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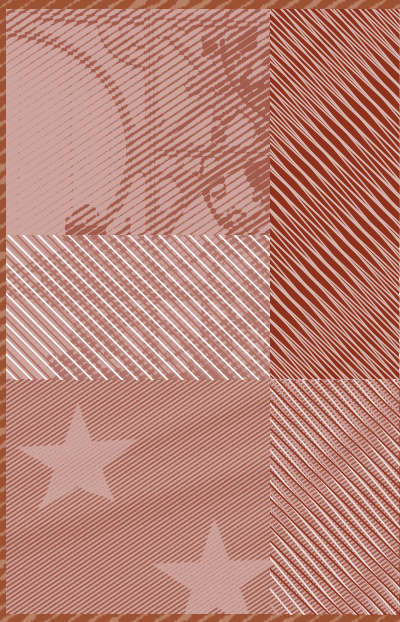

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Abstract

Global imbalances and financial market (de)regulation both feature prominently among the potential causes of the global financial crisis, but they have been generally discussed separately. In this paper, we take a different angle and investigate the relationship between financial market regulation and current account balances, an area for which there is limited empirical evidence. We use a panel of countries over the period 1980-2010 and employ a novel empirical approach which allows us to simultaneously account for model uncertainty, current account persistence and unobserved heterogeneity. We find robust evidence that financial market regulations affect current account balances and that different aspects of these regulations can have opposing effects on the current account. In particular we find that lowering bank entry barriers is negatively associated with the current account balance. In contrast, bank privatisation and securities market deregulation tend to raise current account balances. Our results also highlight the need to control for persistence and unobserved heterogeneity. Once we control for these factors, we find robust evidence for a wide range of current account theories in contrast to previous studies.

Keywords: current account, financial markets, financial regulation, Bayesian model averaging, model uncertainty.

JEL classification: C11, F32, F41, G28.

Resumen

Tanto los desequilibrios mundiales como la (des)regulación de los mercados financieros destacan como posibles causas de la crisis financiera mundial. En este documento se investiga la posible relación entre ambos fenómenos; concretamente, analizamos la relación entra la (des)regulación de los mercados financieros y los saldos por cuenta corriente, un área para la que la evidencia empírica disponible es escasa. A tal fin, explotamos datos para un panel de países en el período 1980-2010 y empleamos un novedoso enfoque empírico que permite atajar simultáneamente la incertidumbre del modelo, la persistencia en los saldos por cuenta corriente y la heterogeneidad no observada a nivel de país. Encontramos evidencias empíricas concluyentes de que las (des)regulaciones de los mercados financieros afectan a los saldos por cuenta corriente y que los diferentes aspectos de estas regulaciones pueden tener efectos opuestos sobre la cuenta corriente. En particular, observamos que reducir las barreras de entrada en el mercado bancario se asocia negativamente con la balanza por cuenta corriente. Por el contrario, la privatización bancaria y la desregulación del mercado de valores tienden a elevar los saldos por cuenta corriente. Nuestros resultados también ponen de relieve la importancia de tener en cuenta la persistencia y la heterogeneidad no observada a nivel de país. Una vez ambos factores son tenidos en cuenta, hallamos evidencias sólidas para una amplia gama de factores que están asociados con la evolución de la cuenta corriente, en contraste con estudios anteriores.

Palabras clave: saldo por cuenta corriente, mercados financieros, regulación financiera, promediado Bayesiano de modelos, incertidumbre de modelo.

Códigos JEL: C11, F32, F41, G28.

1 Introduction

The role of current account imbalances in the global financial crisis and more recently in the euro area sovereign debt crisis is widely debated (Obstfeld, 2012; Chinn, 2013; Campa and Gavilan, 2011; Chen et al., 2012). Some authors go as far as seeing global imbalances prior to the crisis as the main cause of the crisis (e.g. Portes, 2009; King, 2009), while others take a more nuanced view and suggest that the root causes of the global current account imbalances and the financial crisis coincide (Obstfeld and Rogoff, 2010).[1] One such potential root cause is financial deregulation. Several authors have pointed to a link between financial deregulation and the crisis (e.g. Stiglitz, 2010; Keys et al. 2010), but the relationship between financial deregulation and current account imbalances has received little attention to date. Our main contribution in this paper is to take a step towards filling this gap by providing a thorough empirical analysis. A better understanding can help inform the current discussions both on the design of more robust regulatory frameworks of domestic and international financial markets and on how to better monitor and prevent global or regional imbalances.[2,3]

Theoretically, the relationship between financial (de-)regulation and the current account is ambiguous. On the one hand, traditionally financial deregulation has been viewed to deepen financial markets, reduce transaction costs and facilitate risk management. This may encourage saving (e.g. Edwards, 1996; McKinnon, 1973; Shaw, 1973), and hence tends to raise the current account balance. On the other hand, financial deregulation may relax liquidity constraints, which could reduce the need for precautionary saving (Mendoza et al., 2009) and could fuel credit driven consumption and investment growth, and hence reduce the current account balance (Ferrero, 2012; Borio and Disyatat, 2011). Which of these two effects dominates is therefore largely an empirical question.

Our results suggest that the dominating effect may depend on the particular area of deregulation. In particular, we find that the removal of bank entry barriers is negatively associated with the current account, consistent with the liquidity constraints view of financial deregulation. In contrast, we find that deregulating securities markets and privatizing banks tends to raise the current account

[1] Current account imbalances are not necessarily "bad" as they can reflect the optimal allocation of capital across time and space. However, they can also be symptoms of underlying domestic distortions, such as deficient financial market regulation, and spillover effects can suggest a role for multilateral surveillance. Spillover effects can arise from (i) cross-border effects of a sudden stop in deficit countries; (ii) worries about unfair competitive advantages due to undervaluations in surplus countries; and (iii) global demand effects if part of the world is in a liquidity trap (Blanchard and Milesi-Ferretti, 2012).

[2] Examples of efforts to better monitor imbalances are the recent establishment of the G-20 Mutual Assessment Process (MAP) and the EU's Macroeconomic Imbalance Procedure (MIP).

[3] While global imbalances have narrowed after the crisis, a substantial part of the reduction is likely due to cyclical factors, as demand has contracted more in deficit countries than in surplus countries. Once cyclical conditions normalise global imbalances are likely to widen again (e.g. OECD, 2013).

balance. Hence, these aspects of deregulation appear to be more related to the saving enhancing view of financial deregulation, for example through a greater supply of and more sophisticated saving products. Our results therefore highlight the need to take a more nuanced view on financial deregulation, as different aspects can affect the current account in opposite ways.

Our study complements and extends that of Lanau and Wieladek (2012)- to our knowledge the only other study to have empirically investigated the link between financial (de-)regulation and the current account.[4] They set up an intertemporal model in which financial (de-)regulation influences the current account response to a net output shock through the liquidity constraints channel. They empirically test their theory with a VAR model using an aggregated measure of financial regulation. They find that deregulation increases the size and persistence of the current account response to a net output shock. Our findings offer a more nuanced interpretation of their results: the ease of bank entry may be driving force behind their discovered effect as this aspect of regulation appears to be most closely related to the liquidity constraints channel. In addition, we extend Lanau and Wieladek (2012) by using a novel estimation technique, which allows us to show that financial (de-)regulation is a robust determinant of the current account even after controlling for a wide range of competing theories.

In particular, our empirical approach builds on and contributes to the large literature which estimates reduced form equations and includes a large pool of potential current account determinants suggested by the theoretical and empirical literature (for early influential contribution see Debelle and Faruquee, 1996; Calderón et al., 2002; Chinn and Prasad, 2003). Ca' Zorzi et al. (2012a,b) have recently criticized this standard empirical approach for ignoring the issue of model uncertainty given the large number of potential current account determinants and hence empirical models. They show that different economic and statistical criteria would yield different models and no 'true' model appears to exist which can easily be labeled as superior to all others. They further demonstrate that model uncertainty is generally too large to draw any firm conclusions even about the sign of the coefficients. In order to address these challenges, Ca' Zorzi et al. (2012a) use Bayesian Model Averaging (BMA) techniques to account for model and parameter uncertainty. BMA allows examining a large number of potential models, weighting each one according to a fitness criterion, and providing a probability distribution for each coefficient estimate.

In this paper, we also use BMA techniques but extend the approach in Ca' Zorzi et al. (2012a) by considering a dynamic panel data setting and allowing for unobserved country-specific heterogeneity correlated with the regressors (e.g. Moral-Benito, 2012). By considering a dynamic panel we allow for persistence in current account estimations, which is supported both from a theoretical standpoint,

[4]While not their main focus, Ca' Zorzi et al.(2012a) and Kerdrain et al. (2010) also include an index of financial regulation in several of their specifications, but do not find a significant effect.

e.g. through habit formation in the consumption/saving behaviour (Bussiere et al., 2004; Gruber, 2004), as well as empirically (e.g. Bussiere et al., 2004; Calderón et al., 2002; Morsy, 2009; Arezki and Hasanov, 2009; and Beidas-Strom and Cashin, 2011). Our findings suggest that extending Ca' Zorzi et al. (2012a) in this way has important implications.

First, we find decisive evidence of persistence with the lagged dependent variable being one of the most robustly related current account determinants even at lower frequency data (5- and 10 years). Second, once we allow for dynamics and unobserved heterogeneity, we find robust evidence for a wide range of current account theories apart from financial regulation. For example, we find strong evidence of a positive effect from fiscal balances on current accounts as well as proxies for demographics, stages of development, natural resource abundance and institutional quality. This contrasts with the findings in Ca' Zorzi et al. (2012a), who find that the net foreign asset position and the oil balance are the most robust current account determinants and the only ones significantly different from zero.

The remainder of the paper is organized as follows. In section 2, we discuss the potential determinants of current account with special emphasis on financial regulation. Section 3 outlines the econometric methodology that combines BMA with a correlated-random-effects panel estimator. Section 4 presents and discusses the results. Finally, section 5 concludes.

2 Potential determinants of current account balances

2.1 Financial regulation and development

Financial (de-)regulation can affect the current account through the impact on saving and investment decisions.

The impact of financial (de-)regulation on investment is rather uncontroversial: by enhancing financial market development, financial deregulation is associated with higher investment (e.g. Levine, 2005). For example, Caballero et al. (2008) argue that underdeveloped financial markets led to a shortage of financial assets and hence investment opportunities in East Asia. This increased the demand for financial assets in the United States leading to capital outflows and current account surpluses in Asia. Similarly, inefficient financial intermediaries could drive a wedge between financial and capital returns to investment due to monitoring or transaction costs and lead to capital flowing from capital scarce to capital abundant countries (Boyd and Smith, 1992; Ju and Wei, 2010).

The effect of financial (de-)regulation on saving is theoretically ambiguous. The early literature has stressed the role of higher real interest rates following financial liberalization to mobilize savings (McKinnon, 1973; Shaw, 1973). Apart from interest rate effects, financial deregulation could more broadly improve saving opportunities by reducing transaction costs, facilitating risk management, improving risk-return trade-offs and offering a wider range of saving instruments. Edwards (1996)

provides empirical support for a positive effect on savings. However, financial deregulation also involves easing liquidity constraints of households and (small) firms. This could reduce the need for precautionary saving (Mendoza et al., 2009) and increase consumption of previously liquidity constraint private agents (Bayoumi, 1993; Jappelli and Pagano, 1994; Bandiera et al., 2000). Given the ambiguous effect of financial regulation on saving, its impact on the current account is also ambiguous.

The literature linking financial regulation to the current account is still thin. Ferrero (2012) and Borio and Disyatat (2011) argue that financial deregulation prior to the crisis eased borrowing constraints which contributed to credit and asset price booms and the build-up of global imbalances. Along these lines, Lanau and Wieladek (2012) set up an intertemporal current account model in which financial regulation influences the share of liquidity constraint agents. They empirically test their theory with a VAR model and find that deregulation increases the size and persistence of the current account response to a net output shock. Ca' Zorzi et al. (2012a) and Kerdrain et al. (2010) include an index of financial regulation among a wide range of other current account determinants but do not find a significant correlation.

The empirical studies above use an aggregate index of financial reform based on Abiad et al. (2010). We also employ this index but instead focus on the disaggregated components to allow for a more nuanced analysis. In particular, we use the following items: i) credit controls and excessively high reserve requirements; ii) bank entry barriers; iii) privatisation of the banking sector; iv) prudential regulations and supervision of the banking sector and v) securities market regulation. Our empirical results below show that this more nuanced analysis provides important new insights as different aspects of financial regulation can have opposing effects on the current account.

In contrast to financial regulation, the broader concept of financial development has received wider attention as an explanation for the build-up of global imbalances prior to the crisis. In particular, the "saving glut" hypothesis (Bernanke, 2005; Clarida 2005a,b) states that underdeveloped financial markets, especially in China and other emerging Asian economies', have contributed to excess savings, for example due to precautionary savings or a lack of investment opportunities. These excess savings flew to the highly developed US financial market. According to this view, greater financial development may contribute to receding global imbalances. Empirically, the saving glut hypothesis implies hence a negative correlation between measures of financial development and the current account.

Evidence supporting the saving glut hypothesis is at best mixed. Chinn and Ito (2007, 2008a) find that financial development, proxied with the private credit-to-GDP-ratio, leads to higher savings for countries with underdeveloped institutions and closed financial markets including key East Asian countries contrary to the saving glut hypothesis. Only in countries with highly developed legal

systems and open financial markets are financial development and current accounts negatively correlated. Gruber and Kamin (2007) do not find a significant correlation between financial development and the current account. Using a wider range of indicators to investigate different aspects of financial development, Gruber and Kamin (2009) find a significant negative correlation between the growth of stock market capitalization and the current account in their full sample. When they restrict their sample to industrialized countries they find weak evidence that the private credit-to-GDP-ratio is negatively correlated with the current account but the level of stock market capitalization and stock market turnover are positively correlated with the current account. Ito and Chinn (2009) find that measures of the size of financial markets (private credit and stock market capitalization) have a negative effect on the current account in industrialized countries, but the opposite is more often the case in developing countries. The latter result is strengthened when other measures of financial market development, such as a proxy for competitiveness, are included.

We contribute to this literature by focussing on financial (de-)regulation, which is an important driver of financial development. In addition, we believe that this approach has at least two advantages. First, standard indicators of financial development, such as credit to the private sector, are likely to be endogenous to saving and investment decisions and hence the current account. Regulatory settings are less likely to suffer from endogeneity, though not fully independent of wider economic conditions. Second, as regulations are under the control of policy makers, our results bear direct policy implications. In our empirical analysis we nevertheless also include measures of financial development to control for aspects of financial market development that are unrelated to regulatory settings (see Table A1).

2.2 Other factors

Besides financial markets characteristics a large range of determinants have been suggested in the literature explaining equilibrium movements of the current account. In the following, we only briefly revisit some theoretical considerations underlying these factors. A more comprehensive discussion of the theories can be found for example in Chinn and Prasad (2003). Table A1 summarizes the specific variables included in our empirical analysis.

Initial net foreign asset position. A higher initial net asset position is associated with positive investment income flows which improve the current account. On the other hand a highly indebted country may have to eventually improve its current account position to preserve solvency. Hence the theoretically expected sign is ambiguous. However, the vast majority of empirical studies find a positive link.

Demographic factors influence mainly the saving behaviour of an economy. The life-cycle hypothesis for instance suggests that savings are accumulated during the working age while younger and older age cohorts generally dissave. Thus a country with a high old and/or young age dependency ratio should generally be expected to save relatively less.

Oil dependency. Higher oil prices improve the current account balance of oil exporters while they reduce the balance of oil importers. The oil trade balance is generally included in regressions to allow the effect of oil prices to differ across countries and the sign is expected to be positive.

Fiscal policy. In the absence of full Ricardian equivalence, i.e. when changes in private and public saving do not fully offset each other, higher budget deficits reduce overall domestic saving and thus the current account balance.

Stages of economic development. Countries with low income are expected to run current account deficits due to their low saving and high investment growth during the convergence process to higher income per capita levels. Thus the relationship between relative income and the current account should be positive. To allow for non-linearities in this relationship, a squared term is frequently included in the regressions with a theoretically ambiguous sign. In addition, GDP growth is included. The effect of GDP growth on saving is ambiguous and depends inter alia on whether the associated increase in income is perceived as temporary or permanent and the degree of consumption smoothing of economic agents. Higher growth rates resulting from productivity gains may also raise expected asset returns leading to higher investment. Most empirical studies find a negative link between GDP growth and the current account.

Trade. Trade openness is commonly used in the literature as a proxy for barriers to trade and may be correlated with other attributes that make a country attractive to foreign capital.The majority of empirical studies find a positive link. In addition, changes in terms of trade may affect saving if the shock is perceived to be transitory. In this case consumption-smoothing households would adjust their saving in response to the transitory change in real income.

Institutional and regulatory quality. Improving the quality of the legal and regulatory system should in general attract investment and thus lead to a reduction in the current account balance.[5] We also include a measure of labour market regulations with theoretically ambiguous effects on savings and investment and hence the current account (Kerdrain et al., 2010).[6]

[5] Weak institutions may lower risk-adjusted returns to capital in developing countries and has been evoked as one explanation for capital flowing "uphill" (Alfaro et al., 2008).

[6] As more stringent job protection reduces the probability of job loss, but also lengthens the expected unemployment spell after dismissal, the impact on precautionary savings is ambiguous. Stricter employment protection may raise total operating cost and hence discourage investment but could also induce firms to substitute capital for labour.

Dummy variables. An Asian crisis dummy is frequently included to reflect that Asian countries may have permanently increased their saving rate to insure themselves against future external shocks since the financial crisis in 1997/98. Furthermore, a financial center dummy is included as economies that serve as hubs for international financial flows have tended to run substantial current account surpluses and net creditor positions.

3 Empirical Approach

3.1 Data

We consider a balanced dataset including 31 countries over the time period 1980-2010. An important limitation of our approach is that the large number of variables investigated and the requirement of a balanced panel substantially reduces the number of countries included. To investigate if this smaller sample influences the results, we begin our empirical estimation by replicating the baseline results in Ca' Zorzi et al. (2012a), who use a similar methodology but employ a substantially larger and unbalanced panel of 77 countries. Since the results remain basically unaltered, we think that our sample selection is not a major cause of concern.

In line with the literature, most variables are expressed as deviations from a weighted average of foreign trading partners, since the current account balance of one country is not only affected by domestic determinants but also by developments in the rest of the world. Further in line with previous approaches, we use 10-year non-overlapping averages of the annual observations in the baseline to filter out cyclical movements and focus on medium-term developments. Given our sample, the use of 10-year periods guarantees the availability of 3 time-series observations per country. In the robustness section we also allow for different temporal aggregation windows.

Table A1 presents a list of the variables considered together with their sources and a brief description of each one (see also section 2).

3.2 Econometric methodology

The general dynamic current account model typically considered in the literature is given by (e.g. Ca' Zorzi et al., 2012a):[7]

$$CA_{it} = \alpha CA_{it-1} + x'_{it}\beta + \eta_i + \epsilon_{it} \quad (1)$$

[7]We assume that the first lag of the dependent variable is enough to capture the current account dynamics, given that we consider data at 5- and 10-year intervals.

where subscripts i and t denote country and time, CA_{it} refers to the current account balance as a share of GDP, and x_{it} is a $k \times 1$ vector of current account determinants.[8] Most explanatory variables in the x vector are in deviations from weighted averages of foreign trading partners, which accounts for time-specific shocks from the rest of the world affecting current account developments. η_i captures time-invariant unobserved heterogeneity at the country level potentially correlated with the x regressors, and ϵ_{it} represents the serially uncorrelated transitory component of the error term. Finally, α and β refer to a scalar and a $k \times 1$ vector of unknown coefficients respectively.

Model uncertainty hampers consensus on the current account determinants to be included in the x vector. This situation resembles the growth regressions literature (e.g. Fernandez et al., 2001; Sala-i-Martin et al., 2004) in which the 'openendedness' of alternative theories compatible with each other results in many alternative models to be considered by applied researchers. Given the popularity of Bayesian model averaging (BMA) methods to overcome this challenge, Ca' Zorzi et al. (2012a) consider the BMA methodology in the setting of current account determinants. However, Ca' Zorzi et al. (2012a) consider a simplified version of equation (1) in which neither dynamics nor unobserved heterogeneity are included in the empirical model (i.e. $\eta_i = 0 \ \forall i$ and $\alpha = 0$). In this paper, we extend the Ca' Zorzi et al. (2012a) approach by combinig the BMA methodology with a suitable panel estimator that accomodates both persistence and unobserved heterogeneity; therefore we are able to simultaneously address model uncertainty and exploit the panel dimension of our data.[9] We discuss these issues in more detail below.

3.3 Model uncertainty

In general, model uncertainty acknowledges that competing economic theories or models exist to explain the same phenomenon without consensus about the 'true' model. Ca' Zorzi et al. (2012a) analyse the issue of model uncertainty for the case of current account estimations in a panel data context and show that even adopting a transparent approach, different economic and statistical criteria would yield different models. They conclude that there appears to be no 'true' model, i.e. a particular choice of variables to include in x, which can be easily be labelled as superior to all others.

Ignoring such model uncertainty can result in biased parameter estimates, overconfident (too narrow) standard errors and misleading inference and predictions (Draper, 1995). Taking model uncertainty seriously implies a departure from conditioning on a particular model and instead calculating quantities of interest by averaging across different models. BMA allows examining a large

[8] Given our estimation approach, regressors without time variation can also be embeded in the x vector (see Appendix A.1 for more details).

[9] In addition, we extend the Ca' Zorzi et al. (2012a) approach by considering a larger set of potential current account determinants (i.e. larger k).

number of models, weighting each model according to a fitness criterion, and providing a probability distribution for each coefficient estimate.

BMA has been applied extensively in the economic growth literature to deal with model uncertainty (e.g. Fernandez et al., 2001; Sala-i-Martin et al., 2004) and was recently advocated by Ca' Zorzi et al. (2012a) in the context of reduced-form current account estimations. However, the empirical models considered by Ca' Zorzi et al. (2012a) are based on a static version of (1) without country-specific unobserved heterogeneity. In contrast, in this paper we follow the panel data variant of BMA outlined in Moral-Benito (2012) which allows combining the dynamic panel specification in equation (1) with BMA.

BMA is soundly based on statistical theory with all results directly following from elementary probability theory, notably the definition of conditional probability, Bayes' theorem and the law of total probability. Intuitively, BMA asks the researcher to specify candidate regressors that are clearly linked to distinct theories. BMA then allows for any sub-set of regressors to appear in a given model. Given the data, BMA first estimates a posterior distribution of each regressor coefficient for every model that includes the regressor. It then combines all posterior distributions into a weighted average posterior distribution, with weights given by the posterior model probabilities — see Appendix A.2 for more details on BMA.

3.4 Dynamics and unobserved heterogeneity

In order to filter out cyclical movements we construct m-year non-overlapping averages of the annual series. In the spirit of the growth regressions literature we choose $m = \{5, 10\}$ as reasonable values. Based on this data aggregation procedure, Ca' Zorzi et al. (2012a) focus on the static version of equation (1) within the BMA setting; by doing so the authors implicitly assume that current account dynamics are absent beyond the m-year frequency. In contrast, we consider persistence in current accounts beyond 5- or 10-year periods and find that the coefficient on the lagged dependent variable is statistically significant according to the Bayesian robustness check used in this paper.

Moreover, several papers in the literature argue against the use of country-specific effects (η_i) on the grounds that it ignores the between-country variation, which represents most of the variation in current accounts and their determinants (e.g Chinn and Prasad, 2003; Ca' Zorzi et al., 2012a). While this is true if one considered the standard fixed-effects OLS estimator, the correlated-random-effects estimator employed here exploits both within- and between-country variation, and it also allows including country-specific effects. Indeed, the use of between-country variation by this estimator also allows investigating the effect on current accounts of structural variables with little (or no) variation over time in a panel setting with country-specific effects. In Appendix A.1 we provide more details on this estimator.

Having these considerations in mind, we employ a correlated-random-effects estimator based on a likelihood-based approach to estimate the model in (1). Therefore, we allow for persistence in current account dynamics beyond the m-year window, and we can also accommodate unobserved country-specific heterogeneity in current account developments exploiting both within- and between-country variation. Ignoring persistence and/or unobserved heterogeneity would result in biased estimates of the effects of interest. Moreover, the availability of such a likelihood function allows us to combine the aforementioned estimator with BMA to address uncertainty in the selection of the variables to include in the x vector.[10]

As a final remark, we acknowledge an important limitation of the dynamic panel estimator considered in this paper. While it allows us to accommodate regressors' endogeneity with respect to the permanent component of the error term (i.e. the country-specific effects), it is based on the assumption that the right-hand-side variables are exogenous with respect to transitory shocks; hence, feedback from current account developments to the regressors is not allowed. For instance, persistent current account deficits driven by a booming economy might exert pressures on regulators to relax regulations; given our identification strategy, we implicitly rule out this possibility. Despite its relevance, this issue is typically neglected in the literature mainly due to the lack of readily available instrumental variables (Chinn and Prasad, 2003). The reason is that it is difficult to find a set of variables related to the current account determinants but not directly related to the current account. Moreover, lagged levels of the regressors are only weak instruments for their first differences given the persistence of most aggregate variables. Therefore, we see the issue of reverse causality in this setting as a challenging topic for future research.[11]

4 Empirical findings

4.1 Reduced set of regressors

As our empirical approach builds on Ca' Zorzi et al. (2012a), we begin our empirical investigation by analysing whether the smaller number of countries in our dataset compared to theirs substantially drives our results. In particular, following Ca' Zorzi et al. (2012a), we estimate the static versions of equation 1 using the BMA methodology with the same set of 14 regressors without accounting for country-specific effects (see Table 1).

[10] We are aware that the inclusion of the lagged current account as well as country-specific effects in the empirical model might be a controversial issue when estimating current account benchmarks or "norms" (see e.g. Lee et al., 2008; IMF, 2013). However, our focus here is on estimating the effects of the determinants of current accounts which may be biased if we ignored persistence and/or unobserved heterogeneity.

[11] Moreover, given our use of 5- and 10-year intervals, the small time series dimension of our panel precludes us from estimating country-specific coefficients, which also represents a limitation.

Table 1: BMA results under static specification without unobserved heterogeneity

Theory	Variable	PIP	Posterior Mean	Posterior Std.	P. Mean / P. Std.
	Initial NFA	0.984	0.036	0.010	3.636
Oil dependency	Oil balance	0.976	0.296	0.090	3.299
Trade integration	Openness	0.189	0.012	0.011	1.121
Fiscal policy	Fiscal balance	0.801	0.326	0.123	2.644
Economic development	Relative income	0.161	0.005	0.008	0.603
	Relative income squared	0.148	0.000	0.000	0.000
	Economic growth	0.260	0.348	0.244	1.425
	Investment	0.148	-0.103	0.125	-0.828
Demographics	Population growth	0.511	-2.234	1.233	-1.812
	Dependency ratio (old)	0.234	-0.169	0.144	-1.167
	Dependency ratio (young)	0.214	0.072	0.072	0.997
Instituional quality	Civil liberties	0.153	0.359	0.438	0.819
Dummies	Asian crisis dummy	0.449	2.888	1.467	1.968
Financial development.	Financial integration	0.120	-0.001	0.003	-0.440

Note: This table presents the results of applying the BMA pooled and static approach as in Ca'Zorzi et al. (2012) to the reduced set of regressors with $m = 10$ and trade-based weights.

The first column of Table 1 (and of all subsequent tables) reports the posterior inclusion probability (PIP) of each variable. To judge the effectiveness of a regressor in explaining the current account, the interpretation of the results follows a rule of thumb proposed by Jeffreys (1961) and refined by Kass and Raftery (1995). According to this rule, the evidence of a regressor having an effect is weak, positive, strong, or decisive if the posterior inclusion probabilities lie between 50-75%, 75%-95%, 95%-99% or are greater than 99%, respectively.

Columns (2) and (3) of Table 1 (and of all subsequent tables) present the mean and standard deviation (s.d.) of the coefficients' BMA posterior distributions.[12] While the exact distribution of the ratio of BMA posterior mean to posterior s.d. reported in column (4) is not known, several interpretations of this ratio are available in the literature. Raftery (1995) suggested that for a variable to be considered as effective the ratio of mean/s.d. (in absolute value) must exceed 1, which from a frequentist viewpoint implies that the regressor improves the power of the regression. Masanjala and Papageorgiou (2008) are more stringent and consider a threshold value of the mean/s.d. ratio of 1.3, which approximately corresponds to a 90% confidence interval in frequentist approaches. Finally, Sala-i-Martin et al. (2004) set this threshold at 2 since they argue that having a mean/s.d. ratio of 2 in absolute value indicates an approximate 95% Bayesian coverage region that excludes zero.

Overall, the results reported in Table 1 are very similar to Ca' Zorzi et al. (2012a, Table 3). In particular, the initial net foreign asset position and the oil balance are the most robust determinants of current accounts. Both have posterior inclusion probabilities (PIP) higher than 95%, which,

[12]The mean and standard deviations are conditional of the variable being included in a model; however, unconditional versions of these moments can be easily recovered.

according to Kass and Raftery (1995), represents decisive evidence of an effect on current account fluctuations. Moreover, the ratios of mean/s.d. are larger than 2, which confirms the statistical significance of the estimated effects. In addition, the coefficient estimate on the NFA of 0.036 is almost identical to the one in Ca' Zorzi et al. (2012a).[13] However, we find a somewhat larger coefficient on the oil balance (0.3 versus their range of 0.13-0.16). Furthermore, we find evidence of a positive effect of the fiscal balance. Ca' Zorzi et al. (2012a) report a robust effect of the fiscal balance only for smaller temporal aggregation windows of 1 and 4 years. Given the similarity of our results compared to Ca' Zorzi et al. (2012a), we conclude that the differences in the set of countries included in our sample do not substantially drive our findings.

4.2 Extended set of regressors

We now turn to our extended set of regressors. In particular, we add variables that proxy for financial market regulations. In addition, we include variables that pertain to financial market development, trade openness, terms of trade effects, institutional quality as well as a financial centre dummy. With 28 variables, the number of potential models now rises to almost 270 million.

We first consider the same static specification without unobserved heterogeneity as Ca' Zorzi et al. (2012a). Most importantly, we find first evidence that financial market regulations may impact the current account (Table 2). In particular, easing bank entry barriers and the current account are negatively correlated.

Turning to the other variables, we now find stronger evidence for the fiscal balance, population growth and the Asian crisis dummy, compared to results reported in Table 1, all with the theoretically expected sign. In contrast, the evidence for an effect of the NFA now vanishes. Of the additional variables, we find some weak evidence that credit growth and the current account are negatively correlated, and the theoretically expected positive sign for the financial center dummy.

Next, we allow for country-specific unobserved heterogeneity by including country fixed effects (Table 3). Compared to Table 2, a range of important differences emerge, which illustrates the importance of accounting for unobserved heterogeneity and indicates that ignoring such unobserved effects could result in misleading conclusions. We again find evidence that bank entry and the current account are correlated. The PIP now drops to below 75%, but the ratio of posterior mean to standard deviation remains above 2, indicating that the estimated effect is statistically significant.

[13] While Ca' Zorzi et al. (2012a) use 12-year intervals, we use 10-year intervals to ensure the availability of 3 time series observations per country given our sample period.

Table 2: BMA results under static specification without unobserved heterogeneity

Theory	Variable	PIP	Posterior Mean	Posterior Std.	P. Mean / P. Std.
	Initial NFA	0.147	0.010	0.011	0.895
Oil dependency	Oil balance	0.998	0.327	0.082	3.984
Trade integration	Openness	0.122	0.000	0.012	0.024
	Trade regulations	0.219	-0.631	0.519	-1.215
	Terms of trade growth	0.117	0.073	0.172	0.422
Fiscal policy	Fiscal balance	0.979	0.396	0.116	3.410
Economic development	Relative income	0.147	-0.003	0.008	-0.447
	Relative income squared	0.135	0.000	0.000	0.000
	Economic growth	0.175	0.254	0.268	0.947
	Investment	0.169	-0.107	0.105	-1.023
Demographics	Population growth	0.702	-1.939	0.864	-2.244
	Dependency ratio (old)	0.173	-0.094	0.139	-0.674
	Dependency ratio (young)	0.144	0.008	0.069	0.120
Institutional quality	Civil liberties	0.320	0.624	0.398	1.569
	Legal system and property rights	0.169	0.386	0.411	0.940
	Labour market regulations	0.107	-0.101	0.302	-0.333
Dummies	Asian crisis dummy	0.776	3.302	1.304	2.532
	Financial centre	0.999	5.367	1.138	4.716
Financial development	Financial integration	0.103	-0.001	0.002	-0.278
	Capital account openness	0.144	0.310	0.484	0.640
	Private credit to GDP	0.137	0.788	0.998	0.790
	Growth of private credit to GDP	0.622	-0.145	0.064	-2.268
Financial regulation	Credit controls	0.112	-0.162	0.573	-0.282
	Bank entry barriers	0.872	-1.658	0.585	-2.836
	Privatization of banking sector	0.247	0.570	0.420	1.355
	Securities market development	0.183	0.875	0.796	1.100
	Banking sector supervision	0.130	-0.195	0.590	-0.330
	Credit market regulations	0.110	0.017	0.330	0.052

Note: This table presents the results of applying the BMA pooled and static approach as in Ca'Zorzi et al. (2012) to the extended set of regressors with $m = 10$ and trade-based weights.

Interestingly, we now find a larger number of robust current account determinants. In particular we find evidence of the stages of development hypothesis with relative income and its squared term with PIP above 99%. We also find robust evidence of a negative association between private credit to GDP ratio and the current account. In addition we find evidence of demographic factors robustly related to the current account, with the theoretically predicted negative sign on the old age dependency ratio. Furthermore higher institutional quality as proxied by civil liberties is associated with lower current account balances (note that the coding of the variable is inverted). We also find a positive correlation between trade openness and the current account, in line with most empirical studies. In contrast, the dummy variables (Asian crisis and financial center) loose their significance.

Table 3: BMA results under static specification with unobserved heterogeneity

Theory	Variable	PIP	Posterior Mean	Posterior Std.	P. Mean / P. Std.
	Initial NFA	0.522	-0.008	0.013	-0.623
Oil dependency	Oil balance	1.000	0.909	0.244	3.729
Trade integration	Openness	0.995	0.127	0.030	4.262
	Trade regulations	0.396	-0.370	0.703	-0.526
	Terms of trade growth	0.904	0.243	0.188	1.295
Fiscal policy	Fiscal balance	0.862	0.325	0.174	1.868
Economic development	Relative income	0.991	0.553	0.150	3.684
	Relative income squared	0.992	-0.003	0.001	-4.000
	Economic growth	0.712	-0.935	0.390	-2.401
	Investment	0.644	-0.301	0.133	-2.275
Demographics	Population growth	0.206	-1.694	1.661	-1.020
	Dependency ratio (old)	0.973	-0.672	0.217	-3.096
	Dependency ratio (young)	0.583	0.289	0.152	1.898
Institutional quality	Civil liberties	0.840	2.066	0.871	2.373
	Legal system and property rights	0.168	0.182	0.755	0.241
	Labour market regulations	0.281	-0.892	0.595	-1.499
Dummies	Asian crisis dummy	0.208	-1.002	2.097	-0.478
	Financial centre	0.645	5.313	2.142	2.480
Financial development	Financial integration	0.655	-0.006	0.003	-2.440
	Capital account openness	0.288	-0.763	0.672	-1.137
	Private credit to GDP	0.973	-5.135	1.690	-3.039
	Growth of private credit to GDP	0.202	-0.048	0.060	-0.794
Financial regulation	Credit controls	0.185	0.043	0.871	0.049
	Bank entry barriers	0.715	-1.839	0.806	-2.281
	Privatization of banking sector	0.140	0.741	0.647	1.144
	Securities market development	0.387	1.463	1.207	1.212
	Banking sector supervision	0.358	0.595	0.716	0.832
	Credit market regulations	0.251	0.130	0.420	0.309

Note: This table presents the results of applying the BMA static approach with country-specific effects (unobserved heterogeneity) to the extended set of regressors with $m = 10$ and trade-based weights.

of persistence in the current account series with a PIP of the lagged dependent variable of 1. The posterior mean of 0.354 implies that following a shock to the current account, 65% of the deviation of the current account from its equilibrium value is corrected over 10 years. The coefficient of the lagged dependent variable is smaller than in previous studies (e.g. Chinn and Prasad, 2003; Bussiere et al., 2004, Arezki and Hasanov, 2009), which, however, use higher frequency data (annual or 4-year averages). Our results suggest that persistence remains important even at the lower frequency (10-year) current account dynamics considered here.

Once we additionally account for persistence, a larger number of variables related to financial regulations become significant. We again find strong evidence that easier bank entry is associated with lower current accounts. Moreover, we now also find that bank privatization and securities markets deregulation are robust determinants of the current account. However, in contrast to easing bank access, the coefficients on these variables are positive. This suggests that different aspects of

financial regulation might have opposite effects on the current account. Finally, we find that two variables relating to credit market regulations appear to be robustly related to the current account when assessed in terms of their PIP. However both of these variables have very low mean/s.d. ratios (below one), indicating that we cannot conclude the sign of this relation because of model uncertainty.

Table 4: BMA results under dynamic specification with unobserved heterogeneity

Theory	Variable	PIP	Posterior Mean	Posterior Std.	P. Mean / P. Std.
	Lagged current account	1.000	0.354	0.198	1.794
	Initial NFA	0.867	-0.009	0.012	-0.758
Oil dependency	Oil balance	1.000	1.079	0.241	4.475
Trade integration	Openness	1.000	0.143	0.031	4.613
	Trade regulations	0.116	-1.091	0.746	-1.462
	Terms of trade growth	0.051	0.193	0.182	1.062
Fiscal policy	Fiscal balance	1.000	0.425	0.154	2.761
Economic development	Relative income	1.000	0.599	0.138	4.334
	Relative income squared	1.000	-0.003	0.001	-4.833
	Economic growth	0.971	-0.844	0.370	-2.282
	Investment	0.270	-0.250	0.141	-1.769
Demographics	Population growth	0.957	-1.944	1.410	-1.378
	Dependency ratio (old)	0.979	-0.580	0.193	-2.998
	Dependency ratio (young)	0.940	0.430	0.141	3.048
Institutional quality	Civil liberties	0.961	1.598	0.800	1.998
	Legal system and property rights	0.292	-0.048	0.656	-0.073
	Labour market regulations	1.000	-1.044	0.551	-1.894
Dummies	Asian crisis dummy	0.801	-3.218	1.911	-1.684
	Financial centre	1.000	-6.406	1.117	-5.735
Financial development	Financial integration	1.000	-0.004	0.003	-1.556
	Capital account openness	0.985	-1.278	0.650	-1.966
	Private credit to GDP	0.989	-5.261	1.526	-3.448
	Growth of private credit to GDP	0.074	-0.053	0.059	-0.887
Financial regulation	Credit controls	0.983	0.208	0.811	0.256
	Bank entry barriers	0.930	-1.676	0.713	-2.350
	Privatization of banking sector	0.872	1.335	0.580	2.302
	Securities market development	0.884	1.340	1.043	1.286
	Banking sector supervision	0.065	0.339	0.701	0.483
	Credit market regulations	1.000	0.214	0.390	0.549

Note: This table presents the results of applying the BMA dynamic approach with country-specific effects (unobserved heterogeneity) to the extended set of regressors with $m = 10$ and trade-based weights.

Turning to the other variables, we now find even stronger evidence (in terms of PIP) for the relevance of virtually all theories suggested by the literature. The large majority of the variables also have the expected sign. Exceptions are the young age dependency ratio, the Asian crisis dummy and the financial sector dummy which have counterintuitive signs.[14] An interesting case is the NFA.

[14]Kerdrain et al. (2010) and Kumhof et al. (2012) also find a significant positive effect of the young age dependency ratio on the current account in a sample of developed countries. A possible explanation of this finding could be that medium-aged households increase their saving rate in response to anticipated future education expenses of their offspring.

While the large majority of empirical studies have found a positive impact on current accounts, we conclude that the direction is uncertain once we take model uncertainty seriously, as indicated by the posterior mean to standard deviation ratio of less than one. This result suggests that the lagged NFA variable in studies using a static equation may capture some of the persistence effect. Once persistence is appropriately accounted for, the sign becomes ambiguous.

One variable that has received considerable attention in the literature is the fiscal balance. Our preferred specification confirms its robust relationship with current account balances and suggests that over the medium term (10 years) a 1% increase in the budget balance increases current account by 0.4%. In the long-term the effect increases to about 0.65%.[15] These estimates are somewhat larger than found in the previous literature which range from 0.1 to 0.5 (e.g. Bussiere et al, 2004; Chin and Ito, 2007, 2009; Gruber and Kamin 2007, 2009).

4.3 Goodness of fit

Figures 1-3 show the average actual current account realizations (red dots) compared to the predicted current accounts and their associated 95% confidence intervals (blue bars) based on our BMA results for each country and the time periods 1980-1990, 1990-2000 and 2000-2010. In particular, for each estimated model within the BMA approach we compute the predicted current accounts for each country-period; then, we compute the weighted median and 5% and 95% percentiles from the overall distribution of model-specific predicted current accounts.

Figures 1-3 indicate that our preferred specification accounting for unobserved heterogeneity and persistence can explain fairly well the observed current account developments. This specification also seems to provide a better fit than alternative specifications without unobserved heterogeneity and/or persistence, with the differences particularly pronounced for the period 2000-2010 in Figure 3. We acknowledge that this finding is somewhat unsatisfying because unobserved heterogeneity and the lagged current account provide little information on the drivers of current accounts. However, as our results highlight, omitting these two factors from the empirical model would result in biased estimates and give a misleading picture of the drivers of current account balances.

4.4 Robustness

In this section we report robustness analysis with respect to different priors specifications and different temporal aggregation windows.

The choice of prior distribution specifications is always contentious in Bayesian analysis. Ley and Steel (2009) show that differences in BMA approaches can arise from different priors on the prior inclusion probability of each regressor. In our baseline specification we have used a prior

[15] The long-term effect is calculated according to the following formula $\frac{\beta}{(1-\alpha)}$.

inclusion probability of 50% for each variable ($\xi = 0.50$).[16] Table 5 displays the posterior inclusion probabilities for different prior inclusion probabilities. The table shows that our results are overall robust to variations in the prior inclusion probability. Only when we choose a very low prior inclusion probability of $\xi = 0.17$ for each regressor, the posterior inclusion probability of bank entry barriers and privatization of the banking sector falls below the 50% threshold. However, the PIP of bank

Table 5: BMA results under dynamic specification with unobserved heterogeneity - Robustness (I)

		PIPs under different prior inclusion probabilities				
Theory	Variable	$\xi = 0.17$	$\xi = 0.34$	$\xi = 0.50$	$\xi = 0.69$	$\xi = 0.86$
	Lagged current account	1.000	1.000	1.000	1.000	1.000
	Initial NFA	0.246	0.714	0.867	0.948	0.978
Oil dependency	Oil balance	0.989	1.000	1.000	1.000	1.000
Trade integration	Openness	1.000	1.000	1.000	1.000	1.000
	Trade regulations	0.043	0.075	0.116	0.196	0.319
	Terms of trade growth	0.189	0.080	0.051	0.058	0.103
Fiscal policy	Fiscal balance	1.000	1.000	1.000	1.000	1.000
Economic development	Relative income	0.999	1.000	1.000	1.000	1.000
	Relative income squared	0.992	1.000	1.000	1.000	1.000
	Economic growth	0.447	0.901	0.971	0.996	1.000
	Investment	0.343	0.259	0.270	0.312	0.435
Demographics	Population growth	0.654	0.903	0.957	0.984	0.993
	Dependency ratio (old)	0.791	0.946	0.979	0.991	0.998
	Dependency ratio (young)	0.798	0.907	0.940	0.969	0.987
Institutional quality	Civil liberties	0.951	0.932	0.961	0.983	0.993
	Legal system and property rights	0.450	0.355	0.292	0.310	0.425
	Labour market regulations	0.997	1.000	1.000	1.000	1.000
Dummies	Asian crisis dummy	0.327	0.705	0.801	0.858	0.882
	Financial centre	0.996	1.000	1.000	1.000	1.000
Financial development	Financial integration	0.997	1.000	1.000	1.000	1.000
	Capital account openness	0.448	0.930	0.985	0.998	1.000
	Private credit to GDP	0.945	0.987	0.989	0.993	0.998
	Growth of private credit to GDP	0.044	0.052	0.074	0.123	0.203
Financial regulation	Credit controls	0.749	0.947	0.983	0.997	0.999
	Bank entry barriers	0.375	0.817	0.930	0.978	0.992
	Privatization of banking sector	0.155	0.714	0.872	0.953	0.988
	Securities market development	0.789	0.818	0.884	0.945	0.979
	Banking sector supervision	0.048	0.045	0.065	0.104	0.196
	Credit market regulations	0.996	1.000	1.000	1.000	1.000

Note: This table presents the PIPs resulting from the approach in Table 4 but considering different prior inclusion probabilities. In particular ξ is the prior inclusion probability for each regressor; $\xi = 0.50$ refers to the uniform model priors considered in the baseline case, which implies that each model is equally probable a priori (see Appendix A.2 for more details).

[16] This prior implies that each model is equally likely a priory, i.e., the prior model probability is $1/2^k$ for all models where k is the number of variables considered.

entry barriers remains above the prior inclusion probability, indicating that the inclusion of these variables in current account models is supported by the data.

In Table 6, we explore a different prior structure for the model space. The uniform priors considered above fail to account for the multicollinearity between regressors. In particular, collinearity of the regressors might result in placing too little probability on good, but unique, models as a consequence of massing excessive probability on large sets of bad, but similar, models. To account for this issue, we consider here the dilution priors first introduced by George (1999). Essentially, the dilution priors downweight models with many collinear regressors by pre-multiplying the prior model probability by the determinant of the correlation matrix of the regressors included in this model.[17] While the PIPs of some variables are reduced, the BMA results reported in Table 6 broadly confirm the robustness of our main findings to multicollinearity concerns.

Table 6: BMA results under dynamic specification with unobserved heterogeneity - Robustness (II)

Theory	Variable	PIP	Posterior Mean	Posterior Std.	P. Mean / P. Std.
	Lagged current account	1.000	0.357	0.212	1.689
	Initial NFA	0.719	-0.010	0.012	-0.826
Oil dependency	Oil balance	1.000	1.037	0.261	3.980
Trade integration	Openness	1.000	0.139	0.032	4.309
	Trade regulations	0.073	-1.070	0.813	-1.317
	Terms of trade growth	0.124	0.257	0.183	1.403
Fiscal policy	Fiscal balance	1.000	0.408	0.166	2.466
Economic development	Relative income	1.000	0.578	0.149	3.874
	Relative income squared	1.000	-0.003	0.001	-4.362
	Economic growth	0.871	-0.799	0.410	-1.949
	Investment	0.326	-0.267	0.146	-1.833
Demographics	Population growth	0.865	-1.792	1.528	-1.172
	Dependency ratio (old)	0.904	-0.578	0.203	-2.845
	Dependency ratio (young)	0.828	0.414	0.145	2.853
Institutional quality	Civil liberties	0.915	1.684	0.856	1.967
	Legal system and property rights	0.315	0.035	0.673	0.052
	Labour market regulations	1.000	-0.993	0.588	-1.690
Dummies	Asian crisis dummy	0.718	-2.994	2.004	-1.494
	Financial centre	1.000	-6.306	1.179	-5.349
Financial development	Financial integration	1.000	-0.005	0.003	-1.582
	Capital account openness	0.883	-1.237	0.687	-1.800
	Private credit to GDP	0.971	-4.995	1.665	-3.000
	Growth of private credit to GDP	0.093	-0.061	0.063	-0.971
Financial regulation	Credit controls	0.921	0.073	0.854	0.085
	Bank entry barriers	0.823	-1.714	0.746	-2.299
	Privatization of banking sector	0.699	1.308	0.613	2.132
	Securities market development	0.761	1.154	1.159	0.996
	Banking sector supervision	0.074	0.451	0.737	0.612
	Credit market regulations	1.000	0.172	0.412	0.418

Note: This table presents the PIPs resulting from the approach in Table 4 but considering different prior inclusion probabilities. In particular, we consider the dilution priors discussed in George (1999) in order to account for possible multicollinearity between the different regressors, see e.g. George (2010).

[17] Note that this determinant is equal to 1 when the regressors are orthogonal and 0 when they are collinear.

As a final robustness check, we investigate different temporal aggregation windows. In our baseline specification we have used a temporal aggregation window of $m = 10$. Several other studies have used shorter aggregation windows (e.g. Prasad and Chinn, 2003; Chinn and Ito, 2007, 2009). Thus, Table 7 reports results for the case of $m = 5$. The results are again broadly similar to our baseline results. However, the PIP of bank entry barriers drops below 50% and the posterior mean standard deviation ratio of bank privatization falls below 2. This finding suggests that financial regulations exhibit a stronger impact on the current account over the longer term. In terms of the other variables, we find that the coefficient of the budget balance is now smaller and closer to estimates in the previous literature. Finally, the lagged dependent variable is again highly significant and precisely estimated.

Table 7: BMA results under dynamic specification with unobserved heterogeneity - Robustness (III)

Theory	Variable	PIP	Posterior Mean	Posterior Std.	P. Mean / P. Std.
	Lagged current account	1.000	0.261	0.078	3.367
	Initial NFA	0.071	0.007	0.010	0.740
Oil dependency	Oil balance	1.000	0.663	0.126	5.274
Trade integration	Openness	1.000	0.093	0.017	5.447
	Trade regulations	0.059	0.336	0.357	0.941
	Terms of trade growth	0.752	0.213	0.075	2.826
Fiscal policy	Fiscal balance	0.998	0.187	0.086	2.171
Economic development	Relative income	1.000	0.470	0.093	5.028
	Relative income squared	1.000	-0.002	0.000	-5.500
	Economic growth	0.054	0.006	0.167	0.035
	Investment	1.000	-0.401	0.077	-5.196
Demographics	Population growth	0.691	-1.288	0.585	-2.203
	Dependency ratio (old)	0.995	-0.455	0.113	-4.021
	Dependency ratio (young)	0.977	0.261	0.075	3.475
Institutional quality	Civil liberties	0.979	1.218	0.426	2.856
	Legal system and property rights	0.990	-0.565	0.297	-1.899
	Labour market regulations	0.127	-0.461	0.351	-1.315
Dummies	Asian crisis dummy	0.994	1.441	1.172	1.229
	Financial centre	0.996	-1.757	0.563	-3.120
Financial development	Financial integration	0.145	-0.002	0.002	-1.600
	Capital account openness	0.269	-0.545	0.349	-1.560
	Private credit to GDP	0.995	-3.201	1.050	-3.049
	Growth of private credit to GDP	0.666	-0.059	0.026	-2.316
Financial regulation	Credit controls	0.851	-0.182	0.384	-0.473
	Bank entry barriers	0.160	-0.641	0.423	-1.515
	Privatization of banking sector	0.901	0.081	0.354	0.230
	Securities market development	0.966	1.280	0.542	2.363
	Banking sector supervision	0.078	0.403	0.419	0.962
	Credit market regulations	0.977	0.170	0.197	0.861

Note: This table presents the results resulting from the approach in Table 4 but considering a different temporal aggregation window (i.e. $m = 5$ instead of $m = 10$).

4.5 Discussion

Our results overall suggest a robust correlation between financial (de-)regulation and the current account. More interestingly, the results suggest that different aspects of financial (de-)regulation may affect the current account in opposite directions. In this section we provide some discussion of the results.

In particular, we find that easing bank entry negatively affects the current account. In light of our discussion in section 2.1, the result suggests that this aspect of financial (de-)regulation may mainly affect the current account through its impact on liquidity constraints. For example, easier entry by foreign banks should facilitate lending across borders and hence access to foreign funds. Moreover, by stimulating competition, easier bank entry may encourage risk taking, which could prompt banks to lend to previously liquidity constraint higher risk clients such as lower-income households and small firms.

In contrast, we find a robust positive correlation between the current account and both securities market deregulation and bank privatisation. These findings are consistent with the view that financial market deregulation may spur savings (e.g. Edwards, 1996; McKinnon, 1973; Shaw, 1973) and hence tends to improve the current account. One possible channel is that measures, such as tax incentives, to develop (government and corporate) bond, equity and derivative markets raise both the demand and the supply of more sophisticated saving products, which help facilitate risk management and mobilise savings. Similarly, bank privatisation may spur innovation of banking products, which may also channel more savings into the financial system. At the same time, securities market deregulation and/or bank privatisation may also increase the supply of borrowing products or decrease borrowing costs. Moreover, privatised banks may be more inclined to lend to households compared to state-owned banks, which are often discouraged to lend to this sector. Both channels should ease borrowing constraints. However, our results suggest that on net the saving enhancing effect of these types of deregulations dominates.

A potential caveat to our findings is that our employed indicators of financial regulation are rather crude, measuring deregulation on scale from 0-3. For example, the securities market deregulation indicator may not sufficiently differentiate between benign measures to increase the liquidity of bond and equity markets, and the type of deregulations that have accelerated the process of securitization and emergence of highly sophisticated financial products, such as credit default options and asset backed securities. Securitization has sharply reduced borrowing costs and may have reduced the incentives of financial intermediaries to carefully screen borrowers (Keys et al., 2010), which led to excessive borrowing and deteriorating current accounts in several countries prior to the global financial crisis. More research is clearly needed to better understand the exact channels through which different aspects of financial deregulation may affect saving, investment and the current account.

Finally, the effect of financial deregulation on the current account may depend on country circumstances. For example, the effect may differ between debtor and creditor countries, between countries with open or closed capital accounts, or may depend on development of the legal system (e.g. Chinn and Ito, 2007). One simple way to investigate such effects would be to introduce interaction effects between financial regulation variables other variables. Alternatively one could analyse the relationship across different sub-samples of countries. Unfortunately, our small country sample does not allow for this type of analysis and we leave it to future research.

5 Concluding Remarks

In this paper, we investigate the relationship between financial market regulations and the current account balance, an area for which limited empirical evidence exists. We use a panel of countries over the period 1980-2010 and employ a novel empirical approach which allows us to simultaneously address model uncertainty, current account persistence and country-specific unobserved heterogeneity.

We find that financial market regulations are robust current account determinants even after accounting for a wide range of competing theories. Moreover, our results imply that different aspects of financial market regulations can have opposing effects on the current account, highlighting the need to take a nuanced view of financial deregulation. In particular, we find that easing bank entry barriers leads to a deterioration of the current account balance, consistent with the view of financial deregulation that financial deregulation eases liquidity constraints. In contrast, bank privatization and deregulations of securities market have a positive impact on the current account, in line with the saving enhancing view of financial deregulation.

Our results also highlight the importance to control for persistence and unobserved heterogeneity in current account estimations. Once we control for these factors, we find robust evidence for a wide range of variables related to different current account theories. For example we find strong evidence of a positive effect from fiscal balances on current accounts as well as proxies for demographics, stages of development, natural resource abundance and institutional quality. This contrasts with the findings in previous BMA exercises which account for model uncertainty but neglect persistence and unobserved heterogeneity (e.g. Ca' Zorzi et al., 2012a).

We believe that our results improve the understanding of the link between financial regulations and current account balances by identifying robust correlations. Nevertheless, more research is clearly needed to understand the channels through which particular aspects of financial regulation affect the current account. In addition, our results highlight the importance of financial regulations as current account determinants but do not readily lend themselves to normative evaluations of current account

imbalances in the spirit of the (new) External Balance Assessment (EBA) methodology of the IMF (IMF, 2013).[18] Normative evaluations of whether current account imbalances are excessive require assessments of deviations of policies from desirable or appropriate levels. Judging the appropriateness of financial market regulatory settings is still an area of intense debate, which involves weighing efficiency consideratons against financial stability concerns, and is beyond the scope of this paper.

[18]The EBA methodology replaces the previous Consultative Group on Exchange Rate Issues (CGER) methodology (Lee et al., 2008).

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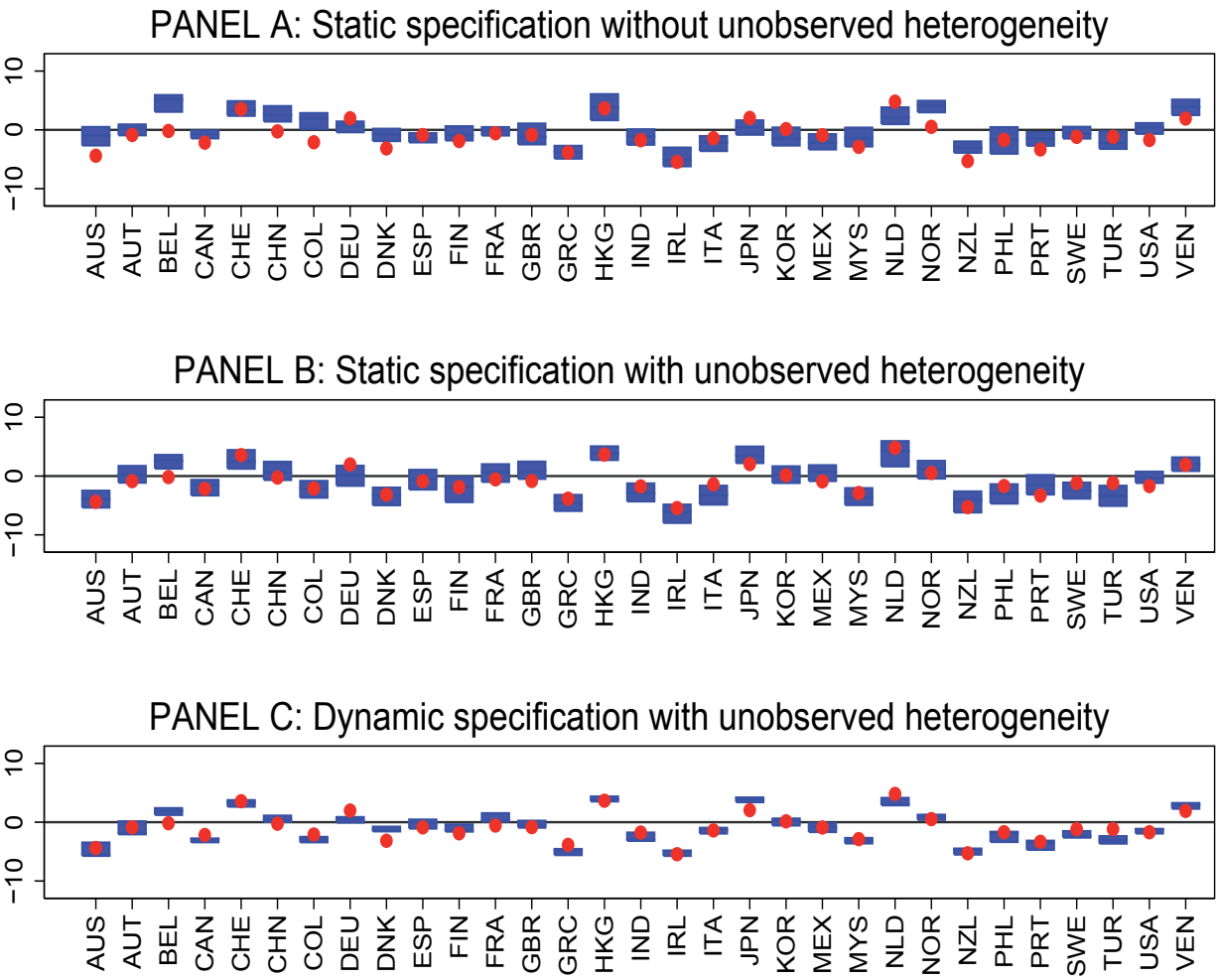
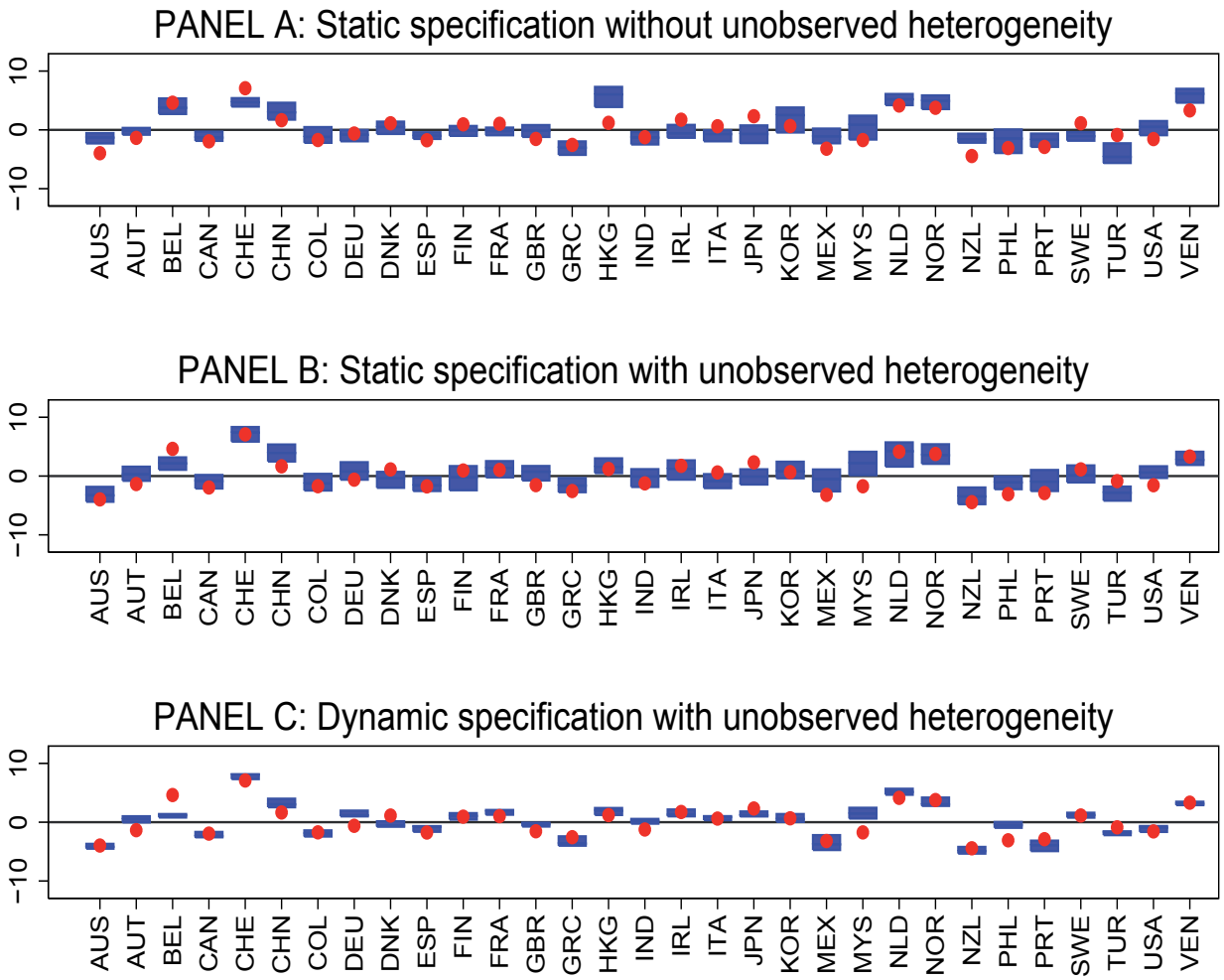
Figure 1: Goodness of fit — 1980-1990



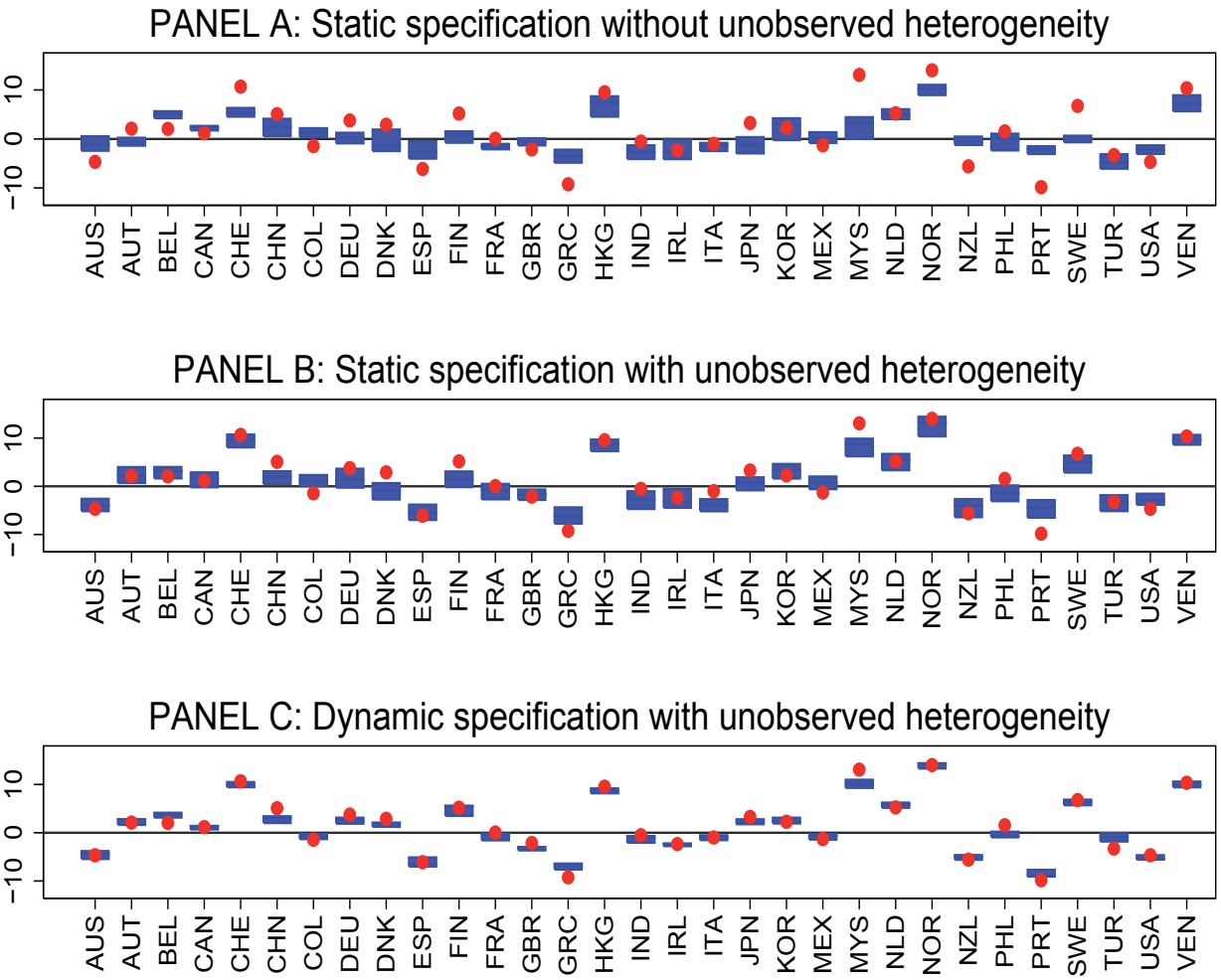
This Figure presents the predicted CAs and their corresponding 95% confidence bands (blue bars) for the period 1980-1990 together with the observed CAs (red dots). See section 4.3 for more details.

Figure 2: Goodness of fit — 1990-2000



This Figure presents the predicted CAs and their corresponding 95% confidence bands (blue bars) for the period 1990-2000 together with the observed CAs (red dots). See section 4.3 for more details.

Figure 3: Goodness of fit — 2000-2010



This Figure presents the predicted CAs and their corresponding 95% confidence bands (blue bars) for the period 2000-2010 together with the observed CAs (red dots). See section 4.3 for more details.

Table A1: Data Description

Theory	Variable	Description	Source
Dependent variable	Current account balance	Current account balance in % of GDP	IMF WEO Sept. 2011
	Initial net foreign assets	Net foreign assets in % of GDP at the beginning of the 5-year period	Lane and Milesi-Ferretti (2007)
Oil dependency	Oil balance	Oil trade balance in % of GDP	IMF WEO Sept. 2011
Trade integration	Trade openness	Sum of exports and imports in % of GDP	IMF WEO Sept. 2011
	Trade regulations	Coded from 0 (restricted) to 10 (free)	Gwartney et al. (2011)
	Terms of trade growth	Growth of goods and services terms of trade index	IMF WEO Sept. 2011
Fiscal policy	Budget balance	General government net lending/borrowing in % of GDP	IMF WEO Sept. 2011
Economic development	Relative income	Real GDP in per capita in % of GDP weighted average	IMF WEO Sept. 2011
	Relative income squared	Real GDP in per capita in % of weighted average, squared	IMF WEO Sept. 2011
	Economic growth	Real GDP growth	IMF WEO Sept. 2011
	Investment	Gross fixed investment as a share of GDP	IMF WEO Sept. 2011
Demographics	Population growth	Growth of total population difference	IMF WEO Sept. 2011
	Old age dependency	Ratio of population over 65 in total population aged 15-64	WDI
	Young age dependency	Ratio of population under 15 in total population aged 15-64	WDI
Institutional quality	Civil Liberties	Coded from 1 (free) to 7 (not free)	Freedom House
	Legal system and property rights	Coded from 0 (restricted) to 10 (free)	Gwartney et al. (2011)
	Labour market regulations	Coded from 0 (restricted) to 10 (free)	Gwartney et al. (2011)
Dummies	Asian crisis	Dummy for Asian economies after the crisis	
	Financial centre	Dummy for Belgium, Hong Kong, Netherlands, Switzerland	Lee et al (2008), Rahman (2008)
Financial development	Financial integration	Sum of assets and liabilities in % of GDP	Lane and Milesi-Ferretti (2007)
	Capital account openness	Index that ranges from -1.84 (closed) to 2.48 (open)	Chinn and Ito (2008b)
	Private credit to GDP	Private credit by deposit money banks and other financial institutions in % of GDP	Beck and Demirgüc-Kunt (2009)
	Growth of private credit to GDP	Growth of private credit to GDP	Beck and Demirgüc-Kunt (2009)
Financial regulation	Credit controls	Coded from 0 (fully repressed) to 3 (fully liberalised)	Abiad et al. (2010)
	Bank entry barriers	Coded from 0 (fully repressed) to 3 (fully liberalised)	Abiad et al. (2010)
	Privatization of banking sector	Coded from 0 (fully repressed) to 3 (fully liberalised)	Abiad et al. (2010)
	Securities market development	Coded from 0 (fully repressed) to 3 (fully liberalised)	Abiad et al. (2010)
	Banking sector supervision	Coded from 0 (not regulated) to 3 (highly regulated)	Abiad et al. (2010)
	Credit market regulations	Coded from 0 (restricted) to 10 (free)	Gwartney et al. (2011)

Note: All variables except for the current account, net foreign asset position, oil balance and growth in terms of trade enter the regressions in deviations from a trade weighted cross-country mean.

A Appendices

A.1 The Correlated-Random-Effects Estimator

As argued by Chinn and Prasad (2003), given the within groups transformation required by fixed effects OLS, one cannot exploit the information contained in regressors without (or with little) variation over time. For instance, some structural variables may affect current account developments and have no variation over time given our sample period. In this Appendix, we present a correlated-random-effects estimator that exploits both between- and within-variation in our panel data; Moreover, given the Bayesian spirit of the BMA approach, we consider a maximum likelihood estimator in the spirit of Balestra and Nerlove (1966) as outlined in Arellano (2003).

Given the model in equation (1), one can assume:

$$\epsilon_{it} \mid CA_i, x_i, \eta_i \sim N\left(0, \sigma_\epsilon^2\right) \tag{A1}$$

$$\eta_i \mid CA_i, x_i \sim N\left(\varphi\overline{CA}_i + \delta\overline{x}_i, \sigma_\eta^2\right) \tag{A2}$$

where $x_i = (x_{i0}, x_{i1}, ..., x_{iT})'$ is a $T \times 1$ vector, $\overline{x}_i$ is the time-series mean[19] of x for individual i ($\overline{x}_i = (1/T)\sum_{t=1}^{T} x_{it}$). Note that (A2) allows for correlation between the country-specific effects and the right-hand-side variables in the model. Also, (A1) implies strict exogeneity of the lagged dependent variable. We recognize this represents a drawback of our approach, but we think it is not critical in our context since the magnitude of the α coefficient is not of central interest for understanding the most robust determinants of current account developments.[20] In order to relax this assumption, one alternative is to consider the Alvarez and Arellano (2003) correlated-random-effects estimator as in Moral-Benito (2012); however, its lack of closed-form solutions would preclude us from considering a large set of candidate determinants of current accounts (note that within the BMA setting the number of models to be estimated increases exponentially with the total number of candidate regressors considered).

Under assumptions (A1)-(A2) above we can write the model in (1) as (see e.g. Mundlak, 1978):

$$CA_{it} = w_{it}'\theta + \lambda_i + \epsilon_{it} \tag{2}$$

where $w_{it} = (CA_{it} - \overline{CA}_i, x_{it} - \overline{x}_i, \overline{CA}_i, \overline{x}_i)'$, $\lambda_i = \eta_i - \varphi\overline{CA}_i - \delta\overline{x}_i$, and $\theta = (\alpha, \beta, \varphi + \alpha, \delta + \beta)$.

[19] We consider the means over time in the spirit of Mundlak (1978) instead of the full vector of time-series observations à la Chamberlain to avoid the proliferation of coefficients.

[20] On the other hand, while this represents a strong assumption in the case of the lagged dependent variable, it is also a concern for the case of the remaining right-hand-side variables; however, the literature typically assumes exogeneity of the potential CA determinants (see e.g. Chinn and Prasad, 2003; Ca'Zorzi et al., 2012a).

Thus, the resulting likelihood function can be written as (see e.g. Arellano, 2003):

$$\begin{aligned}\log f\left(CA_i|w_i\right) \quad \propto \quad & -\frac{N}{2}\log\overline{\sigma}_\epsilon^2 - \frac{1}{2\overline{\sigma}_\epsilon^2}\sum_{i=1}^{N}(\overline{CA}_i - \overline{w}_i'\theta)^2 \\ - \quad & \frac{N(T-1)}{2}\log\sigma_\epsilon^2 - \frac{1}{2\sigma_\epsilon^2}\sum_{i=1}^{N}(CA_i^* - \alpha CA_{i(-1)}^* - x_i^*\beta)'(CA_i^* - \alpha CA_{i(-1)}^* - x_i^*\beta)\end{aligned} \tag{3}$$

where $\overline{\sigma}_\epsilon^2 = \sigma_\lambda^2 + \frac{\sigma_\epsilon^2}{T}$. Moreover, CA_i^*, $CA_{i(-1)}^*$ and x_i^* denote orthogonal deviations of CA_i, $CA_{i(-1)}$ and x_i respectively (see Arellano and Bover, 1995).

Note that the log likelihood function in (3) can be decomposed as the sum of the between and within log likelihoods. Therefore, between variation across countries in our sample is exploited for the estimation of the parameters together with within-time variation for a given country as it is the case in the traditional OLS fixed effects estimator. Note also that regressors without time variation can also be embeded in the original x vector.[21]

A.2 Bayesian Model Averaging

Bayesian Model Averaging (BMA) techniques have been developed in the statistical literature to account for the uncertainty inherent in the model selection process, the so-called model uncertainty. For the ease of exposition let us consider a simple regression model where the dependent variable, the current account balance as a share of GDP, y, is regressed on an intercept, α, and candidate regressors chosen from a set of k variables in the design matrix X of dimension $n \times k$. Further, β is defined as the full k-dimensional vector of regression coefficients. Any $n \times k_j$ submatrix of variables in X is denoted by X_j and M_j the model with regressors grouped in X_j, such that

$$y = \alpha + X_j\beta_j + v \tag{4}$$

where the $k_j \times 1$ vector β_j $(0 \leq k_j \leq k)$ groups regression coefficients corresponding to the submatrix X_j. The exclusion of any given regressor in a particular model implies that the corresponding element in β is zero.

Since BMA allows for any sub-set of variables in X to appear in any model M_j, there are 2^k possible sampling models. BMA specifies that the posterior distribution of the slope coefficients β is the weighted posterior distribution under each of the models, $P(\beta|y, M_j)$, with the weights given by each model's posterior model probability $P(M_j|y)$. The posterior distribution given the data can then be expressed as

[21] In such case, we would have a new vector of regressors $z_{it} = (x_{it}, f_i)'$, and only the time varying regressors would enter the within component of the log likelihood through x_i^*.

$$P(\beta|y) = \sum_{j=1}^{2^k} P(\beta|y, M_j)P(M_j|y) \tag{5}$$

Equation (5) states that the posterior distribution of the quantity of interest is only conditional on the data and not on a particular model. Inference based on the posterior distribution incorporates information across all possible models.

The implementation of BMA is subject to several challenges and the methods and assumptions to overcome these challenges distinguish the various BMA approaches. The most important challenge is the choice of the prior distribution specification, which is always contentious in Bayesian analysis. BMA requires the specification of two types of priors: (a) prior model probabilities and (b) a prior parameter distribution. With respect to the prior model probabilities this paper follows the common practice in the growth literature and assumes a uniform distribution over the model space, which expresses each model as equally likely.[22] Under this assumption the posterior model probability simplifies to

$$P(M_j|y) = \frac{f(y|M_j)}{\sum_{i=1}^{2^k} f(y|M_i)} \tag{6}$$

where $f(y|M_j)$ is the marginal (or integrated) likelihood of model M_j. Thus, the posterior model probability can be viewed as a measure of the relative data fit.

Computation of the marginal likelihood requires the choice of parameter priors. In this paper, the approach of Raftery (1995) is followed, assuming the diffuse Unit Information Prior (UIP) that allows for a simple approximation of the marginal likelihood with the Bayesian Information Criterion (BIC). The BIC approximation is viewed as a conservative fitness measure to evaluate model performance. Eicher et al. (2011) demonstrate that even though the choice of the appropriate prior structure crucially depends on the particular dataset considered, the UIP together with the uniform model prior is generally superior in terms of predictive performance to a range of alternative priors suggested in the literature.[23]

[22] The uniform prior is a special case of a more general model prior proposed by Mitchell and Beauchamp (1988) in that it assumes the prior probability of the inclusion of a specific regressor is constant across models and equal to 0.5. Sala-i-Martin et al. (2004)'s specification of the Mitchell and Beauchamp model prior favors smaller models. Alternatively, Brock et al. (2003) advocate tree-structured model priors that take into account dependencies among regressors, and Ley and Steel (2009) propose hierarchical model priors in which the probability of inclusion of a specific regressor is treated as random rather than fixed.

[23] Another important choice in BMA concerns the selection of a sampling algorithm over the model space. As the number of models increases exponentially with the number of regressors, evaluation of the sum in equation (5) quickly becomes infeasible and sampling algorithms are needed. Fernandez et al. (2001) use the Markov Chain Monte Carlo Model Composition (MC3) sampling algorithm developed by Madigan and York (1995) to search the model space,

Based on these fundamental assumptions and the corresponding equations, BMA allows to compute several important summary statistics of the posterior distribution of the coefficients. For instance, the posterior mean and the posterior standard deviation of a particular coefficient are given by:

$$E(\beta|y) = \sum_{i=1}^{2^k} E(\beta|y, M_i)P(M_i|y) \tag{7}$$

$$V(\beta|y) = \sum_{i=1}^{2^k} P(M_i|y)V(\beta|y, M_i) + \sum_{i=1}^{2^k} P(M_i|y)(E(\beta|y, M_i) - E(\beta|y))^2 \tag{8}$$

In addition, by summing over all models that contain a particular regressor, $P(\beta \neq 0|y)$, the posterior inclusion probability (PIP) of that regressor can be obtained. This statistic provides a probability measure of how important a regressor is to explain the dependent variable.

As suggested by Raftery (1995), the maximum likelihood point estimate (MLE) and variance can be used as the model specific mean $E(\beta|y, M_i)$ and variance $V(\beta|y, M_i)$. This is the particular approach adopted in this paper based on the panel likelihood function described in Appendix A.1. Moreover, Moral-Benito (2012) contains additional discussion on the use of the UIP priors in a panel setting.

while Sala-i-Martin et al. (2004) use a "stratified" Coinflip sampler. MC3 is a technique that allows for sampling of complex high dimensional distributions as it simulates a random walk across the search space to converge at a stationary posterior distribution. Raftery (1995) considers the Leaps-And-Bounds-All-Subsets-Regression-Algorithm of Furnival and Wilson (1974) to reduce the candidate models included in the model space. The Leaps algorithm performs an exhaustive search for the best subsets of candidate variables for predicting the dependent variable in linear regression; it returns a specified number of best models for each model size. All in all, in this paper we follow Fernandez et al. (2001) and use the MC3 algorithm for exploring the model space. Generally, the qualitative differences based on the different samplers are small but not negligible.

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