 6-7 are those performing the best in terms of the second order residual auto-correlation and the Sargan test of over-identifying restrictions.

negative lagged effect on primary spending in the first period. Changes in commercial property prices have a pronounced negative and significant effect on government spending, but only in the first sub-sample.

This is in line with the fact that the average value of the changes in residential property prices increased in 1991-2005, whereas the average value of the change in commercial property prices decreased in the same period. Government spending reacted more forcefully and counter cyclically in the latter part of the sample to rising residential property prices, while in the first part of the sample spending was cut after a pick up in commercial property prices (and to a lesser extent to equity prices) implying that these asset price changes must have been perceived as signalling good economic times.

In line with the findings across the whole period, we see that the impact of the steepening of the yield curve induces more prudent fiscal behaviour in particular in 1991-2005 (see Tables 6 and 7 and columns 12 and 13). Specifically, a 1pp increase in the differential between long and short-term nominal interest rates (at time t) reduces spending by about 0.58pp of GDP at time t (the lagged impact is 0.49pp of GDP). The magnitude of the response is quite sizeable reflecting the importance of market pressures and concerns related the long-term sustainability of public finances.[44]

[Tables 6 and 7 around here]

4.2.3 Current revenue

In both sub-samples past revenue performance affects substantially current revenues, the debt ratio has no particular impact on revenues, while an increase in last years expenditure generates additional revenue needs in the current year (see Tables 8-9). Current revenues behave procyclically in the period 1970-1990; taken together with the strong countercyclical expenditure over the same period, this explains why fiscal policy was countercyclical in the first part of the sample. By contrast, during 1991-2005 revenues are not particularly responsive to cyclical

[44] At odds with what one would expect the debt ratio has a positive effect on government spending, but its size is very small compared to the effect on the differential between long and short term interest rates.

fluctuations, which explains the overall acyclical or procyclical behavior of fiscal balances in the second part of the sample.

In the first sub-sample, all asset price changes have a strong significant contemporanous impact on current revenues. This refers in particular to residential and commercial property prices (Table 8). Changes in residential property prices also have a significant lagged impact on government revenues. On the contrary, in the second part of the sample it is mostly an increase in residential property prices (and to a lesser extent in equity prices) that have a stong positive and sizable contemporaneous effect on current revenues (see Table 9). Interestingly, changes in commercial property prices have a quite significant negative lagged effect on current revenues (see Table 9). Overall, these findings verify the increasing role and impact of the changes in residential property prices on current revenues in recent years, in line also with their increasing average value in 1991-2005.

Following an increase in residential property prices, fiscal balances improve in the second part of the sample mostly because of higher tax revenues and lower spending. An increase in equity prices leads to higher revenues (but the effect is not very significant), while spending is unresponsive, improving primary balances. Following an increase in commercial property prices, revenues fall (while spending is irresponsive) reducing primary balances. In the period 1970-1990 a pick up in residential, commercial property and equity prices raises revenues and improves primary balances. Spending cuts following contemporanous increases in commercial property prices contribute to the improvement of primary balances, but they are of secondary importance.

Finally, and in contrast to the findings reported in the case of current expenditure, an increase in the differential between long and short-term nominal interest rates has no significant impact on current revenues (see Tables 8 and 9). This explains why the overall effect on primary balances from the steepening of the yield curve is much more subdued compared to that for government expenditure.

[Tables 8 and 9 around here]

4.3 So what is the overall picture?

The main findings are that primary balances respond countercyclically over the cycle, reflecting a procyclical current revenue and counter cyclical current spending behaviour. This response incorporates both the automatic and systematic discretionary response of the fiscal policy maker.

Trying to account for the effect that financial innovation and development had on fiscal policy response, we considered two subsamples, 1970-1990 and 1991-2005. Fiscal policy has been countercyclical over the course of the period 1970-1990 and switched to becoming acyclical or even procyclical (negative coefficient on the output gap) in 1991-2005. Current revenues behaved procyclically in the period 1970-1990; taken together with the countercyclical expenditure response over the same period explains why fiscal policy was countercyclical in the first part of the sample. By constrast, in 1991-2005 revenues are not particularly responsive to cyclical fluctuations, which explains the overall acyclical or procyclical behavior of fiscal balances in the second part of the sample.

Hence, there was no cyclical stabilization motive on fiscal policy makers' responses in the latter part of the sample. The automatic and the discretionary responses worked in the same direction in the first part of the sample, whereas in the second part they have worked in opposite directions. Therefore, a fall in the output gap variable generated a negative automatic response in fiscal balances which was countered by a positive discretionary response. This procyclical response probably reflects a global tendency towards fiscal prudence and concerns about the long-term sustainability of fiscal balances.

Increased debt levels contribute to reducing fiscal balances and restraining spending decisions. However, this debt stabilizing motive was prevalent only in the first part of the sample.

Interestingly, current spending and revenue reaction functions have shown that there is an inherent deficit bias in the response of fiscal policy makers, i.e., ceteris paribus, governments typically spend a bigger part of the additional revenues generated, compared to their ability to raise extra revenues to cover additional

expences. Nevertheless, it appears that, on average, in the period 1991-2005 this tendency ceased.

There is evidence that an increase in asset prices affects primary balances in a positive and significant manner. The overall primary balance response reflects an increase in government revenues and negative response of government spending. The most important impact on fiscal balances is due to changes in residential property prices. Equity price changes and commercial property price changes were also found to be important determinants of fiscal balances. The importance of residential property and equity prices as determinant of primary balances has increased over the course of the years, whereas the importance of commercial property prices has diminished.

Following an increase in residential property prices, fiscal balances improve in the second part of the sample mostly because of higher tax revenues and lower spending. An increase in equity prices leads to higher revenues (but the effect is not very significant), while spending is irresponsive, improving primary balances. Following an increase in commercial property prices, revenues fall (while spending is irresponsive). In the period 1970-1990 a pick up in residential, commercial property and equity prices leads to higher revenues and improves primary balances. Spending cuts following a pick up in commercial property prices improve primary balances.

Overall, it is worth noting that the impact of asset price changes to fiscal balances is of secondary importance compared to the response of fiscal balances (including current spending and current revenue) to cyclical economic conditions as captured by the output gap.

The steepening of the yield curve contributes to fiscal discipline and improves fiscal balances by inducing expenditure cuts, which could possibly reflect market pressures to pursue an expenditure based fiscal consolidation. The impact of the steepening of the yield curve induces more prudent fiscal behavior (restraining spending decisions) in particular in 1991-2005. The magnitude of the response is quite sizeable reflecting the importance of market pressures and concerns related to the long-term sustainability of public finances

5. Robustness check

5.1 Cyclically adjusted primary balances

As a robustness test we investigate whether financial market developments have a different effect on the cyclically adjusted primary balances, which are supposed to better reflect discretionary fiscal policy responses (see Table 10). Starting from the control variables we see that, as in the case of unadjusted primary balances, the lagged dependent variable has a very significant and sizeable impact. The debt ratio has a very significant positive effect on cyclically adjusted primary balances, with its magnitude being twice as large compared to the findings in Table 1. Therefore, debt stabilization is a very powerful motive for policy makers.

By constrast, the discretionary response of fiscal policy makers to cyclical economic conditions is not so pronounced. The coefficient on the output gap is smaller and not as significant as in Table 1. Hence, the biggest part of the response of primary balances to output gap movements (about 0.2pp of GDP; see Table 1) reflects the automatic response to the cycle, whereas, as we see in Table 10, the discretionary response is much smaller, i.e., around 0.04pp of GDP (but one need to be cautious here because the results are not statistically significant).

Turning to asset prices, changes in residential property prices, and to a lesser extent equity prices, exert a very significant and positive effect on cyclically adjusted primary balances (Table 10). A 1% increase in residential property prices increases cyclically adjusted primary balances by about 0.053-0.055pp of GDP, while the effect on primary balances was just a bit less than 0.05pp of GDP (Table 1). A 1% increase in equity prices increases cyclically adjusted primary balances by about 0.010-0.13pp of GDP, whereas the impact on primary balances was about 0.013-0.015pp of GDP (Table 1). Compared to the primary balance case, changes in commercial property prices have a smaller (positive) and insignificant effect on cyclically adjusted primary balances. The differential between long and short-term nominal interest rates has no particular impact on the cyclically adjusted fiscal stance.

Overall, asset price changes affect positively and significantly both cyclically adjusted and unadjusted primary balances. This implies that policy makers should

take asset price movements into account because they can provide additional information on cyclical economic conditions.

[Table 10 around here]

5.2 Stability of responses across sub-samples

As we have seen before, fiscal policy making has changed over the course of the years in terms of its responsiveness to cyclical conditions and debt developments on account of several factors, including e.g., financial development. Next, we investigate whether this has any effect on the conduct of discretionary fiscal policy making. Comparing the findings in Tables 11 and 12 we see that, as in the primary balance case, the persistence of the lagged dependent variable has increased significantly in recent years. The coefficient of the lagged dependent variable increased from about 0.82 (in 1970-1990) to about 0.93 (in 1991-2005). The debt stabilization motive is prevalent and most pronounced in the first part of the sample, but is abscent in the second sub-sample (as in the primary balance case).

Fiscal policy responds in a countercyclical manner (positive coefficient) in the first sub-sample, whereas it is highly procyclical in the latter part. Given that, on average, output fell further below trend in 1991-2005 (the average value of the output gap is negative) and that the average value (and the standard deviation) of the cyclically adjusted primary balance increased from -0.81% of GDP (2.73% of GDP) in 1970-1990 to 0.93% of GDP (to 3.26% of GDP) in 1991-2005, we can say that fiscal policy was conducted in a procyclical manner in worse economic conditions. This implies that the cyclical stabilization of the economy was not the primary objective of fiscal policy makers. Instead, as Perotti and Gali (2003) point out in more recent years there was a global trend towards a more prudent fiscal stance. For example in the EU this was related to the run up to European Monetary Union and the need to abide by the rules of the Stability and Growth Pact. On the other hand, increased concerns about the long-term sustainability of public finances linked also

to the future costs of population ageing could have induced discipline on fiscal policy makers.[45]

A 1% increase in residential property prices increases cyclically adjusted primary balances by about 0.06p of GDP in 1970-1990 ; the corresponding effect is much less pronounced and not significant in the latter part of the sample, which is exactly the opposite of what we found in the case of primary balances. This could imply that in 1991-2005 the effect of residential property prices on fiscal balances reflects primarily an automatic response rather than a discretionary action.

Cyclically adjusted balances respond more forcefully to equity price changes in the second sub-sample, i.e., increase by about 0.014pp of GDP. In the first part of the sample their effect is smaller and insignificant. This is exactly the same pattern of responses we get in the case of primary balances. However, the increase in primary balances is twice as large in 1991-2005, i.e., about 0.025pp of GDP, implying that, in the second sub-sample, there is both an automatic and a discetionary response to increasing equity prices. Possibly because asset price changes are perceived as reflecting improvements in cyclical economic conditions.

A change in commercial property prices generates quite different responses in the two sub-samples, cyclically adjusted primary balances increase in the first and fall in the second part of the sample. A similar pattern of responses is obtained in the case of unadjusted primary balances, indicating that a pick up in commercial asset prices leads to significant automatic and discretionary increases in primary balances, in the first part of the sample (where on average its mean value was positive, indicating improving economic conditions). Overall, asset prices are important drivers of both cyclically adjusted and unadjusted fiscal balances.

The differential between long and short-term nominal interest rates does not have a significant impact on the cyclically adjusted fiscal stance. Nevertheless, as in the primary balance case, its coefficient is negative in the first part and turns positive in the second part of the sample.

[Tables 11 and 12 around here]

[45] However, the outstanding debt ratio is highly insignificant.

5.3. Robustness across sub-samples

Given that tax structures differ between countries in this section we want to establish robustness of our results across subsamples. As reported in Appendix 1, based on information provided by Johansson et al (2008), the share of property taxes [they include recurrent taxes on immovable property (paid by both households and businesses), taxes on net wealth (paid by both households and corporations), taxes on gifts and inheritance and taxes on financial and capital transactions] as a percentage of GDP has remained approximately constant, on average, at around 1.7-1.8% in the period 1975-2005 in the OECD. However, there are some difference, i.e., in France, Ireland, Korea, Luxembourg and Spain this share has increased by more than 2.5 percentage points since 1980, whereas in New Zealand it decreased more than 3 percentage points. Moreover, although property taxes have a low revenue share, they do remain an important source of revenue in some OECD countries, with the United Kingdom, Korea, the United States and Canada obtaining at least 10% of tax revenue from this source in 2005 (Johansson et al., 2008). Moreover, as a percentage of GDP, the recurrent taxes on immovable property have increased by 0.5 percentage points or more only in France, Italy, Portugal, Spain and Sweden and decreased by more than 0.5 percentage points in the United Kingdom. The taxes on financial and capital transactions, in percent of GDP, have increased by more than 0.4 percentage points in Belgium, Greece, Ireland, the Netherlands, Spain and the United Kingdom while they decreased by more than 0.4 percentage points only in Japan.

In order to establish robustness across sub-samples we focus our attention on the most important cases. We restimate our baseline regression on primary balances (Table 1), the current revenue specification (Table 3) and the cyclically adjusted primary balances specification (Table 10) by excluding, in turn, one of the following countries Australia, Canada, Spain, Finland, France, United Kingdom, Ireland, Japan, Netherlands, Norway, New Zealand, Sweden, and United States.

The cases to exclude were decided on the following grounds, i.e., countries where property taxation constitutes a significant part of tax revenues (US, UK, Canada) or countries whose immovable property or financial and capital transactions taxes have increased over time (France, Spain, Ireland, the Netherlands). The

consideration of Ireland, Spain, the UK and the US was also driven by these countries' recent experience (the house price bust at the onset of the 2008-2009 financial crisis). Furthermore, we excluded countries that were hit by banking and financial crisis (which required public intervention) as defined by Laevan and Valencia (2008). The cases included in our sample were the following: Australia in 1989-1992, Finland in 1991-1994, France in 1994-1995, Japan in 1992-2005, Sweden in 1991-1994, the US in 1981-1991 and 1998, and Norway in 1987.

The results reported in Tables 13-15 indicate that our model is robust to the exclusion of each of these countries. Our findings are neither driven by differences in the tax structure of these countries nor by financial and real estate market developments (and related public interventions) in specific countries.

[Tables 13, 14 and 15 around here]

6. Summary of results and conclusions

In this paper we have investigated the links between financial market movements and fiscal policy outcomes. We have examined the impact of changes in aggregate asset prices, residential, commercial propery and equity prices, as well as the effect of the difference between long and short-term nominal interest rates on fiscal balances. The objective was to improve our understanding about whether financial market movements have had any effect on the conduct of fiscal policy making, and whether previous evidence suggests that asset price changes should be taken into account.

In order to do that we have estimated standard fiscal policy reaction functions, as in Gali and Perotti (2003), Celasun et al. (2006) and Gollinelli and Momigliano (2009), augmented with financial market variables. Our primary focus has been on primary balances, current expenditure excluding interest payments and current revenues excluding interest receipts. As a robustness test we also investigated cyclically adjusted primary balances, which better reflect the discretionary response of the fiscal policy maker. Following other studies that have found a changing effect

of fiscal policy over the years (either due to financial innovation and development or due to rising debt ratios) we split the sample into two subperiods: 1970-1990 and 1991-2005 in order to examine if fiscal policy makers have responded differently over the years.

The main findings are that primary balances respond countercyclically over the cycle, reflecting a procyclical current revenue and counter cyclical current spending behaviour. This response incorporates both the automatic and systematic discretionary response of the fiscal policy maker. However, the discretionary response of fiscal policy makers (cyclically adjusted primary balances) to cyclical economic conditions is not so pronounced. Fiscal policy has been counter-cyclical over the course of the period 1970-1990 and switched to becoming acyclical or even procyclical in the more recent period 1991-2005. This finding is even more pronounced when considering the cyclically adjusted primary balances.

The automatic and the discretionary fiscal policy responses worked in the same direction in the first part of the sample, whereas in the latter part they worked in opposite directions. Therefore, in the period 1991-2005, a fall in the output gap variable generated a negative automatic response in fiscal balances which was countered by a positive discretionary response, i.e., fiscal policy was conducted in a procyclical manner in worse economic conditions. This procyclical response possibly reflects a global tendency towards fiscal prudence.

Increased debt levels contribute to reducing fiscal balances (by restraining spending decisions) in particular when considering cyclically adjusted primary balances. The debt stabilization motive is prevalent and most pronounced in the first part of the sample, but is absent in the second sub-sample.

Turning to the financial variables, the steepening of the slope of the yield curve contributes to fiscal discipline, in particular in recent years. It improves fiscal balances by inducing expenditure cuts, which could possibly reflect market pressures to pursue expenditure based fiscal consolidation.

There is evidence that an increase in asset prices affects primary balances in a positive and significant manner. The increase in primary balance is driven by an increase in government revenues and a cut back in spending.. The most important

impact on fiscal balances is due to changes in residential property prices. Equity price changes and commercial propery price changes affect fiscal balances, but they are of secondary importance.

Residential property and equity prices are more important determinants of primary balances over the course of the years, whereas the importance of commercial property prices has diminished. These findings verify the increasing impact of residential property prices changes on current revenues and spending over the years. Nevertheless, in more recent years, the effect of residential property prices reflects primarily an automatic rather than a discretionary response of cyclically adjusted fiscal balances. In the case of equity prices, there is both an automatic and discetionary response.

Overall, we see that asset prices have a significant (although not particularly sizeable) effect on both cyclically adjusted and unadjusted fiscal balances (see Tables 16 and 17). This implies that, following an increase in asset prices, there is significant positive automatic response of fiscal balances and, at times, a significant discretionary response (in particular, as regards government spending changes). The latter could imply that asset price movements are relevant indicators of cyclical economic conditions and provide valuable information, on top of what is reflected in output gap movements. In this case, policy makers could, for example, start building up fiscal buffers for the rainy days to come.

Alternatively, it might be the case that fiscal policy makers do not react in a discretionary manner to asset price changes (in particular, as regards government revenue changes). This means that the impact that asset price variables have on cyclically adjusted primary balances merely reflects the fact that the fiscal stance is contaminated by asset price effects, which means that the policy maker does not have a full grasp of his/her decision or policy variable (i.e., the cyclically adjusted fiscal stance).[46] Consequently, this will affect his/her decisions and his/her ability to

[46] As stated beforehand governments and international institutions like the IMF, the OECD and the European Commission (see e.g. OECD, 2008; European Commission, 2009; IMF, 2010) assess fiscal policy developments and conduct fiscal policy surveillance by focusing on the cyclically adjusted primary balances, i.e., they only net out the impact of output gap movements (at times, they take into account the effect of other one-off factors), without controlling for the automatic impact of asset price changes that mainly comes from the revenue side.

effectively stabilize cyclical economic activity and to take permanent measures to address debt sustainability issues.

Therefore policy makers should take on board financial market developments (like the steepening of the yield curve) because they might reflect market concerns regarding the sustainability of a country's fiscal position. Furthermore, asset price movements are relevant for three reasons. First, asset price changes should be controlled for in order for the policy maker to have a better grasp of the actual cyclically adjusted fiscal stance.[47] Second, they are relevant because asset price movements could carry information on cyclical economic conditions, on top of the information provided by economic activity variables. For example, asset prices might be booming, whereas the output gap might be pointing to output being still below trend. Third, they are relevant because asset price changes, in particular abrupt asset price movements, could provide information on forthcoming low probability events, such as financial instability and widespread financial crisis. The current crisis is the best example, the collapse in the US housing market that started in the second semester of 2007 spread to the US banking and financial system, leading, in particular after the collapse of the Lehman Brothers in autumn 2008, to worldwide financial crisis, instability and economic recession. These reasons point to the need for the fiscal policy makers to act pro-actively and build up fiscal buffers when economic conditions are good and when asset prices are booming. These fiscal buffers should be built primarily by the automatic improvement in fiscal balances (revenues), without, however, excluding additional discretionary action.

[Tables 16 and 17 around here]

[47] And in order to improve fiscal policy analysis and surveillance by international economic insitututions.

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Appendix 1 Property and personal capital income taxes in OECD countries

This section draws heavily on information provided by two OECD studies, Johansson et al (2008) and Andre (2010), and summarizes the main features of property and personal capital income taxes in OECD countries. [48] This information is relevant because property and personal capital income taxes are affected by asset price movements (financial and real estate variables).

As documented by Johansson et al. (2008) on average in the OECD the share of property taxes [they include recurrent taxes on immovable property (paid by both households and businesses), taxes on net wealth (paid by both households and corporations), taxes on gifts and inheritance and taxes on financial and capital transactions] as a percentage of GDP has remained approximately constant at around 1.7-1.8% in the period 1975-2005. However, there are some differences, i.e., in France, Ireland, Korea, Luxembourg and Spain the share has increased by more than 2.5 percentage points since 1980, whereas in New Zealand it decreased more than 3 percentage points. Moreover, although property taxes have a low revenue share, they do remain an important source of revenue in some OECD countries, with the United Kingdom, Korea, the United States and Canada obtaining at least 10% of tax revenue from this source in 2005 (Johansson et al., 2008).

OECD averages indicate that recurrent taxes on immovable property – mainly levied at the sub-national level - account for approximately half of total property taxes (about 0.9% of GDP), while taxes on financial and capital transactions account for about half of the rest (about 0.4% of GDP). Recurrent taxes on net wealth are on average a bit more than 0.2% of GDP, whereas estate, inheritance and gift taxes are about 0.1% of GDP. As reported in Johansson et al (2008) there are no strong trends in the revenues from any of these taxes as a share of GDP despite short-term variations) As a percentage of GDP, the recurrent taxes on immovable property have increased by 0.5 percentage points or more only in France, Italy, Portugal, Spain and Sweden and decreased by more than 0.5 percentage points in the United Kingdom. The taxes on financial and capital transactions, in percent of GDP, have increased by

[48] More detailed information on OECD tax structure can be find in Johanson et al (2008), whereas more detailed information on the links between tax system and housing prices can be find in Andre (2010), ECB (2009), Scanlon and Whitehead (2004), and Wolswijk (2010).

more than 0.4 percentage points in Belgium, Greece, Ireland, the Netherlands, Spain and the United Kingdom while they decreased by more than 0.4 percentage points only in Japan.

A variety of taxes, tax reliefs and subsidies affect the housing sector. These fiscal provisions vary greatly across countries, but generally result in a system which is far from neutral, i.e., there is often a bias in favour of homeownership, which is widely assumed to bring positive externalities (see Andre, 2010).[49] Imputed rental income is not taxed under income tax (except in Belgium, the Netherlands, Norway and Sweden), however most countries impose property taxes which have a similar effect (Johansson et al. 2008; ECB, 2009). At the same time, mortgage interest payments can be deducted from the personal income tax base in many countries, but not in Canada, Germany, France (they became partly deductible in 2007) and the United Kingdom (tax reliefs on mortgages were abolished in 2000 in the UK). However, some countries, like Belgium and Spain, even allow for a deduction of the principal repayments.

Realised capital gains on owner-occupied houses are often not subject to capital gains tax, though the value of the house is subject to inheritance tax in most countries, except Canada and Sweden. Moreover, some countries levy a high transaction tax on the purchase of houses. This refers to stamp duties, transfer and cadastral taxes, VAT taxes which are are levied on housing transactions. These taxes vary widely across countries and usually account for a large share of the acquisition costs. In Ireland, stamp duties have been used to restrain housing demand, with mixed results (OECD, 2006).[50]

Scandinavian countries (Finland, Norway, Sweden and Denmark) have introduced a dual tax system which taxes personal capital income at a low and proportional rate while labour income continues to be taxed at high and progressive

[49] According to Andre (2010) it is questionable whether tax advantages granted to homeowners are effective at achieving their social objectives, i.e., ensuring access to housing at a reasonable cost. "As tax advantages increase demand for housing, they tend to increase the level of house prices, offsetting part of the tax advantage. Moreover, housing-related tax advantages are usually regressive in terms of redistribution and costly for the government budget." Furthermore, advantageous tax treatment of housing may also lead to over-investment in real estate and misallocation of capital, with negative effects on long-term economic growth (see Andre, 2010; ECB, 2009; Hoeller and Rae, 2007).

[50] And in the present crisis, a number of countries have used tax measures to bolster house prices: Ireland, for example, removed stamp duty on first-time buyers (of relatively inexpensive properties) and extended mortgage interest relief (IMF, 2009a).

rates. In practice, a majority of OECD countries may be characterized as having 'semi-dual' income tax systems, which are defined as tax systems that use different nominal tax rates on different types of income, typically by taxing some forms of capital income at low and often flat rates and remaining forms of income at higher and progressive rates (e.g., Netherlands introduced such a system in 2001).

The rate of taxation on dividends combines features of both the personal and corporate tax systems. Many European countries have moved away from full imputation systems to systems where dividends are taxed at a lower rate at the personal level. Germany introduced the so-called half-income system in 2002, whereby 50% of dividends are taxed as personal income (but it was abolished as part of the 2008 tax reform). Several other countries have introduced or are introducing similar partial inclusion systems where some proportion of dividends are taxed as personal income, e.g., Finland, France, Italy, Portugal and Turkey. On average, the top marginal tax rate on dividends in OECD countries was reduced by more than 7 percentage points between 2000 and 2007 to 43%. The largest part of this reduction is attributable to the reduction in the corporate income tax rate.[51] Since 2000, the top marginal tax rate on dividends has increased only in Finland and Norway (as a result of the introduction of the partial inclusion system in Finland and the allowance for shareholder equity tax system in Norway) and in Korea.

[51] The part of the tax that is paid as corporate income tax has decreased by more than 5 percentage points to 27.6% on average in the OECD. A smaller part of the reduction in the statutory tax burden on dividends is due to the decrease in personal income tax rates.The reduction of the effective tax rate was 10.8 percentage points in the United States, due to the recent introduction of a reduced tax rate on dividends at the personal level.

Appendix 2 Data information

We used an annual unbalanced panel data set (1970-2005) of 17 OECD economies: Australia, Belgium, Canada, Germany, Denmark, Spain, Finland, France, United Kingdom, Ireland, Italy, Japan, Netherlands, Norway, New Zealand, Sweden, and United States.

Macroeconomic variables

The macroeconomic variables used extend from 1970 to 2005. Fiscal and output variables are from the OECD Economic Outlook (2008), the definitions used are: primary balance as a percent of GDP (PBY), cyclically adjusted primary balance as a percent of GDP (CAPBY), debt ratio as a percent of GDP (Debt), current expenditure excluding interest payments as a percent of GDP (CDXY), current revenue excluding interest receipts as a percent of GDP (CRXY), output gap (ygap), short-term nominal interest rate, long-term nominal interest rate, the GDP deflator. The difference between the long and short nominal interest rates is used as a proxy for the slope of the yield curve. The inflation rate is the GDP deflator based inflation rate (i.e. the growth rate of the GDP deflator times 100).

Asset price variables

Our asset price indicators were kindly provided by the Bank for International Settlements (BIS), and have been used in earlier studies, like Borio and Lowe (2002). The main indicator is the growth rate (times 100) of the annual aggregate real asset prices (AP), which covers 1970-2005 for 17 industrial countries and combines price indices for three asset classes - equities, residential property and commercial property – by weighting the components using shares of the asset classes in private sector wealth. The private consumption deflator is used to convert nominal to real asset prices. In addition, we considered also the growth rates (times 100 in each case) of the three disaggregate asset price indicator, i.e., real commercial prices (CP), real residential prices (RP) and real equity prices (EP). As discussed in Section 3.3, we then net the effect of the economic cycle, by regressing each asset price variable on the contemporaneous and first and second lagged values of the output gap. The

residuals from these regressions are then used in the empirical analysis. These are called RAP, RRP, REP, and RCP.

Table 18 presents the correlations between the output gap and the asset prices variables, as well as the correlations between the asset price variables. Table 19 reports summary statistics and Tables 20 and 21 present summary statistics for the two sample periods considered in the main text.

Appendix 3 Tables

Table 1 Primary balance and asset price variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
Primary balance (t-1)	0.8131 (33.51) ***	0.7884 (31.84) ***	0.7939 (30.69) ***	0.7880 (31.40) ***	0.7950 (30.94) ***	0.8004 (32.34) ***	0.7992 (31.44) ***	0.7941 (30.61) ***	0.7945 (30.08) ***	0.7783 (30.19) ***	0.7833 (29.27) ***	0.8343 (35.62) ***	0.8338 (35.28) ***
Debt (t-1)	0.0029 (1.21)	0.0039 (1.67)*	0.0038 (1.57)	0.0038 (1.59)	0.0039 (1.60)	0.0035 (1.47)	0.0036 (1.49)	0.0030 (1.25)	0.0035 (1.43)	0.0038 (1.57)	0.0039 (1.63)	0.0023 (1.02)	0.0022 (0.96)
Output gap	0.1994 (5.67) ***	0.2147 (6.09) ***	0.2057 (5.65) ***	0.2139 (6.02) ***	0.2020 (5.59) ***	0.1944 (5.48) ***	0.1965 (5.41) ***	0.1923 (5.28) ***	0.1919 (5.21) ***	0.1916 (5.32) ***	0.1916 (5.21) ***	0.1767 (5.25) ***	0.1683 (5.00) ***
Asset prices		0.0368 (5.17) ***											
Asset prices (t-1)			0.0135 (1.85) *										
Residential property prices				0.0489 (3.86) ***						0.0469 (3.59) ***			
Residential property prices (t-1)					0.0221 (1.72) *						0.0262 (1.95) *		
Equity prices						0.0149 (3.15) ***				0.0129 (2.63) ***			
Equity prices (t-1)							0.0075 (1.56				0.0052 (1.04)		
Commercial property prices								0.0128 (1.82) *		0.0041 (0.57)			

Table 1 continued

Commercial property prices (t-1)									0.0029 (0.36)		-0.0019 (-0.26)		
Yield curve slope												0.0581 (1.16)	
Yield curve slope (t-1)													0.0614 (1.26)
Residual's 2nd order AR (p-values)	0.348	0.340	0.664	0.627	0.578	0.310	0.667	0.501	0.484	0.538	0.530	0.198	0.212
Sargan test of overidentifying restrictions (p-values)[a]	0.187	0.118	0.139	0.084	0.103	0.069	0.119	0.121	0.095	0.993	0.985	0.231	0.225
No of Obs	447	431	421	431	421	431	421	410	400	410	400	435	433
Instruments : First differences equation[b]	The whole instrument matrix was used starting from t-2 lags of PBY and ygap and t-3 lags of Debt.	The t-2 to t-4 lags of PBY, ygap and RAP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, and ygap and the t-3 to t-5 lags of Debt and RAP.	The t-2 to t-4 lags of PBY, ygap and RRP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, and ygap and the t-3 to t-5 lags of Debt and RRP.	The t-2 to t-4 lags of PBY, ygap and REP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, and ygap and the t-3 to t-5 lags of Debt and REP.	The t-2 to t-4 lags of PBY, ygap and RCP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, and ygap and the t-3 to t-5 lags of Debt and RCP.	The t-2 to t-4 lags of PBY, ygap and RRP, REP, RCP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, ygap and the t-3 to t-5 lags of Debt and RRP, REP, RCP.	The t-2 to t-5 lags of PBY and ygap and yield curve slope and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of PBY and ygap and the t-3 to t-6 lags of Debt and yield curve slope.

Notes: Dependent variable: Primary balance as a percent of GDP (PBY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses. [a] Not robust, but not weakened by many instruments (see Roodman, 2009a) . [b] When we specify that lagged levels of the left and right hand side variables dated t-a to t-b are used as instruments in the difference equation, then in the level equation we use as instruments the first difference dated at t-a+1 of the left and right hand side variables. For example, when we use in the difference equation as instruments the t-2 to t-4 lags of primary balance, output gap and asset prices and the t-3 to t-5 lags of debt, in the level equation we use as instruments: the first lag (dated at t-1) of the first difference of primary balaance(t-1), asset prices(t-1), output gap(t-1) and debt(t-2).

Table 2 Current expenditure excluding interest payments as a % of GDP

	1	2	3	4	5	6	7	8	9	10	11	12	13
Current expenditure (t-1)	0 .758009 (2.18) **	0.88395 (6.20) ***	0.62804 (3.02) ***	0.46726 (2.31) **	0.56649 (0.89)	0.72096 (3.41) ***	0.87783 (2.62) ***	0.95788 (5.38 ***	0.90277 (2.01) **	0.48970 (2.38) **	0.70850 (2.40) **	0.986609 (8.30) ***	0.9879005 (12.26) ***
Current revenue (t-1)	-0.412102 (-0.38)	0.081550 (0.36)	-0.22961 (-0.40)	0.25188 (1.44)	-0.33197 (-0.32)	0.26519 (0.76)	-0.42251 (-0.38)	0.4758 (1.86)*	-0.31043 (-0.64)	0.36925 (1.83)*	0.58724 (2.02)**	0.063947 (0.57)	0.019535 (0.20)
Debt (t-1)	0 .127387 (0.59)	-0.03873 (-1.31)	0.06838 (0.65)	0.01971 (0.74)	0.13886 (0.55)	0.0496 (0.79)	0.11665 (0.54)	-0.03398 (-0.74)	0.02590 (0.48)	0.01580 (0.64)	0.02685 (0.46)	-0.00543 (-0.47)	-0.0083328 (-0.98)
Output gap	-0.185421 (-0.55)	0.05711 (0.40)	-0.33991 (-1.61)	-0.24099 (-1.80)*	-0.33246 (-0.61)	-0.3877 (-1.63)	-0.15228 (-0.48)	0.04726 (0.26)	-0.12101 (-0.36)	-0.26249 (-1.69)*	-0.11014 (-0.46)	-0.030729 (-0.34)	0.0194683 (0.25)
Asset prices		-0.05603 (-2.43) **											
Asset prices (t-1))			-0.08950 (-1.47)										
Residential property prices				-0.13709 (-2.79) ***						-0.13967 (-2.37) **			
Residential property prices (t-1)					-0.07543 (-0.98)						-0.04968 (-1.32)		
Equity prices						0.09685 (1.54)				0.01295 5 (0.97)			
Equity prices (t-1)							-0.02834 (-1.26)				-0.00953 (-0.67)		
Commercial property prices								-0.08702 (-2.39) **		-0.03798 (-2.66) ***			
Commercial property prices (t-1)									-0.05652 (-1.29)		-0.04161 (-2.13) **		

Table 2 continued

Yield curve slope												-0.221284 (-2.05)**	
Yield curve slope (t-1)													-0.1860175 (-3.01)***
Residual's 2nd order AR (p-values)	0.225	0.079	0.782	0.112	0.707	0.087	0.252	0.110	0.135	0.096	0.378	0.164	0.107
Sargan test of overidentifying restrictions (p-values)[a]	0.113	0.136	0.202	0.091	0.255	0.289	0.105	0.106	0.217	0.246	0.063	0.210	0.299
No of Obs	430	414	404	414	404	414	404	393	383	393	383	435	433
Instruments:[b]	The t-2 to t-3 lags of CRXY and Debt and the t-2 lag of ygap and CDXY.	The t-2 to t-4 lags of CDXY, RAP and ygap and the t-3 to t-5 lags of CRXY and Debt.	The t-2 to t-3 lags of CRXY, GGDY and RAP and the t-2 lags of CDXY and ygap.	The t-2 to t-4 lags of CDXY, RRP and ygap and the t-3 to t-5 lags of CRXY and Debt.	The t-2 to t-3 lags of DRP and the t-2 lags of CDXY, and ygap and the t-3 lags of CRXY and Debt.	The t-2 to t-3 lags of CDXY, REP and ygap and the t-2 lags of CRXY and Debt.	The t-2 to t-3 lags of CRXY, REP, Debt and the t-2 lags of CDXY and ygap.	The t-2 to t-3 lags of CDXY, RCP and ygap and the t-2 lags of CRXY and Debt.	The t-2 lags of CDXY and ygap and the t-3 lag of RCP, and the t-3 to t-4 lags of CRXY and Debt.	The t-2 to t-4 lags of CDXY, RRP, REP, RCP and ygap and the t-3 to t-5 lags of CRXY and Debt.	The t-2 to t-3 lags of CDXY, ygap, RRP, REP, RCP and the t-2 lags of CRXY and Debt.	The t-2 to t-3 lags of CDXY, yield curve slope and ygap and the t-3 to t-4 lags of CRXY and Debt	The t-2 to t-4 lags of CDXY, ygap and yield curve and the t-3 to t-4 lags of CRXY and Debt.

Notes: Dependent variables: Current expenditure excluding interest payments as a percent of GDP(CDXY). Estimator : One step difference GMM, see Arellano and Bond (1991) and Roodman (2009b). Collumns 12-13: One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias.*,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses. [a] Not robust, but it cannot be weakened by many instruments (see Roodman, 2009a). [b]A collapsed instrument set was used according to Roodman (2009b).

Table 3 Current revenue excluding interest receipts as a % of GDP

	1	2	3	4	5	6	7	8	9	10	11	12	13
Current revenue (t-1)	0.9476 (52.17) ***	0.9305 (50.60) ***	0.9501 (49.93) ***	0.9311 (49.98) ***	0.9428 (49.57) ***	0.9352 (50.41) ***	0.9464 (50.02) ***	0.9183 (45.92) ***	0.9416 (46.38) ***	0.9109 (46.00) ***	0.9392 (45.66) ***	0.9404 (51.26) ***	0.9387 (50.77) ***
Current expenditure (t-1)	0.0526 (2.90) ***	0.0674 (3.69) ***	0.0512 (2.72) ***	0.0691 (3.72) ***	0.0579 (3.06) ***	0.0635 (3.44) ***	0.0546 (2.91) ***	0.0779 (3.99) ***	0.0577 (2.92) ***	0.0843 (4.36) ***	0.0606 (3.03) ***	0.0594 (3.23) ***	0.0616 (3.31) ***
Debt (t-1)	-0.0016 (-0.99)	-0.0009 (-0.56)	-0.0015 (-0.92)	-0.0009 (-0.58)	-0.0013 (-0.77)	-0.0012 (-0.73)	-0.0014 (-0.85)	-0.0013 (-0.81)	-0.0013 (-0.77)	-0.0008 (-0.52)	-0.00101 (-0.64)	-0.0014 (-0.85)	-0.0013 (-0.78)
Output gap	0.0692 (2.78) ***	0.0764 (3.09) ***	0.0616 (2.45) **	0.0776 (3.10) ***	0.0647 (2.56) ***	0.0664 (2.65) ***	0.0654 (2.59) ***	0.0718 (2.82) ***	0.0628 (2.45) **	0.0698 (2.76) ***	0.0645 (2.51) **	0.0562 (2.23) **	0.0621 (2.46) **
Asset prices		0.0209 (4.32) ***											
Asset prices (t-1))			-0.0069 (-1.42)										
Residential property prices				0.0300 (3.50) ***						0.0298 (3.38) ***			
Residential property prices (t-1)					0.0056 (0.65)						0.0131 (1.45)		
Equity prices						0.0085 (2.62) ***				0.0077 (2.31) **			
Equity prices (t-1)							-0.0023 (-0.71)				-0.0019 (-0.56)		
Commercial property prices								0.0116 (2.41) ***		0.0060 (1.23)			
Commercial property prices (t-1)									-0.0078 (-1.65)*		-0.0088 (-1.80)*		

Table 3 continued

Yield curve slope												-0.0472 (-1.30)	
Yield curve slope (t-1)													-0.0501 (-1.41)
Residual's 2nd order AR (p-values)	0.527	0.435	0.693	0.522	0.648	0.549	0.686	0.596	0.847	0.640	0.831	0.554	0.555
Sargan test of overidentifying restrictions (p-values)[a]	0.373	0.983	0.781	0.989	0.959	0.982	0.952	0.991	0.968	1.000	1.000	0.993	0.989
No of Obs	447	431	421	431	421	431	421	410	400	410	400	435	433
Instruments: First differences equation	The t-2 to t-4 lags of CRXY and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, RAP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RAP and Debt.	The t-2 to t-4 lags of CRXY, RRP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RRP and Debt.	The t-2 to t-4 lags of CRXY, REP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, REP and Debt.	The t-2 to t-4 lags of CRXY, RCP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RCP and Debt.	The t-2 to t-4 lags of CRXY, RRP, REP, RCP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RRP, REP, RCP and Debt	The t-2 to t-4 lags of CRXY, yield curve slope and ygap and the t-3 to t-5 lags of CDXY and Debt	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, yield curve slope and Debt.

Notes: Dependent variables: Current revenues excluding interest receipts as a percent of GDP(CDXY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses. [a]Not robust, but it cannot be weakened by many instruments (see Roodman, 2009a).

Table 4 Primary balances 1970-1990

	1	2	3	4	5	6	7	8	9	10	11	12	13
Primary balance (t-1)	0.7981 (19.26) ***	0.7612 (17.03) ***	0.7489 (16.47) ***	0.7692 (17.39) ***	0.7634 (16.74) ***	0.7834 (17.85) ***	0.7713 (17.14) ***	0.7374 (15.82) ***	0.7307 (14.15) ***	0.7318 (15.56) ***	0.7282 (14.01) ***	0.8292 (21.44) ***	0.8260 (21.18) ***
Debt (t-1)	0.0068 (1.39)	0.0089 (1.74)*	0.0099 (1.95)*	0.0079 (1.55)	0.0094 (1.81)*	0.0089 (1.74)*	0.0099 (1.89)*	0.0059 (1.17)	0.0079 (1.49)	0.0062 (1.19)	0.0090 (1.70)*	0.0075 (1.69) *	0.0072 (1.59)
Output gap	0.2520 (4.58) ***	0.2752 (4.83) ***	0.2610 (4.56) ***	0.2619 (4.63) ***	0.2616 (4.49) ***	0.2608 (4.60) ***	0.2534 (4.34) ***	0.2209 (3.80) ***	0.2379 (3.92) ***	0.2226 (3.83) ***	0.2410 (3.98) ***	0.2031 (4.01) ***	0.2017 (3.97) ***
Asset prices		0.0402 (2.12)**											
Asset prices (t-1))			0.0405 (2.13)**										
Residential property prices				0.0330 (1.82)*						0.0273 (1.43)			
Residential property prices (t-1)					0.0199 (1.08)						0.0282 (1.44)		
Equity prices						0.0086 (1.17)				0.0015 (0.20)			
Equity prices (t-1)							0.0129 (1.76)*				0.0089 (1.13)		
Commercial property prices								0.0287 (2.77)***		0.0253 (2.32)**			
Commercial property prices (t-1)									0.0045 (0.40)		-0.0019 (-0.16)		
Yield curve slope												-0.0211 (-0.34)	
Yield curve slope (t-1)													-0.0065 (-0.11)

Table 4 continued

Residual's 2nd order AR (p-values)	0.351	0.239	0.131	0.234	0.135	0.299	0.078	0.164	0.187	0.153	0.106	0.351	0.290
Sargan test of overidentifying restrictions (p-values)[a]	0.427	0.994	0.996	0.993	0.997	0.992	0.998	0.999	0.997	1.000	1.000	0.952	0.932
No of Obs	209	193	183	193	183	193	183	172	162	172	162	197	195
Instruments: First differences equation	The t-2 to t-4 lags of PBY and ygap and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, ygap and RAP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, and ygap and the t-3 to t-5 lags of Debt and RAP.	The t-2 to t-4 lags of PBY, ygap and RRP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, and ygap and the t-3 to t-5 lags of Debt and RRP.	The t-2 to t-4 lags of PBY, ygap and REP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, and ygap and the t-3 to t-5 lags of Debt and REP.	The t-2 to t-4 lags of PBY, ygap and RCP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, and ygap and the t-3 to t-5 lags of Debt and RCP.	The t-2 to t-4 lags of PBY, ygap and RRP, REP, RCP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of PBY, ygap and the t-3 to t-5 lags of Debt and RRP, REP, RCP.	The t-2 to t-5 lags of PBY and ygap and yield curve slope and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of PBY and ygap and the t-3 to t-6 lags of Debt and yield curve slope.

Notes: Dependent variables: Primary Balances as a percent of GDP (PBY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses. [a] Not robust, but not weakened by many instruments (see Roodman, 2009a).

Table 5 Primary balances 1991-2005

	1	2	3	4	5	6	7	8	9	10	11	12	13
Primary balance (t-1)	0.8977 (24.18) ***	0.8819 (28.89) ***	0.8998 (22.05) ***	0.8777 (25.83) ***	0.9030 (24.37) ***	0.8817 (23.10) ***	0.8973 (22.60) ***	0.9096 (22.39) ***	0.9093 (20.69) ***	0.8776 (24.05) ***	0.9090 (20.33) ***	0.9044 (26.12) ***	0.9071 (26.38) ***
Debt (t-1)	-0.0039 (-1.01)	-0.0029 (-0.84)	-0.0038 (-1.00)	-0.0026 (-0.89)	-0.0039 (-1.00)	-0.0037 (-0.96)	-0.0037 (-0.99)	-0.0039 (-1.05)	-0.0039 (-0.95)	-0.0028 (-0.89)	-0.0038 (-0.97)	-0.0044 (-1.13)	-0.0043 (-1.29)
Output gap	-0.0943 (-1.61)	-0.0850 (-1.63)	-0.0909 (-1.50)	-0.0777 (-1.61)	-0.1014 (-1.84)*	-0.1233 (-2.28)**	-0.0881 (-1.59)	-0.0990 (-1.62)	-0.0912 (-1.48)	-0.1180 (-2.61) ***	-0.1083 (-1.82)*	-0.0783 (-1.24)	-0.0994 (-1.70)*
Asset prices		0.0355 (4.36) ***											
Asset prices (t-1))			-0.0008 (-0.13)										
Residential property prices				0.0508 (2.41) **						0.0506 (3.17) ***			
Residential property prices (t-1)					-0.0053 (-0.022)						0.0104 (0.46)		
Equity prices						0.0258 (2.14) **				0.0251 (2.25) ***			
Equity prices (t-1)							0.0008 (0.10)				0.0029 (0.40)		
Commercial property prices								-0.0104 (-0.79)		-0.0182 (-1.97) **			
Commercial property prices (t-1)									-0.0254 (-1.82)*		-0.0252 (-2.05) **		
Yield curve slope												0.1123 (0.97)	
Yield curve slope (t-1)													0.0923 (0.73)

Table 5 continued

Residual's 2nd order AR (p-values)	0.370	0.240	0.376	0.401	0.370	0.301	0.371	0.372	0.418	0.332	0.412	0.370	0.400
Sargan test of overidentifying restrictions (p-values)[a]	0.029	0.171	0.096	0.076	0.116	0.178	0.103	0.114	0.182	0.755	0.767	0.086	0.126
No of Obs	238	238	238	238	238	238	238	238	238	238	238	238	238
Instruments: First differences equation	The whole instrument matrix was used starting from t-2 lags of PBY and ygap and t-3 lags of Debt.	The t-2 to t-5 lags of PBY, ygap and RAP and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of PBY, and ygap and the t-3 to t-6 lags of Debt and RAP.	The t-2 to t-5 lags of PBY, ygap and RRP and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of PBY, and ygap and the t-3 to t-6 lags of Debt and RRP.	The t-2 to t-5 lags of PBY, ygap and REP and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of PBY, and ygap and the t-3 to t-6 lags of Debt and REP.	The t-2 to t-5 lags of PBY, ygap and RCP and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of PBY, and ygap and the t-3 to t-6 lags of Debt and RCP.	The t-2 to t-5 lags of PBY, ygap and RRP, REP, RCP and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of PBY, ygap and the t-3 to t-6 lags of Debt and RRP, REP, RCP.	The t-2 to t-5 lags of PBY and ygap and yield curve slope and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of PBY and ygap and the t-3 to t-6 lags of Debt and yield curve slope.

Notes: Dependent variables: Primary Balances as a percent of GDP (PBY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses. [a]Not robust, but not weakened by many instruments (see Roodman, 2009a). In all cases the Hansen test (which is robust but can be weakened by many instruments) points to non rejection of the null that the overidentifying restrictions are valid (p-values in all columns approach 1)

Table 6 Current expenditure excluding interest payments as a % of GDP – 1970-1990

	1	2	3	4	5	6	7	8	9	10	11	12	13
Current expenditure (t-1)	0.77820 (6.55)***	0.9108 (26.94) ***	0.8930 (21.00) ***	0.9092 (25.02) ***	0.8989 (20.51) ***	0.9103 (24.87) ***	0.8957 (24.10) ***	0.9024 (24.69) ***	0.8747 (20.49) ***	0.9014 (21.55) ***	0.8830 (19.41) ***	0.9157 (29.08) ***	0.9266 (29.85) ***
Current revenue (t-1)	0.24584 (1.86)*	0.1008 (2.71) ***	0.1195 (2.57) **	0.1022 (2.60) ***	0.1143 (2.46) ***	0.1014 (2.57) ***	0.1199 (2.83) ***	0.1104 (2.69) ***	0.1391 (2.81) ***	0.1115 (2.52) **	0.1335 (2.64) ***	0.0904 (2.88) ***	0.0826 (2.64) ***
Debt (t-1)	-0.012958 (-1.10)	-0.0102 (-5.29) ***	-0.0161 (-5.45) ***	-0.0102 (-5.38) ***	-0.0104 (-5.59) ***	-0.0103 (-4.49) ***	-0.0111 (-4.96) ***	-0.0093 (-4.96) ***	-0.0094 (-4.62) ***	-0.0089 (-4.19) ***	-0.0099 (-4.58) ***	-0.0094 (-6.39) ***	-0.0087 (-4.89) ***
Output gap	-0.003423 (-0.03)	-0.1194 (-3.86) ***	-0.1283 (-4.56) ***	-0.1203 (-3.93) ***	-0.1273 (-4.47) ***	-0.1203 (-3.88) ***	-0.1238 (-4.33) ***	-0.1026 (-3.28) ***	-0.1149 (-3.55)***	-0.1013 (-3.33) ***	-0.1129 (-3.39) ***	-0.1110 (-4.39) ***	-0.1036 (-3.71) ***
Asset prices		0.0019 (0.13)											
Asset prices (t-1))			-0.0045 (-0.24)										
Residential property prices				-0.0024 (-0.14)						0.0046 (0.27)			
Residential property prices (t-1)					0.0067 (0.33)						0.0076 (0.38)		
Equity prices						-0.0005 (-0.09)				0.0032 (0.64)			
Equity prices (t-1)							-0.0109 (-3.84) ***				-0.0097 (-4.44) ***		
Commercial property prices								-0.0092 (-1.88)*		-0.0108 (-2.64) ***			
Commercial property prices (t-1)									-0.0023 (-0.27)		0.0001 (0.02)		
Yield curve slope												-0.0189 (-0.29)	
Yield curve slope (t-1)													-0.1036 (-1.24)

Table 6 continued

	1	2	3	4	5	6	7	8	9	10	11	12	13
Residual's 2nd order AR (p-values)	0.727	0.929	0.773	0.933	0.676	0.935	0.858	0.812	0.379	0.798	0.589	0.690	0.723
Sargan test of overidentifying restrictions (p-values)[a]	0.065	0.131	0.063	0.126	0.095	0.126	0.053	0.380	0.122	0.789	0.393	0.137	0.117
No of Obs	209	193	183	193	183	193	183	172	162	172	162	197	195
Instruments: First differences equation	The t-2 to t-4 lags of CDXY and ygap and the t-3 to t-4 lags of CRXY and Debt. A collapsed instrument set was used according to Roodman (2009b).	The t-2 to t-4 lags of CDXY, RAP and ygap and the t-3 to t-5 lags of CRXY and Debt.	The t-2 to t-4 lags of CDXY, and ygap and the t-3 to t-5 lags of CRXY, RAP and Debt.	The t-2 to t-4 lags of CDXY, RRP and ygap and the t-3 to t-5 lags of CRXY and Debt.	The t-2 to t-4 lags of CDXY, and ygap and the t-3 to t-5 lags of CRXY, RRP and Debt.	The t-2 to t-4 lags of CDXY, REP and ygap and the t-3 to t-5 lags of CRXY and Debt.	The t-2 to t-4 lags of CDXY, and ygap and the t-3 to t-5 lags of CRXY, REP and Debt.	The t-2 to t-4 lags of CDXY, RCP and ygap and the t-3 to t-5 lags of CRXY and Debt.	The t-2 to t-4 lags of CDXY, and ygap and the t-3 to t-5 lags of CRXY, RCP and Debt.	The t-2 to t-4 lags of CDXY, RRP, REP, RCP and ygap and the t-3 to t-5 lags of CRXY and Debt.	The t-2 to t-4 lags of CDXY, and ygap and the t-3 to t-5 lags of CRXY, RRP, REP, RCP and Debt.	The t-2 to t-4 lags of CDXY, yield curve slope and ygap and the t-3 to t-5 lags of CRXY and Debt.	The t-2 to t-4 lags of CDXY, and ygap and the t-3 to t-5 lags of CRXY, yield curve slope and Debt.

Notes: Dependent variables: Current expenditure excluding interest payments as a percent of GDP(CDXY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses.
[a]Not robust, but cannot be weakened by many instruments (see Roodman, 2009a).

Table 7 Current expenditure excluding interest payments as a % of GDP – 1991-2005

	1	2	3	4	5	6	7	8	9	10	11	12	13
Current expenditure (t-1)	0.81478 (2.81)***	0.9533 (2.95)***	0.84236 (3.60)***	0.7784 (1.62)	0.8541 (4.01)***	0.71842 (1.62)	0.84016 (2.63)***	0.57386 (1.04)	0.90975 (2.48)***	0.84792 (2.52)**	0.97479 (3.50)***	0.6444 (2.54)**	0.6787 (3.39)***
Current revenue (t-1)	-0.10956 (-0.27)	0.07677 (0.15)	0.04291 (0.10)	-0.4748 (-0.67)	0.2225 (0.37)	-.25971 (-0.42)	-0.00307 (-0.01)	-0.55641 (-0.51)	0.0942 (0.13)	0.09118 (0.19)	0.4149 (0.61)	-0.5807 (-1.48)	-0.2604 (-0.71)
Debt (t-1)	0.07139 (0.97)	0.04762 (0.90)	0.05487 (0.90)	0.11421 (0.69)	0.04314 (0.80)	0.08328 (1.06)	0.0573 (0.89)	0.11354 (0.65)	0.06192 (0.76)	0.07038 (0.73)	0.0277 (0.60)	0.0309 (0.68)	0 .01376 (0.43)
Output gap	-0.08880 (-0.40)	0.05218 (0.14)	-0.09874 (-0.52)	0.09272 (0.23)	-0.13955 (-0.68)	-0.16701 (-0.37)	-0.04514 (-0.19)	-0.15238 (-0.51)	-0.13782 (-0.53)	-0.10694 (-0.35)	-0.13851 (-0.59)	-0.27202 (-1.64)	-0.28819 (-1.64)
Asset prices		-0.03693 (-0.44)											
Asset prices (t-1))			-0.01970 (-0.65)										
Residential property prices				-0.2111 (-1.99)**						-0.11935 (-1.45)			
Residential property prices (t-1)					-0.1102 (-1.43)						-0.0597 (-0.58)		
Equity prices						0.01102 (0.19)				0.00714 (0.23)			
Equity prices (t-1)							-0.0305 (-0.92)				0.00096 (0.03)		
Commercial property prices								0.0235 (0.41)		-0.03747 (-0.95)			
Commercial property prices (t-1)									-0.10584 (-1.13)		-0.0697 (-0.97)		
Yield curve slope												-0.5875 (-2.44)**	

Table 7 continued

	1	2	3	4	5	6	7	8	9	10	11	12	13
Yield curve slope (t-1)													-0.49032 (-4.75)***
Residual's 2nd order AR (p-values)	0.165	0.228	0.267	0.392	0.091	0.084	0.233	0.315	0.345	0.292	0.211	0.126	0.160
Sargan test of overidentifying restrictions (p-values)[a]	0.121	0.247	0.205	0.944	0.256	0.204	0.430	0.115	0.667	0.108	0.620	0.123	0.199
No of Obs	221	221	221	221	221	221	221	221	221	221	221	221	221
Instruments:[b]	The t-2 to t-3 lags of CDXY and ygap and the t-3 to t-4 lags of CRXY and Debt.	The t-2 to t-3 lags of CDXY, RAP and ygap and the t-3 to t-4 lags of CRXY and Debt.	The t-2 to t-3 lags of CDXY, and ygap and the t-3 to t-4 lags of CRXY, RAP and Debt.	The t-2 to t-3 lags of CDXY, RRP, ygap, CRXY and Debt.	The t-2 to t-3 lags of CDXY, and ygap and the t-3 to t-4 lags of CRXY, RRP and Debt.	The t-2 to t-3 lags of CDXY, RCP and ygap and the t-3 to t-4 lags of CRXY and Debt.	The t-2 to t-3 lags of CDXY, and ygap and the t-3 to t-4 lags of CRXY, RCP and Debt.	The t-2 to t-3 lags of CDXY and ygap and the t-2 lag of RCP and the t-3 lags of CRXY and Debt.	The t-2 to t-3 lags of CDXY, and ygap and the t-3 to t-4 lags of CRXY, RCP and Debt.	The t-2 to t-3 lags of CDXY, RRP, REP, RCP, ygap, CRXY and Debt.	The t-2 to t-3 lags of CDXY and ygap and the t-3 to t-4 lags of CRXY, RRP, REP, RCP, and Debt.	The t-2 to t-4 lags of CDXY, slope of the yield curve and ygap and the t-3 to t-5 lags of CRXY and Debt	The t-2 to t-4 lags of CDXY, and ygap and the t-3 to t-5 lags of CRXY, slope of the yield curve and Debt.

Notes: Dependent variables: Current expenditire excluding interest payments as a percent of GDP(CDXY). Estimator : One step difference GMM, see Arellano and Bond (1991) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses.
[a] Not robust, but cannot be weakened by many instruments (see Roodman, 2009a). [b] A collapsed instrument set was used according to Roodman (2009b).

Table 8 Current revenue excluding interest receipts as a % of GDP- 1970-1990

	1	2	3	4	5	6	7	8	9	10	11	12	13
Current revenue (t-1)	0.9642 (32.62) ***	0.9312 (29.76) ***	0.9518 (29.06) ***	0.9403 (29.84) ***	0.9524 (29.57) ***	0.9494 (30.55) ***	0.9590 (30.19) ***	0.8987 (25.30) ***	0.9458 (23.63) ***	0.8984 (25.17) ***	0.9395 (23.29) ***	0.9507 (31.87) ***	0.9456 (31.45) ***
Current expenditure (t-1)	0.0344 (1.14)	0.0676 (2.14) **	0.0487 (1.48)	0.0616 (1.92)*	0.0497 (1.52)	0.0471 (1.50)	0.0412 (1.29)	0.0910 (2.64) ***	0.0504 (1.32)	0.0934 (2.68) ***	0.0602 (1.55)	0.0479 (1.55)	0.0555 (1.77)*
Debt (t-1)	-0.0028 (-0.82)	-0.0009 (-0.28)	-0.0019 (-0.56)	-0.0022 (-0.62)	-0.0019 (-0.57)	-0.0011 (-0.32)	-0.0023 (-0.65)	-0.0028 (-0.81)	-0.0021 (-0.59)	-0.0019 (-0.56)	-0.0016 (-0.44)	-0.0035 (-1.01)	-0.0026 (-0.76)
Output gap	0.0917 (2.37) ***	0.1075 (2.75) ***	0.0777 (1.97) **	0.0932 (2.37) **	0.0792 (2.00) **	0.0938 (2.40) **	0.0772 (1.96) **	0.0755 (1.90)*	0.0765 (1.85)*	0.0790 (1.99) **	0.0805 (1.94)*	0.0666 (1.67)*	0.0712 (1.79)*
Asset prices		0.0429 (3.33) ***											
Asset prices (t-1))			0.0124 (0.94)										
Residential property prices				0.0272 (2.13) **						0.0263 (1.98) **			
Residential property prices (t-1)					0.0174 (1.38)						0.0275 (2.02) **		
Equity prices						0.0093 (1.83)*				0.0074 (1.37)			
Equity prices (t-1)							-0.0002 (-0.04)				0.0003 (0.05)		
Commercial property prices								0.0216 (3.04) ***		0.0160 (2.14) **			
Commercial property prices (t-1)									-0.0059 (-0.76)		-0.0093 (-1.14)		

Table 8 continued

	1	2	3	4	5	6	7	8	9	10	11	12	13
Yield curve slope												-0.0221 (-0.44)	
Yield curve slope (t-1)													-0.0620 (-1.25)
Residual's 2nd order AR (p-values)	0.781	0.783	0.547	0.824	0.526	0.936	0.514	0.780	0.438	0.857	0.406	0.729	0.781
Sargan test of overidentifying restrictions (p-values)[a]	0.694	0.970	0.877	0.975	0.886	0.949	0.851	0.972	0.906	0.999	0.995	0.972	0.956
No of Obs	209	193	183	193	183	193	183	172	162	172	162	197	195
Instruments: First differences equation	The t-2 to t-4 lags of CRXY and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, RAP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RAP and Debt.	The t-2 to t-4 lags of CRXY, RRP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RRP and Debt.	The t-2 to t-4 lags of CRXY, REP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, REP and Debt.	The t-2 to t-4 lags of CRXY, RCP and ygap and the t-3 to t-5 lags of CDXY and Debt	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RCP and Debt	The t-2 to t-4 lags of CRXY, RRP, REP, RCP and ygap and the t-3 to t-5 lags of CDXY and Debt	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RRP, REP, RCP and Debt	The t-2 to t-4 lags of CRXY, yield curve slope and ygap and the t-3 to t-5 lags of CDXY and Debt	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, yield curve slope and Debt

Notes: Dependent variables: Current revenues excluding interest receipts as a percent of GDP(CDXY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses. [a] Not robust, but it cannot be weakened by many instruments (see Roodman, 2009a).

Table 9 Current revenue excluding interest receipts as a % of GDP-1991-2005

	1	2	3	4	5	6	7	8	9	10	11	12	13
Current revenue (t-1)	0.9499 (38.44) ***	0.9423 (36.69) ***	0.9626 (38.71) ***	0.9376 (38.38) ***	0.9549 (38.43) ***	0.9416 (38.53) ***	0.9546 (38.26) ***	0.9538 (36.70) ***	0.9627 (38.12) ***	0.9428 (37.33) ***	0.9671 (37.80) ***	0.9499 (38.42) ***	0.9545 (38.46) ***
Current expenditure (t-1)	0.0518 (2.05) **	0.0543 (2.26) **	0.0412 (1.64)	0.0593 (2.41) **	0.0473 (1.89)*	0.0578 (2.34) **	0.0478 (1.90)*	0.0478 (1.82)*	0.0397 (1.55)	0.0524 (2.07) **	0.0358 (1.40)	0.0514 (2.04) **	0.0459 (1.82)*
Debt (t-1)	-0.0013 (-0.68)	-0.0010 (-0.56)	-0.0016 (-0.90)	-0.0006 (-0.33)	-0.0016 (-0.85)	-0.0013 (-0.71)	-0.0012 (-0.66)	-0.0014 (-0.74)	-0.0014 (-0.78)	-0.0007 (-0.39)	-0.0015 (-0.82)	-0.0011 (-0.57)	-0.0014 (-0.73)
Output gap	0.0109 (0.25)	0.0082 (0.20)	0.0028 (0.07)	0.0131 (0.31)	0.0077 (0.18)	0.0081 (0.19)	0.0198 (0.47)	0.0077 (0.18)	-0.0076 (-0.18)	-0.0083 (-0.20)	-0.0083 (-0.19)	-0.0028 (-0.07)	-0.0051 (-0.12)
Asset prices		0.0159 (3.33) ***											
Asset prices (t-1)			-0.0119 (-2.44) **										
Residential property prices				0.0363 (2.82) ***						0.0400 (3.02) ***			
Residential property prices (t-1)					-0.0111 (-0.85)						-0.0041 (-0.30)		
Equity prices						0.0071 (1.61)				0.0070 (1.58)			
Equity prices (t-1)							-0.0062 (-1.40)				-0.0038 (-0.86)		
Commercial property prices								-0.0045 (-0.61)		-0.0119 (-1.62)			
Commercial property prices (t-1)									-0.0148 (-2.19) **		-0.0118 (-1.69)		
Yield curve slope												-0.0550 (-0.82)	

Table 9 continued

	1	2	3	4	5	6	7	8	9	10	11	12	13
Yield curve slope (t-1)													-0.0224 (-0.46)
Residual's 2nd order AR (p-values)	0.523	0.380	0.501	0.558	0.522	0.675	0.633	0.507	0.879	0.669	0.882	0.527	0.528
Sargan test of overidentifying restrictions (p-values)[a]	0.032	0.571	0.173	0.475	0.528	0.560	0.547	0.585	0.648	0.982	0.980	0.572	0.495
No of Obs	238	238	238	238	238	238	238	238	238	238	238	238	238
Instruments: First differences equation	The t-2 to t-4 lags of CRXY and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, RAP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RAP and Debt.	The t-2 to t-4 lags of CRXY, RRP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RRP and Debt.	The t-2 to t-4 lags of CRXY, REP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, REP and Debt.	The t-2 to t-4 lags of CRXY, RCP and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RCP and Debt.	The t-2 to t-4 lags of CRXY, RRP, REP, RCP and ygap and the t-3 to t-5 lags of CDXY and Debt	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, RRP, REP, RCP and Debt.	The t-2 to t-4 lags of CRXY, yield curve slope and ygap and the t-3 to t-5 lags of CDXY and Debt.	The t-2 to t-4 lags of CRXY, and ygap and the t-3 to t-5 lags of CDXY, yield curve slope and Debt.

Notes: Dependent variables: Current revenues excluding interest receipts as a percent of GDP(CDXY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses.
[a]Not robust, but it cannot be weakened by many instruments (see Roodman, 2009a).

Table 10: Cyclically adjusted primary balances - CAPBY

	1	2	3	4	5	6	7	8	9	10	11	12	13
CAPBY(t-1)	0.8887 (41.50) ***	0.8766 (41.85) ***	0.8839 (39.39) ***	0.8712 (41.01) ***	0.8857 (39.35) ***	0.8862 (41.63) ***	0.8863 (40.15) ***	0.8836 (39.92) ***	0.8855 (39.14) ***	0.8714 (40.02) ***	0.8806 (38.18) ***	0.9021 (45.12) ***	0.9019 (45.00) ***
Debt (t-1)	0.0058 (2.63) ***	0.0067 (3.14) ***	0.0061 (2.73) ***	0.0068 (3.14) ***	0.0060 (2.70) ***	0.0059 (2.75) ***	0.0059 (2.69) ***	0.0058 (2.65) ***	0.0059 (2.67) ***	0.0069 (3.18) ***	0.0063 (2.79) ***	0.0052 (2.53) ***	0.0051 (2.46) ***
Output gap	0.0458 (1.47)	0.0484 (1.60)	0.0459 (1.45)	0.0453 (1.49)	0.0439 (1.38)	0.0365 (1.18)	0.0417 (1.31)	0.0351 (1.10)	0.0376 (1.17)	0.0274 (0.88)	0.0333 (1.02)	0.0305 (1.03)	0.0259 (0.89)
Asset prices		0.0366 (5.77) ***											
Asset prices (t-1)			0.0075 (1.13)										
Residential property prices				0.0551 (4.71) ***						0.0533 (4.31) ***			
Residential property prices (t-1)					0.0076 (0.61)						0.0124 (0.96)		
Equity prices						0.0125 (2.88) ***				0.0098 (2.18)**			
Equity prices (t-1)							0.0058 (1.31)				0.0036 (0.78)		
Commercial property prices								0.0093 (1.44)		0.0004 (0.06)			
Commercial property prices (t-1)									-0.0010 (-0.16)		-0.0034 (-0.50)		
Yield curve slope												0.0330 (0.73)	

Table 10 continued

Yield curve slope (t-1)													0.0413 (0.95)
Residual's 2nd order AR (p-values)	0.689	0.940	0.498	0.489	0.577	0.862	0.513	0.803	0.636	0.719	0.596	0.894	0.875
Sargan test of overidentifying restrictions (p-values)[a]	0.412	0.844	0.826	0.775	0.796	0.784	0.820	0.824	0.790	1.000	1.000	0.422	0.422
No of Obs	419	416	407	416	407	416	407	395	386	395	386	409	408
Instruments: First differences equation	The t-2 to t-5 lags of CAPBY and ygap and the t-3 to t-6 lags of Debt.	The t-2 to t-4 lags of CAPBY, ygap and RAP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, and ygap and the t-3 to t-5 lags of Debt and RAP.	The t-2 to t-4 lags of CAPBY, ygap and RRP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, and ygap and the t-3 to t-5 lags of Debt and RRP.	The t-2 to t-4 lags of CAPBY, ygap and REP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, and ygap and the t-3 to t-5 lags of Debt and REP.	The t-2 to t-4 lags of CAPBY, ygap and RCP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, and ygap and the t-3 to t-5 lags of Debt and RCP.	The t-2 to t-4 lags of CAPBY, ygap and DRRP, DREP, DRCP and the t-3 to t-5 lags of GGDY.	The t-2 to t-4 lags of CAPBY, ygap and the t-3 to t-5 lags of Debt and RRP, REP, RCP.	The t-2 to t-5 lags of CAPBY and ygap and yield curve slope and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of CAPBY and ygap and the t-3 to t-6 lags of Debt and yield curve slope.

Notes: Dependent variables:Cyclically adjusted primary balance as a percent of GDP (CAPBY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses. [a]Not robust, but not weakened by many instruments (see Roodman, 2009a).

Table 11: Cyclically adjusted primary balances – 1970-1990

	1	2	3	4	5	6	7	8	9	10	11	12	13
CAPBY (t-1)	0.8320 (19.08) ***	0.8281 (19.19) ***	0.8109 (17.21) ***	0.8289 (19.58) ***	0.8206 (17.39) ***	0.8369 (19.06) ***	0.8250 (17.61) ***	0.8070 (17.19) ***	0.7997 (15.12) ***	0.8200 (17.67) ***	0.8003 (14.90) ***	0.8655 (21.64) ***	0.8641 (21.57) ***
Debt (t-1)	0.0097 (2.04) **	0.0115 (2.43) **	0.0114 (2.31) **	0.0104 (2.25) **	0.01069 (2.16) **	0.0106 (2.22) **	0.0110 (2.22) **	0.0098 (2.01) **	0.0107 (2.13) **	0.0109 (2.28) **	0.0112 (2.20) **	0.0101 (2.41) **	0.0102 (2.42) **
Output gap	0.1323 (2.34) **	0.1482 (2.64) ***	0.1405 (2.39) **	0.1250 (2.28) **	0.1446 (2.44) **	0.1388 (2.45) **	0.1454 (2.45) **	0.1070 (1.79)*	0.1329 (2.11) **	0.1012 (1.72)*	0.1304 (2.04) **	0.0967 (1.87)*	0.0983 (1.91)*
Asset prices		0.0505 (2.80) ***											
Asset prices (t-1))			0.0281 (1.46)										
Residential property prices				0.0622 (3.47) ***						0.0589 (2.98) ***			
Residential property prices (t-1)					0.0074 (0.38)						0.0149 (0.71)		
Equity prices						0.0094 (1.28)				0.0041 (0.52)			
Equity prices (t-1)							0.0083 (1.13)				0.0036 (0.44)		
Commercial property prices								0.0220 (2.12) **		0.0130 (1.21)			
Commercial property prices (t-1)									0.0011 (0.09)		-0.0019 (-0.15)		
Yield curve slope												-0.0198 (-0.33)	

Table 11 continued

Yield curve slope (t-1)													-0.0226 (-0.38)
Residual's 2nd order AR (p-values)	0.394	0.348	0.277	0.347	0.293	0.500	0.224	0.444	0.351	0.460	0.270	0.788	0.736
Sargan test of overidentifying restrictions (p-values)[a]	0.922	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	1.000	1.000	0.995	0.993
No of Obs	181	178	169	178	169	178	169	157	148	157	148	171	170
Instruments: First differences equation	The t-2 to t-4 lags of CAPBY and ygap and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, ygap and RAP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, and ygap and the t-3 to t-5 lags of Debt and RAP.	The t-2 to t-4 lags of CAPBY, ygap and RRP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, and ygap and the t-3 to t-5 lags of Debt and RRP.	The t-2 to t-4 lags of CAPBY, ygap and REP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, and ygap and the t-3 to t-5 lags of Debt and REP.	The t-2 to t-4 lags of CAPBY, ygap and RCP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, and ygap and the t-3 to t-5 lags of Debt and RCP.	The t-2 to t-4 lags of CAPBY, ygap and RRP, REP, RCP and the t-3 to t-5 lags of Debt.	The t-2 to t-4 lags of CAPBY, ygap and the t-3 to t-5 lags of Debt and RRP, REP, RCP.	The t-2 to t-5 lags of CAPBY and ygap and yield curve slope and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of CAPBY and ygap and the t-3 to t-6 lags of Debt and yield curve slope.

Notes: Dependent variables: Cyclically adjusted primary balance as a percent of GDP (CAPBY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses. [a]Not robust, but not weakened by many instruments (see Roodman, 2009a).

Table 12: Cyclically adjusted primary balances – 1991-2005

	1	2	3	4	5	6	7	8	9	10	11	12	13
CAPBY(t-1)	0.9352 (39.97) ***	0.9266 (41.69) ***	0.9384 (39.34) ***	0.9267 (38.12) ***	0.9437 (38.56) ***	0.9327 (40.50) ***	0.9354 (39.57) ***	0.9431 (39.62) ***	0.9416 (39.50) ***	0.9302 (38.29) ***	0. 9453 (38.01) ***	0.9363 (40.21) ***	0.9361 (40.04) ***
Debt (t-1)	-0.0004 (-0.18)	0.0005 (0.21)	-0.0005 (-0.21)	0.0002 (0.08)	-0.0009 (-0.39)	-0.0004 (-0.16)	-0.0004 (-0.18)	-0.0006 (-0.27)	-0.0006 (-0.26)	0.00003 (0.01)	-0.0009 (-0.38)	-0.0006 (-0.21)	-0.0009 (-0.37)
Output gap	-0.1502 (-3.39) ***	-0.1536 (-3.66) ***	-0.1514 (-3.46) ***	-0.1496 (-3.41) ***	-0.1552 (-3.53) ***	-0.1733 (-3.87) ***	-0.1474 (-3.29) ***	-0.1474 (-3.33) ***	-0.1554 (-3.58) ***	-0.1798 (-4.06) ***	-0.1679 (-3.80) ***	-0.1440 (-3.18) ***	-0.1498 (-3.36) ***
Asset prices		0.0312 (5.35) ***											
Asset prices (t-1))			-0.0019 (-0.31)										
Residential property prices				0.0215 (1.27)						0.0258 (1.50)			
Residential property prices (t-1)					-0.0156 (-0.92)						-0.0047 (-0.26)		
Equity prices						0.0141 (2.50) **				0.0148 (2.50) **			
Equity prices (t-1)							0.0012 (0.21)				0.00381 (0.66)		
Commercial property prices								-0.0128 (-1.35)		-0.0173 (-1.87) **			
Commercial property prices (t-1)									-0.0161 (-1.85)*		-0.0152 (-1.70)*		
Yield curve slope												0.0332 (0.38)	

Table 12 continued

Yield curve slope (t-1)													0.0763 (0.96)
Residual's 2nd order AR (p-values)	0.768	0.622	0.809	0.661	0.688	0.798	0.769	0.711	0.729	0.606	0.708	0.775	0.734
Sargan test of overidentifying restrictions (p-values)[a]	0.372	0.731	0.598	0.617	0.648	0.688	0.629	0.676	0.777	0.989	0.991	0.627	0.588
No of Obs	238	238	238	238	238	238	238	238	238	238	238	238	238
Instruments: First differences equation	The whole instrument matrix was used starting from t-2 lags of CAPBY and ygap and t-3 lags of Debt.	The t-2 to t-5 lags of CAPBY, ygap and RAP and the t-3 to t-6 lags of Debt	The t-2 to t-5 lags of CAPBY, and ygap and the t-3 to t-6 lags of Debt and RAP.	The t-2 to t-5 lags of CAPBY, ygap and RRP and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of CAPBY, and ygap and the t-3 to t-6 lags of Debt and RRP.	The t-2 to t-5 lags of CAPBY, ygap and REP and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of CAPBY, and ygap and the t-3 to t-6 lags of Debt REP.	The t-2 to t-5 lags of CAPBY, ygap and RCP and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of CAPBY, and ygap and the t-3 to t-6 lags of Debt and RCP.	The t-2 to t-5 lags of CAPBY, ygap and RRP, REP, RCP and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of CAPBY, ygap and the t-3 to t-6 lags of GGDY and RRP, REP, RCP.	The t-2 to t-5 lags of CAPBY and ygap and yield curve slope and the t-3 to t-6 lags of Debt.	The t-2 to t-5 lags of CAPBY and ygap and the t-3 to t-6 lags of Debt and yield curve slope.

Notes: Dependent variables: Cyclically adjusted primary balance as a percent of GDP (CAPBY). Estimator : One step system GMM, see Blundell and Bond (1998) and Roodman (2009b). Year dummy variables were used to reduce omitted variable bias. *,**, *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses. [a]Not robust, but not weakened by many instruments (see Roodman, 2009a).

Table 13: Robustness- Primary balance/GDP

	Impact of financial and real estate variables on primary balance excluding												
	AUS	CAN	ESP	FIN	FRA	UK	IRE	JPN	NTL	NOR	NZL	SWE	US
Asset prices	0.0365 (5.01)***	0.0376 (5.13)***	0.0363 (5.04)***	0.0466 (4.65)***	0.0366 (4.97)***	0.0388 (5.37)***	0.0380 (5.32)***	0.0332 (4.56)***	0.0371 (5.12)***	0.0315 (4.64)***	0.0352 (4.86)***	0.0361 (5.09)***	0.0377 (5.06)***
Asset prices (t-1)	0.01250 (1.67)*	0.0133 (1.77)*	0.0136 (1.84)*	0.0171 (1.69)*	0.0145 (1.93)*	0.01265 (1.69)*	0.01334 (1.80)*	0.0123 (1.66)*	0.0144 (1.93)*	0.0171 (2.46)**	0.01587 (2.14)**	0.0108 (1.48)	0.0122 (1.60)
Residential property prices	0.0483 (3.68)*** [0.0456 (3.36)***]	0.0501 (3.73)*** [0.0487 (3.59)***]	0.0493 (3.83)*** [0.0464 (3.49)***]	0.0448 (3.36)*** [0.043 (3.17)***]	0.0504 (3.77)*** [0.0483 (3.49)***]	0.0573 (4.23)*** [0.0523 (3.68)***]	0.0487 (3.84)*** [0.0457 (3.50)***]	0.0415 (3.11)*** [0.0393 (2.84)***]	0.0513 (3.90)*** [0.0496 (3.66)]	0.0491 (4.06)*** [0.0486 (3.87)***]	0.0502 (3.93)*** [0.0485 (3.68)***]	0.0420 (3.45)*** [0.0406 (3.24)***]	0.05306 (4.02)*** [0.0510 (3.78)***]
Residential property prices (t-1)	0.0188 (1.42) [0.0227 (1.63)]	0.0257 (1.89)* [0.0264 (1.88)*]	0.0192 (1.47) [0.0235 (1.71)*]	0.0141 (1.05) [0.0200 (1.43)]	0.0234 (1.73)* [0.0274 (1.93)*]	0.0195 (1.40) [0.0220 (1.49)]	0.0239 (1.85)* [0.0273 (2.03)**]	0.0120 (0.90) [0.0166 (1.18)]	0.0283 (2.12)** [0.0339 (2.43)***	0.0304 (2.49)** [0.0326 (2.56)**]	0.0270 (2.10)** [0.0311 (2.31)**]	0.0297 (2.44)** [0.0353 (2.80)***]	0.0243 (1.82)* [0.0296 (2.14)**]
Equity prices	0.0159 (3.25)*** [0.0135 (2.69)***]	0.0162 (3.27)*** [0.01434 (2.85)***]	0.0151 (3.15)*** [0.0127 (2.56)***]	0.0151 (2.84)*** [0.0129 (2.35)**]	0.0161 (3.20)*** [0.0137 (2.62)***]	0.0157 (3.18)*** [0.0123 (2.43)**]	0.0161 (3.83)*** [0.0137 (2.78)***]	0.0145 (2.99)*** [0.0129 (2.57)***]	0.0146 (2.98)*** [0.0124 (2.45)**]	0.0095 (2.03)** [0.0083 (1.72)*]	0.01298 (2.69)*** [0.0107 (2.15)**]	0.0134 (2.90)*** [0.0117 (2.48)**]	0.0152 (3.04)*** [0.0126 (2.46)**]

Table 13 continued

	Impact of financial and real estate variables on primary balance excluding												
	AUS	CAN	ESP	FIN	FRA	UK	IRE	JPN	NTL	NOR	NZL	SWE	US
Equity prices (t-1)	0.0083 (1.69)* [0.0059 (1.15)]	0.0059 (1.17) [0.0056 (1.11)]	0.0078 (1.61) [0.0056 (1.11)]	0.0048 (0.90) [0.0022 (0.40)]	0.0072 (1.42) [0.0043 (0.82)]	0.0088 (1.77)* [0.0056 (1.09)]	0.0078 (1.62) [0.0052 (1.04)]	0.0070 (1.44) [0.0048 (0.96)]	0.0088 (1.80)* [0.0069 (1.36)]	0.0073 (1.56) [0.0037 (0.77)]	0.0083 (1.73)* [0.0058 (1.17)]	0.0046 (1.00) [0.0024 (0.52)]	0.0065 (1.30) [0.0036 (0.70)]
Commercial property prices	0.0139 (1.93)* [0.005 (0.70)]	0.0131 (1.80)* [0.0041 (0.55)]	0.0161 (2.15)** [0.0065 (0.85)]	0.0180 (2.32)** [0.0106 (1.36)]	0.0128 (1.73)* [0.0037 (0.49)	0.01425 (1.94)* [0.0049 (0.66)]	0.0150 (2.11)** [0.0061 (0.84)***]	0.0104 (1.47) [0.0027 (0.38)]	0.0143 (1.94)* [0.0053 (0.71)	0.0042 (0.58) [-0.0031 (-0.43)]	0.0134 (1.90)* [0.0054 (0.75)]	0.0074 (1.09) [0.0001 (0.02)]	0.0117 (1.60) [0.0031 (0.42)]
Commercial property prices (t-1)	0.0025 (0.36) [-0.0015 (-0.21)]	0.0023 (0.33) [-0.0020 (-0.27)]	0.0019 (0.26) [-0.0027 (-0.35)]	-0.0018 (-0.24) [-0.0044 (-0.56)]	0.0037 (0.52) [-0.0004 (-0.06)]	0.0027 (0.37) [-0.0013 (-0.17)]	0.0045 (0.65) [0.0001 (0.02)]	0.0019 (0.28) [-0.0012 (-0.16)]	0.0012 (0.17) [-0.0044 (-0.58)]	0.0101 (1.42) [0.0053 (0.72)]	0.0039 (0.57) [-0.0010 -0.14)]	-0.0023 (-0.35) [-0.0072 (-1.05)]	0.0008 (0.12) [-0.0032 (-0.43)]
Yield curve slope	0.0553 (1.07)	0.0549 (1.06)	0.0602 (1.20)	0.0331 (0.61)	0.0576 (1.09)	0.0528 (1.00)	0.0658 (1.32)	0.0676 (1.27)	0.0673 (1.34)	0.0456 (0.98)	0.0318 (0.63)	0.0144 (0.29)	0.0810 (1.50)
Yield curve slope (t-1)	0.0536 (1.06)	0.0264 (0.52)	0.0585 (1.19)	0.0713 (1.33)	0.0646 (1.24)	0.0410 (0.79)	0.0634 (1.30)	0.0582 (1.13)	0.0656 (1.33)	0.1074 (2.37)**	0.0371 (0.75)	0.0589 (1.20)	0.0648 (1.23)

Notes: Impact of financial and real estate variables on primary balance excluding, in turn, Australia, Canada, Spain, Finland, France, United Kingdom, Ireland, Japan, Netherlands, Norway, New Zealand, Sweden, and United States. The coefficient estimates are comparable to those in Table 1 (colunns 1-13). In brackets we report the coefficient estimates from the joint estimation of residential, commercial property and equity prices (the contemporaneous values correspond to the estimates in column 10 of Table 1, whereas the lagged values correspond to the estimates in column 11 of Table 1). *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses.

Table 14 Robustness- Current revenue/GDP

	Impact of financial and real estate variables on current revenues excluding												
	AUS	CAN	ESP	FIN	FRA	UK	IRE	JPN	NTL	NOR	NZL	SWE	US
Asset prices	0.0207 (4.18)***	0.0211 (4.22)***	0.0210 (4.29)***	0.0265 (4.07)***	0.0208 (4.20)***	0.0223 (4.67)***	0.0211 (4.32)***	0.0203 (4.02)***	0.0223 (4.64)***	0.0175 (3.73)***	0.0199 (4.06)***	0.0189 (3.66)***	0.0224 (4.45)***
Asset prices (t-1)	-0.0071 (-1.43)	-0.0072 (-1.43)	-0.0074 (-1.50)	-0.0045 (-0.71)	-0.0062 (-1.25)	-0.0081 (-1.66)*	-0.0073 (-1.49)	-0.0075 (-1.48)	-0.0052 (-1.07)	-0.0063 (-1.36)	-0.0065 (-1.33)	-0.0080 (-1.56)	-0.0071 (-1.40)
Residential property prices	0.0302 (3.40)*** [0.0299 (3.26)***]	0.0297 (3.25)*** [0.0292 (3.19)***]	0.0296 (3.40)*** [0.0285 (3.17)***]	0.0306 (3.55)*** [0.0316 (3.60)***]	0.0315 (3.54)*** [0.0320 (3.47)***]	0.0337 (3.78)*** [0.0301 (3.27)***]	0.0295 (3.42)*** [0.0288 (3.25)***]	0.0277 (2.96)*** [0.0253 (2.63)***]	0.0343 (3.95)*** [0.0341 (3.83)***]	0.0282 (3.39)*** [0.0296 (3.43)***]	0.0309 (3.60)*** [0.0309 (3.49)***]	0.0234 (2.66)*** [0.0258 (2.82)***]	0.0339 (3.82)*** [0.0325 (3.57)***]
Residential property prices (t-1)	0.0055 (0.62) [0.0136 (1.46)]	0.0073 (0.80) [0.0131 (1.40)]	0.0037 (0.42) [0.0116 (1.27)]	0.0071 (0.84) [0.0143 (1.62)]	0.0078 (0.88) [0.0158 (1.68)*]	-0.0106 (-1.17) [-0.0043 (-0.45)]	0.0065 (0.75) [0.0134 (1.48)]	0.0046 (0.50) [0.0118 (1.21)]	0.0131 (1.50) [0.0209 (2.28)**]	0.0059 (0.71) [0.0129 (1.49)]	0.0079 (0.92) [0.0152 (1.69)*]	0.0086 (0.99) [0.0180 (1.97)**]	0.0102 (1.14) [0.0168 (1.81)*]
Equity prices	0.0090 (2.70)*** [0.0081 (2.37)**]	0.0097 (2.84)*** [0.0083 (2.42)**]	0.0084 (2.54)*** [0.0072 (2.14)**]	0.0087 (2.49)** [0.0084 (2.36)**]	0.0085 (2.48)** [0.0072 (2.05)**]	0.0093 (2.83)*** [0.0078 (2.36)**]	0.0089 (2.69)*** [0.0079 (2.35)**]	0.0085 (2.48)** [0.0077 (2.18)**]	0.0100 (3.06)*** [0.0090 (2.71)***]	0.0062 (1.93)* [0.0059 (1.76)*]	0.0073 (2.24)** [0.0064 (1.91)*]	0.0059 (1.76)* [0.0059 (1.70)*]	0.0089 (2.62)*** [0.0079 (2.25)**]

Table 14 continued

	Impact of financial and real estate variables on current revenues excluding												
	AUS	CAN	ESP	FIN	FRA	UK	IRE	JPN	NTL	NOR	NZL	SWE	US
Equity prices (t-1)	-0.0021 (-0.63) [-0.0017 (-0.50)]	-0.0035 (-1.04) [-0.0022 (-0.66)]	-0.0021 (-0.65) [-0.0015 (-0.46)]	-0.0037 (-1.10) [-0.0035 (-0.98)]	-0.0023 (-0.70) [-0.0021 (-0.61)]	-0.0001 (-0.04) [0.0004 (0.12)]	-0.0024 (-0.75) [-0.0022 (-0.64)]	-0.0034 (-1.02) [-0.0031 (-0.89)]	-0.0009 (-0.29) [-0.0003 (-0.11)]	-0.0038 (-1.20) [-0.0040 (-1.20)]	-0.0022 (-0.68) [-0.0018 (-0.55)]	-0.0039 (-1.18) [-0.0036 (-1.07)]	-0.0018 (-0.56) [-0.0019 (-0.56)]
Commercial property prices	0.0118 (2.42)** [0.0061 (1.22)]	0.0103 (2.07)** [0.0047 (0.94)]	0.0146 (2.86)*** [0.0087 (1.66)*]	0.0131 (2.62)*** [0.0078 (1.53)]	0.0117 (2.36)** [0.0059 (1.17)]	0.0120 (2.49)** [0.0063 (1.29)]	0.0127 (2.61)*** [0.0071 (1.43)]	0.0122 (2.47)** [0.0073 (1.45)]	0.0146 (2.99)*** [0.0082 (1.63)]	0.0067 (1.33) [0.0017 (0.34)]	0.0120 (2.51)** [0.0068 (1.38)]	0.0042 (0.85) [-0.0002 (-0.05)]	0.0117 (2.36)** [0.0061 (1.22)]
Commercial property prices (t-1)	-0.0082 (-1.71)* [-0.0094 (-1.88)*]	-0.0081 (-1.67)* [-0.0091 (-1.79)*]	-0.0089 (-1.77)* [-0.0100 (-1.89)*]	-0.0083 (-1.67)* [-0.0089 (-1.74)*]	-0.0076 (-1.56) [-0.0089 (-1.75)*]	-0.0113 (-2.38)** [-0.0109 (-2.21)**]	-0.0066 (-1.38) [-0.0076 (-1.53)]	-0.0061 (-1.27) [-0.0066 (-1.32)]	-0.0074 (-1.53) [-0.0096 (-1.91)*]	-0.0050 (-1.04) [-0.0053 (-1.06)]	-0.0072 (-1.54) [-0.0085 (-1.74)*]	-0.0117 (2.45)** [-0.0133 (-2.68)***]	-0.0068 (-1.39) [-0.0082 (-1.62)]
Yield curve slope	-0.0542 (-1.43)	-0.0427 (-1.11)	-0.0451 (-1.22)	-0.0073 (-0.20)	-0.0586 (-1.53)	-0.0561 (-1.49)	-0.0443 (-1.20)	-0.0576 (-1.45)	-0.0392 (-1.08)	-0.0506 (-1.44)]	-0.0690 (-1.87)*	-0.0670 (-1.81)*	-0.0449 (-1.14)
Yield curve slope (t-1)	-0.0621 (-1.67)*	-0.0530 (-1.41)	-0.0546 (-1.51)	-0.0101 (-0.27)	-0.0516 (-1.38)	-0.0396 (-1.07)	-0.0495 (-1.38)	-0.0685 (-1.79)*	-0.0500 (-1.42)	-0.0291 (-0.85)	-0.07399 (-2.05)**	-0.0532 (-1.47)	-0.0676 (-1.76)*

Notes: Impact of financial and real estate variables on primary balance excluding, in turn, Australia, Canada, Spain, Finland, France, United Kingdom, Ireland, Japan, Netherlands, Norway, New Zealand, Sweden, and United States. The coefficient estimates are comparable to those in Table 3 (colunns 1-13). In brackets we report the coefficient estimates from the joint estimation of residential, commercial property and equity prices (the contemporaneous values correspond to the estimates in column 10 of Table 3, whereas the lagged values correspond to the estimates in column 11 of Table 3). *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses.

Table 15 Robustness- Cyclically adjusted primary balance/GDP

	Impact of financial and real estate variables on cylically adjusted primary balance excluding												
	AUS	CAN	ESP	FIN	FRA	UK	IRE	JPN	NTL	NOR	NZL	SWE	US
Asset prices	0.0369 (5.69)***	0.0365 (5.55)***	0.0368 (5.77)***	0.0390 (4.44)***	0.0364 (5.56)***	0.0364 (5.63)***	0.0381 (6.05)***	0.0343 (5.24)***	0.0371 (5.80)***	0.0371 (5.81)***	0.0366 (5.67)***	0.0349 (5.75)***	0.0375 (5.65)***
Asset prices (t-1)	0.0070 (1.04)	0.0068 (0.99)	0.0079 (1.18)	0.0077 (0.85)	0.0083 (1.21)	0.0078 (1.15)	0.0068 (1.03)	0.0066 (0.98)	0.0082 (1.22)	0.0115 (1.71)*	0.0103 (1.53)	0.0049 (0.78)	0.0061 (0.88)
Residential property prices	0.0562 (4.64)*** [0.0538 (4.18)***]	0.0553 (4.39)*** [0.0534 (4.13)***]	0.0566 (4.79)*** [0.0539 (4.30)***]	0.0560 (4.66)*** [0.0546 (4.33)***]	0.0558 (4.51)*** [0.0545 (4.14)***]	0.0555 (4.57)*** [0.0532 (4.12)***]	0.0545 (4.68)*** [0.0517 (4.21)***]	0.0485 (3.85)*** [0.0452 (3.37)***]	0.0575 (4.77)*** [0.0560 (4.40)***]	0.0547 (4.59)*** [0.0517 (4.14)***]	0.0578 (4.90)*** [0.0562 (4.50)***]	0.0492 (4.55)*** [0.0486 (4.26)***]	0.0586 (4.79)*** [0.0571 (4.43)***]
Residential property prices (t-1)	0.0054 (0.42) [0.0098 (0.73)]	0.0097 (0.74) [0.0110 (0.81)]	0.0047 (0.38) [0.0093 (0.70)]	0.0016 (0.13) [0.0081 (0.62)]	0.0094 (0.73) [0.0147 (1.07)]	0.0086 (0.68) [0.0131 (0.97)]	0.0090 (0.73) [0.0135 (1.04)]	-0.0030 (-0.23) [0.0020 (0.15)]	0.0133 (1.05) [0.0197 (1.47)]	0.0116 (0.93) [0.0157 (1.21)]	0.0128 (1.04) [0.0175 (1.34)]	0.0158 (1.40) [0.0229 (1.95)*]	0.0114 (0.88) [0.0171 (1.27)]
Equity prices	0.0132 (2.95)*** [0.0101 (2.18)**]	0.0125 (2.71)*** [0.0105 (2.27)**]	0.0128 (2.93)*** [0.0097 (2.14)***]	0.0112 (2.33)** [0.0080 (1.62)]	0.0131 (2.84)*** [0.0099 (2.06)**]	0.0127 (2.86)*** [0.0096 (2.09)**]	0.0135 (3.12)*** [0.0105 (2.35)**]	0.0123 (2.73)*** [0.0100 (2.14)**]	0.0122 (2.74)*** [0.0095 (2.06)**]	0.0136 (3.01)*** [0.0106 (2.26)**]	0.0116 (2.63)*** [0.0086 (1.90)*]	0.0102 (2.51)** [0.0077 (1.85)*]	0.0120 (2.60)*** [0.0085 (1.80)*]
Equity prices (t-1)	0.0066 (1.46) [0.0043 (0.91)]	0.0037 (0.79) [0.0039 (0.83)]	0.0061 (1.37) [0.0039 (0.84)]	0.0013 (0.27) [-0.0017 (-0.34)]	0.0051 (1.10) [0.0023 (0.47)]	0.0064 (1.41) [0.0039 (0.84)]	0.0058 (1.31) [0.0033 (0.73)]	0.0054 (1.19) [0.0031 (0.67)]	0.0073 (1.62) [0.0054 (1.15)]	0.0079 (1.73)* [0.0051 (1.07)]	0.0072 (1.61) [0.0048 (1.03)]	0.0033 (0.82) [0.0011 (0.26)]	0.0046 (1.00) [0.0015 (0.32)]

Table 15 continued

Commercial property prices	0.0105 (1.59) [0.0012 (0.19)]	0.0088 (1.32) [-0.00008 (-0.01)]	0.0128 (1.87)* [0.0026 (0.38)]	0.0118 (1.71)* [0.0039 (0.56)]	0.0089 (1.32) [-0.0002 (-0.03)]	0.0093 (1.41) [0.0002 (0.02)]	0.0109 (1.68)* [0.0017 (0.27)]	0.0080 (1.22) [0.0001 (0.03)]	0.0104 (1.54) [0.0012 (0.18)]	0.0100 (1.41) [0.0011 (0.16)]	0.0104 (1.60) [0.0017 (0.90)]	0.0030 (0.52) [-0.0046 (-0.76)]	0.0076 (1.12) [-0.0009 (-0.14)]
Commercial property prices (t-1)	-0.0004 (-0.06) [-0.0026 (-0.38)]	-0.0006 (-0.10) [-0.0028 (-0.41)]	-0.0007 (-0.12) [-0.0031 (-0.43)]	-0.0033 (-0.49) [-0.0037 (-0.52)]	-0.00001 (-0.00) [-0.0022 (-0.32)]	0.00001 (0.00) [-0.0025 (-0.37)]	0.0003 (0.05) [-0.0020 (-0.31)]	-0.0003 (-0.05) [-0.0013 (-0.20)]	-0.0032 (-0.48) [-0.0068 (-0.98)]	0.0017 (0.24) [-0.0014 (-0.20)]	0.0003 (0.06) [-0.0027 (-0.41)]	-0.0063 (-1.08) [-0.0093 (-1.53)]	-0.0019 (-0.29) [-0.0041 (-0.59)]
Yield curve slope	0.0369 (0.79)	0.0477 (1.01)	0.0358 (0.79)	-0.0004 (-0.01)	0.0232 (0.49)	0.0472 (1.01)	0.0364 (0.81)	0.0495 (1.04)	0.0396 (0.88)	-0.0015 (-0.04)	0.0079 (0.17)	-0.0112 (-0.24)	0.0616 (1.24)
Yield curve slope (t-1)	0.0421 (0.93)	0.0376 (0.82)	0.0383 (0.87)	0.0437 (0.94)	0.0394 (0.85)	0.0455 (1.00)	0.0401 (0.93)	0.0434 (0.95)	0.0451 (1.03)	0.0257 (0.58)	0.0210 (0.47)	0.0378 (0.88)	0.0538 (1.12)

Notes: Impact of financial and real estate variables on primary balance excluding, in turn, Australia, Canada, Spain, Finland, France, United Kingdom, Ireland, Japan, Netherlands, Norway, New Zealand, Sweden, and United States. The coefficient estimates are comparable to those in Table 10 (colunns 1-13). In brackets we report the coefficient estimates from the joint estimation of residential, commercial property and equity prices (the contemporaneous values correspond to the estimates in column 10 of Table 10, whereas the lagged values correspond to the estimates in column 11 of Table 10). *** significant at the 10%, 5%, 1% level, respectively. The Z statistics are in parentheses.

Table 16:Summary of financial and real estate variables' impact on primary balances

	Primary balance/GDP			Cyclically adjusted primary balance/GDP		
	1970-2005	**1970-1990**	**1991-2005**	**1970-2005**	**1970-1990**	**1991-2005**
Asset prices	0.0368	0.0402	0.0355	0.0366	0.0505	0.0312
Asset prices (t-1)	0.0135	0.0405				
Residential property prices	0.0469-0.0489	0.0330	0.0506-0.0508	0.0551-0.0533	0.0589-0.0622	
Residential property prices (t-1)	0.0221-0.0262					
Equity prices	0.0129-0.0149		0.0251-0.0258	0.0098-0.0125		0.0141-0.0148
Equity prices (t-1)		0.0129				
Commercial property prices	0.0128	0.0287-0.0253	-0.0182		0.0220	-0.0173
Commercial property prices (t-1)			-0.0252 to - 0.0254			-0.0152 to -0.0161
Yield curve slope						
Yield curve slope (t-1)						

Notes: The table summarizes the statistically significant coefficient estimates of the impact of financial and real estate variables on fiscal variables. The results are read as follows: a 1% increase in e.g., residential property prices increases contemporaneously the ratio of primary balance to GDP by about 0.047-0.049pp in the whole sample case, with the impact effect increasing over time, i.e. from 0.033pp in 1970-1990 to about 0.05pp in 1991-2005. Moreover, there is also a significant lagged effect amounting to 0.022-0.026pp but only in the whole sample case.

Table 17: Summary of financial and real estate variables' impact on current expenditure and revenue

	Current expenditure/GDP			Current revenue/GDP		
	1970-2005	**1970-1990**	**1991-2005**	**1970-2005**	**1970-1990**	**1991-2005**
Asset prices	-0.05603			0.0209	0.0429	0.0159
Asset prices (t-1)						-0.0119
Residential property prices	-0.13709 to -0.13967		-0.2111	0.0298-0.0300	0.0263-0.0272	0.0363-0.0400
Residential property prices (t-1)					0.0275	
Equity prices				0.0077-0.0085	0.0093	
Equity prices (t-1)		-0.0097 to -0.0109				
Commercial property prices	-0.08702 to -0.03798	-0.0092 to -0.0108		0.0116	0.0160-0.0216	
Commercial property prices (t-1)	-0.04161			-0.0078 to -0.0088		-0.0148
Yield curve slope	-0.22128		-0.5875			
Yield curve slope (t-1)	-0.18601		-0.49032			

Notes: The table summarizes the statistically significant coefficient estimates of the impact of financial and real estate variables on fiscal variables. The results are read as follows: a 1% increase in e.g., residential property prices increases contemporaneously the ratio of current revenue to GDP by about 0.03pp in the whole sample case, with the impact effect increasing over time, i.e. from 0.026-0.027pp in 1970-1990 to about 0.036-0.04pp in 1991-2005. Moreover, there is also a significant lagged effect amounting to 0.0275pp but only in the period 1970-1990. Furthermore, a 1pp (100 basis points) increase in the differential between the long and short-term nominal interest rates reduces expenditure to GDP ratio by about 0.186-0.221pp in the whole sample case and by 0.490-0.587 in the period 1991-2005.

Table 18 Correlations

	1970-2005	1970-1990	1991-2005
Correlation of ygap with			
AP	0.1916	0.2587	0.1715
RAP	0.0295	-0.0388	0.0744
RP	0.4530	0.4532	0.4807
RRP	0.0100	0.0510	0.0122
EP	-0.2077	-0.3004	-0.1217
REP	0.0053	-0.1763	0.1548
CP	0.2611	0.2241	0.2765
RCP	0.0302	-0.0461	0.0564
Yield curve slope	-0.1784	-0.1783	-0.1463
Correlation of CP with			
RP	0.4571	0.4555	0.5177
EP	0.2961	0.2615	0.3549
Correlation of RP with			
EP	0.1185	0.0659	0.1955
Correlation of RCP with			
RRP	0.3083	0.3464	0.3454
REP	0.2840	0.3087	0.2563
Correlation of RRP with			
REP	0.0961	0.0759	0.1330
Correlation of DILS with			
LGGDY	0.2591	0.1977	0.2422

Correlations (1970-2005)				
	AP	RP	EP	CP
RAP	0.8914			
RRP		0.8409		
REP			0.9059	
RCP				0.8827

Table 19 Summary statistics

	Mean	Std. Dev	Min	Max
PBY	0.17722	3.32394	-11.7558	12.9902
CAPBY	0.04343	3.12310	-9.53656	7.43622
Debt	58.9626	28.6831	7.96639	172.074
CDXY	38.5538	8.46198	15.8003	62.7384
CRXY	40.6954	8.53872	20.6407	59.1518
YGAP	-0.56167	2.35083	-11.4463	6.73591
AP	2.83095	11.0587	-27.5545	139.502
RAP	6.80e-09	10.0222	-27.0028	129.856
RP	2.57458	7.59495	-19.7993	40.1670
RRP	3.69e-09	6.35355	-17.6283	31.3175
EP	4.49251	21.2498	-49.7364	98.64
REP	2.59e-08	19.0416	-43.8561	82.6511
CP	0.79940	12.4594	-40.0371	44.0577
RCP	2.17e-08	11.07913	-42.0715	40.3378
Yield curve slope	0.43761	1.74619	-6.32591	4.79762
Inflation	5.65651	4.84874	-10.1527	27.1313
Nominal long-term interest rate	8.51604	3.40042	1.00325	21.2480
Nominal short-term interest rate	8.07842	4.29132	0.02895	23.305

Table 20 Summary statistics 1970-1990

	Mean	Std. Dev	Min	Max
PBY	-0.51971	3.0444	-9.2566	8.61022
CAPBY	-0.81167	2.7326	-8.9215	7.14310
Debt	49.6566	23.024	7.96639	126.135
CDXY	37.0692	8.3599	15.8003	56.7759
CRXY	38.9343	8.7086	20.6407	59.1518
YGAP	-0.30075	2.3595	-6.3484	6.73591
AP	1.968008	8.5643	-22.3304	35.6363
RAP	-1.06713	7.4928	-20.2528	27.1943
RP	2.115219	8.3589	-15.4892	40.1670
RRP	-0.92058	7.1424	-17.6283	31.3175
EP	3.188323	22.3019	-49.7364	98.64
REP	-0.44801	20.5517	-43.8561	82.6511
CP	3.338467	13.3795	-34.9223	42.4157
RCP	2.081891	12.5769	-42.0715	40.3378
Yield curve slope	-0.04013	1.92209	-6.32591	4.79762
Inflation	8.229965	4.74932	-0.72918	27.1313
Nominal long-term interest rate	10.47745	2.949329	4.791667	21.24807
Nominal short-term interest rate	10.51758	3.72315	2.96333	23.305

Table 21 Summary statistics 1991-2005

	Mean	Std. Dev	Min	Max
PBY	1.06821	3.45669	-11.7558	12.9902
CAPBY	0.93544	3.25773	-9.53656	7.43622
Debt	68.2685	30.7380	14.38604	172.074
CDXY	40.5392	8.20169	22.84792	62.7384
CRXY	42.9468	7.77023	27.9136	58.5235
YGAP	-0.8747	2.30615	-11.4463	4.78277
AP	3.97817	13.6233	-27.5545	139.502
RAP	1.13827	12.0660	-27.0028	129.856
RP	3.18526	6.4059	-19.7993	18.9875
RRP	0.98195	5.22412	-9.72640	14.3386
EP	6.23143	19.6688	-44.0347	83.2150
REP	0.47788	17.3140	-43.2816	74.3976
CP	-1.6301	10.9994	-40.0371	44.0577
RCP	-1.8124	9.23667	-30.7334	35.8222
Yield curve slope	0.99968	1.30953	-5.00166	3.68666
Inflation	2.22525	2.04731	-10.1527	15.6511
Nominal long-term interest rate	6.20850	2.25624	1.00325	13.2820
Nominal short-term interest rate	5.20881	2.92474	0.02895	14.3183

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