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DOMESTIC AND INTERNATIONAL FINANCE: HOW DO THEY AFFECT CONSUMPTION SMOOTHING?

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ABSTRACT

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This Paper uses empirical proxies for the domestic development and international integration of debt and equity markets to assess the role of financial development in international consumption smoothing. First, we find that both domestic and international finance contribute to international consumption smoothing. Second, domestic debt market development is relatively important in explaining consumption smoothing relative to GNP among developed countries, while international debt market integration appears to be the limiting factor in developing countries. Third, both debt and equity market development contribute to the smoothing of consumption relative to GDP, with a somewhat larger role for the former than the latter. Finally, debt and equity market development reveal themselves to be substitutes in that more of one reduces the contribution of the other to consumption smoothing.

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1 Introduction

In tandem with the development of a range of proxies for financial market development, researchers have addressed several aspects of the financial development-growth nexus (see Levine, 1996, for an early survey). A main question is whether financial structure, i.e. the relative development of debt and equity markets, matters for growth. The answer, as suggested by Levine (2002) is that financial structure matters relatively little, as the two types of financial market development to some extent are substitutes. More recently, several papers have addressed whether there is a distinct role for international financial integration as proxied by either international capital flow or stock variables in explaining growth. The available evidence does not find clear and robust support for the idea that international financial integration boosts economic growth (see Edison, Levine, Ricci and Slok ,2002, and Prasad, Rogoff, Wei and Kose, 2003), although some studies suggest that different types of international financial integration may have different growth effects (see De Mello, 1999, and Reisen and Soto, 2001). Edison et al. (2002) particularly find that the growth effect of domestic bank or stock market development dominates that of international financial integration, if any.

Relative to the financial development-growth nexus, the link between financial development and consumption smoothing has received relatively little attention in the empirical literature. Theoretical contributions (see Obstfeld and Rogoff, 1998, Chapter 5; Sorensen and Yosha, 1998; and Baxter and Crucini, 1995) have laid out that the feasibility of international consumption smoothing depends crucially on the existence and tradeability of debt and equity instruments. The tradeability of equity, specifically, should allow economies to swap equity shares, or claims to output as proxied by GDP, with the result of smoothing both national income, or GNP, and consumption. The tradeability of debt claims, in turn, enables economies to adjust their consumption streams in the face of temporary output shocks that remain despite equity trading. Debt and equity market development hence are expected to be empirically important in explaining the variability of consumption smoothing across countries. The purpose of this paper is to provide a detailed empirical investigation of how in fact financial market development affects the ability to smooth consumption at the national level. A range of empirical proxies for debt and equity market development and efficiency, familiar from the growth literature, are used for this purpose.

Private agents, with few exceptions, only deal with domestic banks and other financial institutions. If so, international consumption smoothing can only come about through the international interaction of financial institutions. Banks, for instance, may choose to offset their aggregate transactions with their domestic retail customers by entering the international interbank deposit market. Similarly, domestic equity market institutions (brokerage houses, exchanges, clearing and settlement institutions) generally are involved in any transaction that changes a country's net portfolio equity balance. This suggests that both domestic financial market development and financial market integration are necessary

to bring about effective international consumption smoothing. Parallel to the finance and growth literature, this paper tests for the independent effects of both aspects of overall financial development. International financial market integration is measured by several gross or net debt and equity balances from the capital account of the balance of payments and, alternatively, by dummy variables indicating whether a particular net balance item is positive.

In overall economic development, domestic financial development can be expected to precede international financial integration. The reason is that international financial integration, mostly resulting from the international interaction of financial institutions, presupposes the existence of these (domestic) financial institutions. The existence of an international interbank deposit market, for instance, requires the existence of banking institutions that are active in individual countries. This suggests that for countries just entering international financial markets the bottleneck factor will indeed be the level of international integration of domestically active financial institutions. At higher levels of economic development, there already is some level of international financial integration and, relatively speaking, domestic financial market development becomes more of a bottleneck factor. To see why this is the case, note that even in rich countries a high percentage of households does not have substantial financial assets and only a limited borrowing capacity. Hence, even in rich countries many households can do little to contribute to their own consumption smoothing. For these individuals, there thus can only be international consumption smoothing through their "participation" in national tax and transfer systems. This suggests that for rich economies the bottleneck in bringing about better international consumption smoothing will be domestic financial development. Our sample includes developed and developing countries. This allows us to test whether different aspects of financial development are important for countries at different levels of economic development in furthering international consumption smoothing.

As indicated, on the basis of the theory we expect equity market development to help smooth GNP relatively to GDP. Debt market development subsequently helps to smooth consumption relative to GNP, while debt and equity market development together contribute to smoothing consumption relative to GDP. Based on these three relationships, the paper presents three sets of empirical results.

Regarding the first relationship, we find that proxies for domestic equity market development, in particular the ratio of stock market capitalization to GDP and stock market turnover, are important in smoothing GNP relative to GDP for the overall world sample. However, we find no role for our measures of international equity market integration, in particular gross and net stocks of FDI and portfolio equity investments, to explain consumption smoothing. The bottleneck factor thus appears to be domestic equity market development, as this explains differences in GNP variability relatively well. Domestic equity market development has a similar role in reducing GNP variability for developed and developing countries separately. The role of international financial market integration, as measured by FDI stocks, however, is different for the two sets of countries. FDI exposure appears to contribute to GNP smoothing for developing

countries, but it perversely increases GNP variability for developed countries. This may reflect that the FDI flows of rich countries are intended to capitalize on these countries' technological and other strengths and in practice are bad hedges against output shocks.

Our proxies for domestic debt market development, i.e. measures of bank credit and overall liquid assets relative to GDP and the bank interest spread, and our proxies for international debt market integration, i.e. gross and net stocks of bank liabilities and other debt instruments, all perform well in explaining the smoothing of consumption relative to GNP. Interestingly, domestic debt market integration is found to be more important in smoothing consumption for developed countries, and vice versa. This suggests that for developed countries, with well-established international links between financial institutions, domestic debt market integration is the bottleneck factor.

Finally, we examine the joint role of debt and equity market development in explaining consumption smoothing in the face of GDP shocks. For this purpose, domestic debt market development is measured by bank credit relative to GDP, while domestic equity market development is measured by the stock market capitalization relative to GDP. International debt and equity market integration now are measured as gross debt and equity balances relative to GDP. We find that debt and equity market development have an independent role in explaining consumption smoothing. In fact, debt and equity market development appear to be substitutes in that a lack of one can be made up by more of the other. Moreover, the effectiveness of, say, debt market development to smooth consumption relative to GDP decreases in the extent of equity market development, and vice versa. On the basis of the estimated coefficients, we can compute the implied elasticities of the variability of consumption with respect to debt and equity market development. Comparing these elasticities, we see a larger role for debt markets in smoothing consumption than for equity markets. Domestic debt market development continues to be relatively important for developed countries, and vice versa.

In previous work, Van Wincoop (1994) has shown that international risk sharing can bring non-negligible welfare gains. Asdrubali, Sorensen and Yosha (1996) use a decomposition of variance to compute the relative importance of equity market developing (which smooths GNP relative to GDP) and debt market development (which smooths consumption relative to GNP). Sorensen, Wu, and Yosha (2002) show that risk sharing from international cross-ownership of asset, as measured by the smoothing of GNP, is higher in countries that hold a higher amount of foreign equity relative to GDP. Bekaert, Harvey, and Lundblad (2002) examine the impact of equity market liberalization on the volatility of output and consumption, finding that capital account openness has smaller effects on consumption smoothing than equity market liberalization. Melitz and Zumer (1999) show that in the long run credit plays a smaller role relative to claims on property in risk sharing between countries. Becker and Hoffmann (2003) extend Asdrubali et al. (1996) to a dynamic setting and find that transitory shocks can be smoothed away to a greater extent compared to permanent shocks because market incompleteness may render permanent shocks a lot harder to insure.

Kose, Prasad, and Terrones (2003) show that the risk-sharing and consumption smoothing benefits of financial integration appear to accrue only beyond a certain "threshold" level of financial openness. Easterly, Islam, and Stiglitz (2001) find that a higher level of development of the domestic financial sector is associated with lower output volatility. However, their concern is how domestic financial development can affect output volatility, rather than consumption smoothing. Relative to these papers, the contribution of this paper is to examine simultaneously the domestic and international aspects of debt and equity market development in bringing about consumption smoothing.

Section 2 presents the underlying theoretical model. Section 3 describes the data and empirical specifications. Section 4 presents and interprets the empirical results. Section 5 concludes.

2 The model

This section lays out the theoretical framework that underlies the later empirical work. There is a representative agent who adjusts his consumption path in the face of domestic output shocks subject to financial market imperfections. Both debt and equity markets exist, but market imperfections imply that the agent can only smooth consumption partially through the use of debt and equity instruments.

2.1 Assumptions

At the beginning of period $t = 1, 2, ...$, the representative agent receives a random output, denoted GDP_t, generated from a "goods tree". This output is the sum of a fixed expected value, with $E(GDP_t) = \bar{y}$, and a random component, ε_t, as follows

$$GDP_t = \bar{y} + \varepsilon_t \tag{1}$$

The random term $\{\varepsilon_t : t = 1, 2, ..., t, t+1, ...\}$ is an i.i.d. sequence with $E(\varepsilon_t) = 0$ and $Var(\varepsilon_t) = \sigma^2$.

The representative individual optimally chooses the optimal consumption path $\{c_t, c_{t+1}, ...\}$ at the beginning of each period t to maximize the expected value of lifetime utility given by,

$$u_t = E_t \left\{ \sum_{\tau=t}^{\infty} \beta^{\tau-t} u(c_\tau) \right\} \tag{2}$$

where β is a discount factor equal to $\frac{1}{1+r}$ with r being the international interest rate. Further, we take the utility function to be quadratic with $u(c) = c - \frac{a_0}{2}c^2$.

In principle, both equity and debt markets are available to enable the consumer to smooth his consumption path. Equity markets allow the individual to diversify away part of the risk associated with domestic output by selling shares to foreigners (in exchange for riskless foreign debt instruments or a diversified,

riskless foreign share portfolio). After the shock is known, the individual may in part wish to borrow or lend internationally to the extent that he has not already diversified away the risk associated with domestic output. Market imperfections are assumed to limit in practice the extent to which the individual can transact in international equity and debt markets. Straightforwardly, the individual would like to sell all the equity in the domestic goods tree to obtain perfect income certainty. In practice, we assume that only a share α_s $(0 \leqq \alpha_s \leqq 1)$ of desired (total) equity sales can be realized. Similarly, we will assume that only a share α_c $(0 \leqq \alpha_c \leqq 1)$ of the desired borrowing or lending (after the shock is known) can be realized. Desired lending or borrowing is below shown to be a simple share of the output shock (with imperfect equity markets). Rather than as a share of desired lending or borrowing, the limitation on borrowing could thus easily be rephrased as a share of the observable output shock.

The literature has advanced several reasons why perfect risk sharing through equity and debt markets, domestic or international, in reality is not possible (see Lewis, 1999, for a survey). These include, among others, contract writing costs (Levine, 1997), the non-tradeability of goods (Tesar, 1993), the existence of non-tradable wealth such as human capital (Lewis, 1999), restrictions on the ownership of foreign assets that can take the form of taxes on repatriated earnings (Lewis, 1996), asymmetric information regarding the productivity of assets (Brennan and Cao, 1997), incomplete market due to imperfect contract enforcement (Kehoe and Perri, 2002), and the incentive effects associated with selling equity to outside international investors (Eijffinger & Wagner, 2001). Factors of this kind limit domestic financial market development as well as international financial integration and, indirectly, a country's ability to smooth consumption through international debt and equity markets. In this paper, we do not spell out the precise micro foundations of the restriction parameters α_s and α_c. In the subsequent empirical work, however, we will take empirical proxies for equity and debt market development and international integration also to be proxies for the equity and debt transaction restriction parameters.

2.2 Optimal consumption under financial market constraints

With actual equity sales to foreigners equal to the maximum possible, it is seen that domestic national income, or GNP, is given by

$$GNP_t = rA_{t-1} + \bar{y} + (1 - \alpha_s)\varepsilon_t , \tag{3}$$

where A_{t-1} is the country's net foreign asset position at the beginning of period t before any equity trading.

Taking into account equity market diversification, we can write the consumer's post-diversification intertemporal budget constraint at period t as follows,

$$E_t \left\{ \sum_{s=t}^{\infty} (\frac{1}{1+r})^{s-t} c_\tau \right\} = A_{t-1} + E_t \left\{ \sum_{\tau=t}^{\infty} (\frac{1}{1+r})^{\tau-t} (\bar{y} + (1 - \alpha_s)\varepsilon_t) \right\} \tag{4}$$

The consumer determines his consumption - and implicitly his international borrowing and lending - so as to maximize lifetime utility subject to the post-diversification intertemporal budget constraint. This yields the following familiar Euler equation,

$$E_t \{u'(c_\tau)\} = (1+r)\beta E_t \{u'(c_{\tau+1})\} \tag{5}$$

which implies for date $\tau = t$ that $u'(c_t) = (1+r)\beta E_t \{u'(c_{t+1})\}$. With the quadratic utility specification, we get, for any $\tau > t$, that $E_t c_\tau = E_t c_{\tau-1} = ... = E_t c_{t+1} = c_t$. Recognizing the budget constraint, we can now derive the optimal consumption, c_t^*, if there were no debt market imperfection or $c_t^* = \bar{y} + \frac{r}{1+r}[A_{t-1} + (1-\alpha_s)\varepsilon_t]$. Correspondingly, we can derive the optimal lending (or borrowing, if negative) in the absence of debt market restrictions, L_t^*, given by $L_t^* = \frac{1}{1+r}(1-\alpha_s)\varepsilon_t$.

As only a fraction α_c of these desired credit market transactions can be realized, we see that actual lending (or borrowing) L_t is given by

$$L_t = \frac{1}{1+r}\alpha_c(1-\alpha_s)\varepsilon_t \tag{6}$$

So the actual consumption, c_t, different from desired consumption, c_t^*, can be seen to be given by

$$c_t = \frac{r}{1+r}A_{t-1} + \bar{y} + (1-\alpha_s)\varepsilon_t - L_t = \bar{y} + \frac{r}{1+r}A_{t-1} + (1-\alpha_c\frac{1}{1+r})(1-\alpha_s)\varepsilon_t \tag{7}$$

The dynamics of the net foreign asset position and actual consumption can now be seen to follow

$$A_t - A_{t-1} = \alpha_c(1-\alpha_s)\varepsilon_{t-1} \tag{8}$$

and

$$c_t - c_{t-1} = (1-\alpha_s)[(1-\frac{\alpha_c}{1+r})\varepsilon_t - (1-\alpha_c)\varepsilon_{t-1}] \tag{9}$$

2.3 Derivation of estimating equations

In this subsection, we derive the estimating equations that relate the co-variability of GDP, GNP and consumption to empirical proxies of domestic financial development and international financial integration. To start, the three covariances among GDP_t and GNP_t, GNP_t and c_t, and GDP_t and c_t - all in first differences - can be obtained as follows,

$$Cov(GDP_t - GDP_{t-1}, GNP_t - GNP_{t-1}) = 2(1-\alpha_s)\sigma^2$$

$$Cov(GNP_t - GNP_{t-1}, c_t - c_{t-1}) = (1-\alpha_s)^2\sigma^2[\frac{r}{1+r} + (\frac{2+r}{1+r})(1-\alpha_c)]$$

$$Cov(GDP_t - GDP_{t-1}, c_t - c_{t-1}) = (1 - \alpha_s)\sigma^2 [\frac{r}{1+r} + (\frac{2+r}{1+r})(1 - \alpha_c)]$$

Next, we can derive the following theoretical least-squares regression equations:

$$GNP_t - GNP_{t-1} = b_1(GDP_t - GDP_{t-1}) \tag{10}$$

$$c_t - c_{t-1} = b_2(GNP_t - GNP_{t-1}) \tag{11}$$

$$c_t - c_{t-1} = b_3(GDP_t - GDP_{t-1}) \tag{12}$$

with the three coefficients b_1, b_2 and b_3 given by,

$$b_1 = \frac{Cov(GDP_t - GDP_{t-1}, GNP_t - GNP_{t-1})}{Var(GDP_t - GDP_{t-1})} = 1 - \alpha_s$$

$$b_2 = \frac{Cov(GNP_t - GNP_{t-1}, c_t - c_{t-1})}{Var(GNP_t - GNP_{t-1})} = 1 - \frac{1}{2}(1 + \frac{1}{1+r})\alpha_c$$

$$b_3 = \frac{Cov(GDP_t - GDP_{t-1}, c_t - c_{t-1})}{Var(GDP_t - GDP_{t-1})} = 1 - \alpha_s - \frac{1}{2}(1 + \frac{1}{1+r})\alpha_c + \frac{1}{2}(1 + \frac{1}{1+r})s$$

To interpret the coefficients, first note that b_2 and b_3 depend on the interest rate r. With α_c or the fraction of desired lending that can be realized given, we see that actual lending L_t is negatively related to the interest rate r in (6) (as at a higher interest rate smaller savings are required to guarantee a future consumption equal to current consumption in expected value). At a higher interest rate, actual lending thus becomes less responsive to the output shock ε_t and at the same time consumption becomes more responsive to this shock. This increases the covariances between the differenced consumption and GNP, and between the differenced consumption and GDP - leading to higher coefficients b_2 and b_3. The role of the interest rate in this model, to wit, reflects its discrete-time nature, with only periodic adjustment of consumption to output shocks. With smaller periods, the relevant interest rate between periods would become smaller as well. If we let the interest rate go to zero, it can be seen that b_2 collapses to $1 - \alpha_c$, while b_3 collapses to $(1 - \alpha_c)(1 - \alpha_s)$. Regardless of whether the interest rate is taken to be zero in the limit, the role of the restriction parameters α_s and α_c in determining b_1, b_2 and b_3 is now apparent. A less stringent equity market restriction - or higher α_s - reduces the "regression coefficient" b_1, while a less stringent debt market restriction - or higher α_c - reduces the "regression coefficient" b_2. Finally, higher values of α_s and α_c both reduce b_3 and we see that $\frac{\partial^2 b_3}{\partial \alpha_s \partial \alpha_c} = \frac{1}{2}(1 + \frac{1}{1+r}) > 0$, which means that a higher level value of the equity market restriction parameter the effect of a higher debt market restriction parameter in reducing the covariance between consumption and GDP is smaller (and vice versa).

Next, we note that the restriction parameters α_s and α_c are not directly observable. However, we can assume that they are related to observable proxies for equity and credit market development, denoted S and C, by and $\alpha_s = \beta_s S$ and $\alpha_c = \beta_c C$. Substituting period t values for α_c and α_s and suppressing the interest rate, we get

$$GNP_t - GNP_{t-1} = GDP_t - GDP_{t-1} - \beta_s S_t(GDP_t - GDP_{t-1}) \qquad (13)$$

$$c_t - c_{t-1} = GNP_t - GNP_{t-1} - \beta_c C_t(GNP_t - GNP_{t-1}) \qquad (14)$$

$$c_t - c_{t-1} = GDP_t - GDP_{t-1} - \beta_c C_t(GDP_t - GDP_{t-1}) - \beta_s S_t(GDP_t - GDP_{t-1}) +$$
$$+ \beta_c \beta_s C_t S_t(GDP_t - GDP_{t-1}) \qquad (15)$$

After adding constant and error terms, we obtain the benchmark regression equations underlying the empirical work in the next section. A variety of proxies for domestic equity market development and international equity market integration will be used for S_t, while a variety of domestic and international debt market indicators will be used to represent C_t. In the empirical work, growth rates rather than first differences of the GDP, GNP and consumption variables will be used.

3   Data and empirical specifications

3.1   Data

The data on GDP, GNP, consumption and domestic financial development covers 210 countries from 1960 to 2001, while there are international financial variables for 67 countries during 1970-1998. This section briefly describes the data used in this study. Variable definitions and data sources are provided in the appendix.

3.2   Macroeconomic and domestic financial variables

GDPg, GNPg, CONSg are defined as the annual growth rates of per capita GDP, GNP, and final consumption expressed in terms of constant local currencies[1]. Domestic financial variables are proxies for domestic debt and equity market development. Two stock market development indicators are used as measures of domestic stock market size and efficiency. They are the market capitalization of listed companies as a percent of GDP *(MCap)* and stock market turnover relative to market capitalization *(Turn)*. There are five domestic credit market

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[1] Local currencies are chosen since we are interested in countries' growth rates rather than international level comparisons.

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development indicators: domestic credit to the private sector as a percent of GDP *(CredPriv)*, domestic credit provided by the banking sector as a percent of GDP *(CredBank)*, liquid liabilities as a percent of GDP *(M3)*, and the bank interest rate spread *(Spread)*. They characterize the size (*CredPriv, CredBank*), liquidity (*M3*) and efficiency (*Spread*) of the domestic credit market.

3.3 International financial variables

The international financial variables are indices of international equity and debt market integration. All of these variables are based on financial stock variables from the balance of payments. Stock variables summarize a county's past involvement in international financial markets and are taken to be indices of potential current international financial activity in pursuit of consumption smoothing as well. To represent international equity integration, there are three variables: the gross stock of foreign direct investment assets and liabilities as a percent of GDP (*FDI*), the gross stock of the portfolio equity assets and liabilities as a percent of GDP (*PortEq*), and the sum of the previous two, i.e. the gross international equity stock as a percent of GDP (*TotEq*). These variables are obtained from estimates by Lane & Milesi-Ferretti (2001).

To obtain variables to represent international debt market integration, we need to use data from several sources. Again represented as the sums of national assets and liabilities, i.e. as gross variables, we have three variables for rich countries: gross non-portfolio debt (mostly bank debt) as a percent of GDP *(IntBank)*, gross portfolio debt as a percent of GDP *(PortDebt)*, and, finally, the sum of the previous two, i.e., gross total debt as a percent of GDP *(TotDebt)*. For poor countries, we can obtain two analogues of the rich-country *TotDebt* by taking the sum between one series of national debt liability[2] (from the OECD) and two alternative estimated series of debt assets (Lane & Milesi-Ferretti, 2001), leading to the *TotDebt* and *TotDebt$'$* series for poor countries. After combining with rich-country data, we obtain the *TotDebt* and *TotDebt$'$* series for the world as a whole.

Gross stock variables are indices of total market activity. Higher gross stocks thus may give rise to volume-based, lower transaction costs in international financial markets, which would be a sign of higher financial market integration. Gross stock variables, by construction, give equal weight to national financial assets and liabilities. However, it is reasonable to assume that countries with a positive net foreign asset position in, say, bank deposits can more easily smooth their consumption than countries with a negative net asset position, as it may be easier to draw down positive balances than to increase negative balances. To reflect this, we also construct analogous net stock variables, measured as

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[2]For debt liability data, we in fact have two measures avaliable, constructed differently. OECD data rely mainly on the creditor-reporting system and refers primarily to debt by a country's residents, regardless of the currency of denomination. World Bank data relies on a debtor-reporting system and focuses primarily on foreign-currency denominated debt. Not surprisingly, the World Bank numbers are smaller than OECD numbers. We use the broader OECD data as out debt liability measure.

national assets minus liabilities for the relevant financial instrument category. These net stock variables clearly are continuous variables. However, it may be important whether a country is a net asset or liability holder rather than how large these net assets or liabilities are. To reflect this, we also construct net stock dummy variables that take on a value of 1 if the country is a net asset holder in a particular instrument category and zero otherwise.

3.4   Summary statistics

Table 1 provides summary statistics for all the variables. Next, Table 2A gives the correlation coefficients among the *GDPg, GNPg, CONSg* variables. It is seen that the correlation coefficients between *GDPg* and *GNPg* are close to one. The correlation coefficients between *GDPg* and *GNPg* on the one hand and *CONSg* on the other are both shown to be a bit above 0.5.[3] Table 2B gives the correlation coefficients among the financial variables, with the international financial variables measured in gross stock terms. The financial variables tend to be significantly correlated with the expected signs. Countries with large domestic debt markets (high *CredPriv* and *CredBank*), for instance, tend to have highly liquid financial markets (high *M3*) and a high efficiency (low *Spread*). Turning to the international equity variables, we see that countries with high gross FDI stocks also tend to have high gross portfolio equity stocks, which suggests that these modes of equity finance are complements rather than substitutes. Not surprisingly, the two total international debt measurements (*TotDebt and TotDebt'*) are highly positively correlated with a correlation coefficient of 0.923. We see, however, that the *TotEq* and *TotDebt* variables display only a weak positive correlation. Also note that the domestic variables tend to be positively correlated with the international debt variables and the same holds for the equity variables. Domestic and international financial development, not surprisingly, thus tend to move in tandem.

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[3]Let ρ_1, ρ_2, ρ_3 be the correlation coefficients between differenced GDP and GNP, differenced GDP and consumption, and differenced GDP and consumption as follows,

$$\rho_1 = \frac{Cov(GDP_t - GDP_{t-1}, GNP_t - GNP_{t-1})}{\sqrt{Var(GDP_t - GDP_{t-1}) \cdot Var(GNP_t - GNP_{t-1})}} = 1$$

$$\rho_2 = \frac{Cov(GNP_t - GNP_{t-1}, c_t - c_{t-1})}{\sqrt{Var(GNP_t - GNP_{t-1}) \cdot Var(c_t - c_{t-1})}} = \frac{r + (2+r)(1-\alpha_c)}{\sqrt{2}\sqrt{(1-\alpha_c)^2(1+r)^2 + (1+r-\alpha_c)^2}}$$

$$\rho_3 = \frac{Cov(GDP_t - GDP_{t-1}, c_t - c_{t-1})}{\sqrt{Var(GDP_t - GDP_{t-1}) \cdot Var(c_t - c_{t-1})}} = \rho_2$$

Note that all three correlation coefficients collaps to one if the international interest rate is suppressed to be zero.

4   Empirical results

This section presents three sets of regression results. First, we examine how equity market development affects the co-movement of GNP and GDP based on specification (13). Second, we consider how debt market development affects the co-movement of consumption and GNP based on specification (14). Finally, the impact of equity and debt market development on the co-movement of consumption and GDP is considered along the lines of specification (15). For all three sets of regressions as discussed in three subsections, we first take the worldwide sample and subsequently the samples of OECD and non-OECD countries separately. For each sample, the impact of domestic and international financial variables is considered in turn given that these tend to be highly correlated as seen in Table 2B. Subsection 2 in addition considers the joint impact of domestic and international debt market development on the relationship between consumption and GNP to check whether in fact they can be shown to have a distinct impact. Subsection 4, finally, assesses the quantitative impact of domestic and international finance on the co-movements of GDP, GNP and consumption as implied by the estimated regression coefficients.

Throughout, we correct for possible heteroscedasticity across country panels and autocorrelation over time within a panel. Specifically, we allow for AR(1) autocorrelation which is specific for each country in the panel data set, while between countries we assume heteroskedasticy[4]. Estimation is by feasible generalized least squares (FGLS).

4.1   Smoothing GNP relative to GDP

The regressions of GNP growth on GDP growth are based on specification (13). Table 3 shows the results for the worldwide sample. Panel A is based on domestic equity market variables, while Panels B through D contain the international equity market variables in gross, net and dummy form, respectively. In Table 3A, stock market capitalization and turnover ratio enter the regressions separately with negative and significant coefficients, which suggests that both domestic stock market size and efficiency are conducive to smoothing GNP relative to GDP. Moreover, capitalization and stock market turnover jointly enter into a regression with negative signs as well, demonstrating to some extent that stock market size and efficiency actually play distinct roles. In Tables 3B through 3D, international equity market integration indicators - in gross, net, and dummy forms - appear to be unimportant for the smoothing of GNP relatively to GDP with the exception that the net dummy variable for equity ($TotEq$) enters negatively, to suggest that a positive net equity positive position is good for smoothing GNP relative to GDP.

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[4]We do not specify cross-sectional correlation because in order to cosider this possiblity we must have at least as many time periods as there are panels in the dataset, which is not the case. We alternatively applied robust standard error methods with clustering of countries, which specifies that error terms are independent across countries but correlated within a country with similar, unreported results.

Table 4 presents results analogous to Table 3 but based on a sample of only OECD member countries.[5] Domestic stock market size and efficiency play similar roles in Table 4A for OECD countries as for the world as a whole. Turning to the international variables, we see that gross *FDI* and *PortEq* enter simultaneously with a negative and positive coefficient in Table 4B. In net and dummy forms, the international equity variables enter with positive significant coefficients in several instances in Tables 4C and 4D. Overall, this suggests that equity investments of rich countries do not contribute to smoothing GNP relative to GDP. This could reflect that in practice international equity investments from rich countries serve to exploit national technological and other advantages, while international equity portfolio diversification may only be of secondary importance in the selection of international portfolio investments.

For the non-OECD countries in Table 5, the domestic equity variables, i.e. stock market capitalization and turnover, play a similar role in smoothing GNP relative to GDP as in the world sample, as both variables enter the regressions in Table 5A with negative and significant coefficients. Similarly to the world sample, international equity market integration indicators, measured in gross terms, do no appear to significantly reduce GNP shocks relative to GDP shocks. However, when measured in net and dummy terms, higher FDI appears to contribute to GDP smoothing for the poor countries in Tables 5C and 5D. For non-OECD countries, FDI thus appears to bring diversification advantages, as the implied activities (in part resulting from inward FDI) may be sufficiently distinct from domestic activities (not related to FDI).

4.2   Smoothing consumption relative to GNP

In this subsection, we present regressions of consumption growth on GNP growth along the line of (14). Table 6 presents the results for the world as a whole. In Table 6A, the various domestic debt market development indicators enter into regressions of consumption growth on GNP growth with negative and significant coefficients, except for the interest rate spread which enters with a positive but not statistically significant coefficient. So larger domestic debt markets (measured by higher *CredPriv* and *CredBank*) and more liquid ones (higher *M3*) appear to contribute to smoothing consumption relatively to GNP. Turning to the international debt indicators *TotDebt and TotDebt′*, we see in Tables 6B through 6D that they enter negatively regardless of whether they are in gross, net or dummy form, with statistically significant coefficients (apart from the net *TotDebt* variable). Specifically, the negative and significant signs for the *TotDebt* and *TotDebt′* variables in dummy form suggest that countries with positive net foreign debt assets can more easily smooth their consumption in

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[5] We use the latest OECD member country list including the following 30 countries: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Rep., Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

the face of GNP shocks than countries with negative net foreign debt assets. This makes sense as it should be much easier to draw down a positive bank deposit balance or to liquidate a net position in bonds than to borrow money from banks or through the flotation of bonds in the international capital market. Specifically, the liquidation of positive debt balances may be quicker and require lower transaction costs.[6]

Table 7 presents the results for OECD countries. Now in Table 7A, all domestic debt market variables enter the regressions with significant coefficients, with the expected negative signs for *CredPriv, CredBank, M3,* and a positive sign for *Spread*. For rich countries, domestic debt market development thus is important in explaining international variation in the smoothing of consumption relative to GNP. Turning to the international debt variables, we now have the *CredPriv, CredBank* variables in addition to a *TotDebt* variable. For the gross variables, we see that all three enter with negative and significant coefficients in Table 7A when entered by themselves. Negative coefficients also are shown in several instances in Tables 7B through 7D with the net and dummy variables. For OECD countries, international debt integration thus appears to make a contribution to the smoothing of consumption to GNP as well.

Next, for non-OECD countries in Table 8 all of the domestic debt market development again enter with negative coefficients, apart from *Spread* that enters with a positive coefficient. Two of these variables *CredBank* and *M3*, however, fail to have coefficients that are statistically significant. Thus the evidence that domestic debt market development matters for non-OECD countries is somewhat weaker than it is for OECD countries. Turning to the international variables *TotDebt* and *TotDebt'*, we see that these enter with negative and significant coefficients in Tables 8B through 8D. Hence, the evidence that international debt market integration is important for smoothing consumption relative to GNP is particularly strong for poor countries.

Finally, Table 9 presents some regressions along the lines of (14) where we jointly include domestic debt variables (*CredPriv* and *CredBank*)and an international debt variable (*TotDebt*) to see if domestic and debt market development have an independent role in explaining the smoothing of consumption relative to GNP and, if so, which one is more important. Regressions 1 and 2 relate to the sample of OECD countries, while regressions 3 through 6 relate to the non-OECD countries. Comparing the sizes and significance levels of the various debt variables across the regressions for the OECD and non-OECD samples, we see that (i) the domestic debt variables enter regressions (1) and (2) for the OECD sample with negative and significant coefficients, but not so in regressions (3) through (6) for the non-OECD sample. A conclusion is that domestic financial development is a relatively large bottleneck in improving the smoothing of consumption relative to GNP in OECD countries. Instead, the international debt variables obtain relatively large negative coefficients in regressions (3) through

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[6] Note that transaction costs may imply that the net-of-cost interets rate received on positive debt balances is less than the cost-inclusive interest rate to be paid on negative debt balances. This could lead to a more rapid liquidation of positive balances than build-up of negative balances, but the oppositve should be true as well.

(6) for the non-OECD sample, with significance levels of at least 5 percen in 3 out of 4 regressions. A further conclusion therefore is that international debt integration is a relatively large bottleneck in improving the smoothing of consumption relative to GNP in non-OECD countries. Thus it appears that at different levels of economic development different forms of debt market development are important in improving consumption smoothing. Poor countries may still have rather weak links with the international debt market, and hence improving these links may be most important in achieving better consumption smoothing. For rich countries, links with the international debt market are generally well-established. In these countries, however, there are still many households that may not have sufficient financial wealth or may otherwise not be sufficiently "plugged into" the financial system to enable them to smooth their household consumption. In rich countries, further domestic financial development may serve to increase the share of households that can effectively smooth their household consumption and hence improve overall macroeconomic consumption smoothing as studied in this paper.

4.3   Smoothing consumption relative to GDP

Next we present the results of regressions relating consumption growth to GDP growth following (15) to see how equity and debt market development jointly affect the smoothing of consumption relative to GDP. For this purpose, we select *CredPriv* and *CredBank* to be two alternative domestic debt market variables, while *MCap* is the domestic equity market variable. At the same time, we select *TotDebt* and *TotDebt'* to be alternative international debt market variables and *TotEq* to be the international equity market variable.

Table 10 presents the results for the world sample. The two domestic debt variables and the capitalization variable enter with negative and significant coefficients in the two regressions, which indicates that debt and equity market development have distinct roles in bringing about consumption smoothing as suggested by the theoretical model of section 2. Interestingly, the interaction terms of *CredPriv* or *CredBank* with *MCap* enter the two regressions positively and significantly at the 10 and 5 percent respectively, also consistent with the theoretical model. The (marginal) benefit of higher debt market development in improving consumption smoothing thus decreases with the level of equity market development, and vice versa. The marginal benefit of either type of development, however, remains positive (see the next subsection for an assessment of the implied quantitative effects), which suggests that domestic debt and equity market are substitutes in that a relative lack of one can be made up by having more of the other. It would be going too far, however, to say that financial structure (or the relative development of debt and equity markets) does not matter, as the marginal effects of the two types of development are not the same (see again the next subsection for a quantitative assessment). For the international variables in the world sample, we get qualitatively similar results for the gross, net, or net dummy measurements of both the *TotDebt* and *TotDebt'* variables with several of the regression coefficients having the expected signs

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and being statistically significant.

Table 11 presents the results for the OECD sample. In Table 11A, for domestic debt and equity variables we get similar results for the OECD sample as for the whole world as a whole. Interaction terms are positive and significant. For the international financial variables, the gross variables regressions in Table 11B are consistent with our model, while Tables 11C and 11D provide somewhat less strong support for the model using net and dummy variables. Overalll, however, Table 11 suggests that international equity market integration leads to better consumption smoothing after we control for international debt market integration. This result is more in line with expectations based on the theory than those reported in subsection 4.1 which suggested that for OECD countries international equity market integration can amplify rather than reduce shocks of GNP relative to GDP.

Finally, Table 12 presents the results for non-OECD countries. Again, the domestic debt and capitalization variables and their interactions enter with the expected signs and are significant at minimally the 10 percent level. In Table 12B, the international financial variables in gross terms also enter with expected and significant coefficients (in the second regression). The regressions reported in Tables 12C and 12D, however, provide less strong support for the theory: in Table 12C only the *TotDebt'* variables has a negative and significant coefficient according to the theory, while in Table 12D the interaction term of *TotDebt'* and *TotEq* has an unexpected negative and significant coefficient.

Overall, the results in this section strongly support the theoretical predications that (i) both equity and debt market development are useful in reducing the co-movement of consumption and GDP and that (ii) the marginal benefit of having one type of financial market development decreases in the level of the other type.

4.4 Quantitative assessment

Next, we wish to assess the quantitative importance of the estimated coefficients of the previously reported regressions for reducing the variability of consumption and GNP relative to each other and relative to GDP. To start, we wish to know how the estimated coefficients on the stock market variables in the regressions reported in Tables 3 through 5 can be used to computed the implied elasticities of the variance of GNP growth (as a ratio of the variance of GDP growth). Extending the theoretical framework, we can easily derive that the ratio of the variance of (differenced) GNP to (differenced) GNP is related to the equity trading restriction parameter α_s as follows,

$$\frac{var(GNP_t - GNP_{t-1})}{var(GDP_t - GDP_{t-1})} = (1 - \alpha_s)^2 \tag{16}$$

where we take the interest rate r to be zero.

The elasticity of this relative variance w.r.t. α_s is now seen to be given by[7]

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[7] Alternatively, the elasticity of the standard deviation of differenced GNP relative to the

$$\zeta_1 = \frac{\partial}{\partial \alpha_s} \left(\frac{var(GNP_t - GNP_{t-1})}{var(GDP_t - GDP_{t-1})} \right) \bullet \frac{\alpha_s}{\frac{var(GNP_t - GNP_{t-1})}{var(GDP_t - GDP_{t-1})}} = \frac{-2\alpha_s}{1 - \alpha_s} \qquad (17)$$

Remember that $\alpha_s = \beta_s S$ where S stands for overall (domestic or international) stock market development. To evaluate expression (17) we can take an estimated value for the coefficient β_s from one of the tables with regression results and find an associated value for S by taking the sample mean of the proxy for stock market development that is a variable in the relevant regression.

Before turning to the results, note that similarly we can write the variance of differenced consumption relative to differenced GNP as follows

$$\frac{var(GNP_t - GNP_{t-1})}{var(c_t - c_{t-1})} = (1 - \alpha_c)^2 \qquad (18)$$

The elasticity of this variance ratio to the debt market transaction parameter, α_c, is given by

$$\zeta_1 = \frac{\partial}{\partial \alpha_s} \left(\frac{var(c_t - c_{t-1})}{var(GNP_t - GNP_{t-1})} \right) \bullet \frac{\alpha_s}{\frac{var(c_t - c_{t-1})}{var(GNP_t - GNP_{t-1})}} = \frac{-2\alpha_c}{1 - \alpha_c} \qquad (19)$$

where now $\alpha_c = \beta_s C$ with C standing for overall (domestic or international) debt market development.

Finally, note that the ratio of the variance of differenced consumption to the variance of differenced GDP is given by

$$\frac{var(c_t - c_{t-1})}{var(GDP_t - GDP_t)} = (1 - \alpha_s)^2 (1 - \alpha_c)^2 \qquad (20)$$

Now we can find the two elasticities of this ratio with respect to the two financial market restriction parameters α_s and α_c as follows

$$\zeta_{3,\alpha_s} = \frac{\partial}{\partial \alpha_s} \left(\frac{var(c_t - c_{t-1})}{var(GDP_t - GDP_t)} \right) \bullet \frac{\alpha_s}{\frac{var(c_t - c_{t-1})}{var(GDP_t - GDP_t)}} = \frac{-2\alpha_s}{1 - \alpha_s} \qquad (21)$$

$$\zeta_{3,\alpha_c} = \frac{\partial}{\partial \alpha_c} \left(\frac{var(c_t - c_{t-1})}{var(GDP_t - GDP_{t-1})} \right) \bullet \frac{\alpha_c}{\frac{var(c_t - c_{t-1})}{var(GDP_t - GDP_{t-1})}} = \frac{-2\alpha_c}{1 - \alpha_c} \qquad (22)$$

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standard deviation of differenced GDP w.r.t. α_s can be calculated as
$\zeta_1' = \frac{\partial}{\partial \alpha_s} \left(\frac{\sigma(GNP_t - GNP_{t-1})}{\sigma(GDP_t - GDP_{t-1})} \right) \bullet \frac{\alpha_s}{\frac{\sigma(GNP_t - GNP_{t-1})}{\sigma(GDP_t - GDP_{t-1})}} = \frac{-\alpha_s}{1 - \alpha_s}$, which is half of the elasticity of
the analogous w.r.t. in (17).

Table 13A first presents the estimated elasticity of the relative variance of GNP and GDP with respect to proxies for equity market development. The estimates are based on the coefficients for *Mcap* and *Turn* in the final regressions in Tables 3A, 4A and 5A. The figures can be interpreted to indicate how much the variance of GNP growth relative to GDP growth changes by having an increase in one of the domestic equity market variables of one percent. For example, a one percent increase in stock market capitalization relative to GDP evaluated at the mean value can reduce the relative variance of GNP growth to GDP growth rate by 0.079 percent for the OECD sample. To illustrate that this number is not negligible, we can conduct a thought experiment as follows. The mean value of OECD countries' stock market capitalization relative to GDP is 57% and the relative variance of GNP growth to GDP growth rate for all OECD countries is 1.003. By increasing the level of stock market capitalization by 50 percent, i.e. up to 85.5%, the relative variance of GNP growth and GDP growth for OECD countries will decrease by 50%*0.079=3.95%. The new relative variance between GNP and GDP would be 0.963. As seen in the table, the magnitude of the effects of domestic equity market development - expressed as elasticities - on the relative GNP variance is much smaller for non-OECD countries than for OECD counties. We do not compute analogous elasticity estimates using international equity measures, as the underlying regression coefficients in several instances are statistically insignificant in Tables 3 through 5.

Table 13B provides the estimated elasticity of the variance of consumption growth (relative to GNP growth) with respect to both domestic and international indicators. These are based on regression coefficients taken from Tables 6 through 8. In each case, the regression coefficient used is the one from a regression where the corresponding variable is the only included financial market variable in the regression. The estimated elasticity for *CredPriv* for the world sample, for instance, is taken from the first regression in Table 6A. We see that the estimated elasticities in Table 13B tend to be larger than those reported in Table 13A. This suggests that credit market development is more effective in reducing the variance of consumption relative to GNP than equity market development is in reducing the variance of GNP relative to GDP. To take an example, a one percent increase of the sum of the international debt asset and liability stock measured by either *TotDebt* or *TotDebt'* evaluated at the mean value decreases the variance of the consumption growth relative to GNP growth rate by 0.48% and 0.28 percent respectively, for non-OECD countries. We also see that the elasticity of this relative consumption variance w.r.t. the domestic debt variables (*CredPriv* or *CredBank'*) is relatively large for OECD countries, while the elasticity of this relative consumption variance with respect to an international debt variable (*TotDebt* (OECD) vs. *TotDebt* (non-OECD) or *TotDebt'* (non-OECD)) is relatively large for non-OECD countries.

Table 13C presents the estimated elasticity of the variance of consumption growth relative to GDP growth rate with respect to debt and equity market development jointly. The first two lines of Table 13C are based on the second regressions in Tables 10A, 11A and 12A. The third and fourth lines of Table 13C are based on the first regression of Table 10B, the regression in Table 11B,

and the first regression in Table 12B. The estimated elasticities are generally not negligible. It is seen that domestic equity and debt market development matters more for OECD countries than for non-OECD countries in terms of the shown elasticities, while international equity and debt market integration matters more for non-OECD countries. These elasticity results are consistent with the "level" results in Table 9 comparing the impact of domestic and international debt market development on reducing the variability of consumption relative to GNP for OECD and non-OECD countries.

5 Discussions and conclusions

In this paper we use a simple theoretical model to illustrate how a representative consumer smooths his consumption under a restricted availability of debt and equity market instruments due to imperfect domestic and international debt and equity markets. The model yields testable implications regarding the co-movements of GDP, GDP and consumption for a given level of domestic or international debt and equity market development. These implications are explored using a variety of empirical proxies for domestic and international debt and equity market development that are familiar from the empirical literature on the finance and growth nexus.

The empirical results confirm that the extent to which consumption smoothing is possible in the face of output or GDP shocks depends importantly on the level of financial development. The domestic and international aspects of financial development turn out to play distinct roles in reducing consumption variability. Specifically, we find that domestic debt market development is more relevant for reducing consumption variability relative to GNP for OECD member countries than for non-member countries, while international debt market development is relatively important for OECD non-member countries in reducing consumption variability. Similarly, we find that debt and equity market developments have independent roles in reducing the variability of consumption relative to GDP. They are to some extent substitutes in that more of one can make up for less of the other. Calculated elasticities suggest that credit market development is more potent than equity market development in reducing the variability of consumption relative to GNP.[8] Generally, the calculated elasticities suggest that financial market development can have economically relevant effects in reducing consumption variability relative to GNP. Consistent with the theoretical model, we also find empirical support for the hypothesis that a higher level of equity market development reduces the potential for debt market development to reduce the variability of consumption relative to GDP, and vice versa.

There are several avenues for further research. At a theoretical level, ex-

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[8] This study uses annual data. Instead, one could examine the co-movements of consumption and GDP or GNP taking three or five year intervals. Over longer periods, equity market development may be relatively important in smoothing consumption, as suggested by findings in Melitz and Zumer (1999).

isting models of imperfections in international debt and equity markets can be extended to see how the determinants of these restrictions in the end determine the scope for international consumption smoothing. At the empirical level, similarly it may be possible to consider some of the determinants of domestic and financial development, such as the nature of legal systems, to see how these determinants impact on actual consumption smoothing.

At a policy level, the knowledge that financial sector development helps to smooth consumption should provide an impetus to take measures that promote such development. The results of this paper suggest that gross stock variables derived from the balance of payments help to explain a country's consumption smoothing possibilities. The gross financial stock variables of one country are likely to be directly affected by financial sector development in other countries. This reflects that international consumption smoothing requires the active involvement of at least two countries. Financial market development in one country thus is likely to increase the consumption smoothing options available to other countries. The potentially beneficial effects of national financial sector development on consumption smoothing possibilities and welfare abroad should provides policy markets an additional reason to aim for financial sector development.

Table 1. Summary statistics

Variables	The whole sample				
Growth rates					
	Obs.	Mean	S. D.	Min	Max
GDPg	5907	1.90	5.50	-19.73	42.99
GNPg	5633	1.95	5.91	-19.74	47.35
CONg	4371	2.13	6.62	-19.54	47.56
Domestic Finance					
MCap	1142	40.64	54.37	0	549.88
Turn	778	42.23	53.00	0	475.46
CredPriv	5283	34.06	30.66	.56	203.17
CredBank	5150	47.00	39.14	.00	333.99
M3	5012	41.99	34.72	0	753.98
Spread	2869	7.16	7.78	-9.25	91.76
Int. Finance: Gross					
FDI	1858	16.01	17.94	0	127.22
PortEq	1724	4.42	16.00	0	343.32
TotEq	1671	21.32	30.28	0	438.11
IntBank					
PortDebt					
TotDebt	976	80.36	68.29	10.54	606.55
TotDebt$'$	1078	93.94	85.09	10.54	606.55
Int. Finance: Net					
FDI	1858	-8.29	15.60	-110.90	34.74
PortEq	1724	-.81	9.05	-246.83	97.14
TotEq	1671	-9.67	18.21	-258.80	45.65
IntBank					
PortDebt					
TotDebt	976	-45.66	39.08	-204.84	99.74
TotDebt$'$	1078	-24.40	70.63	-192.23	337.17

Table 1 (Continued). Summary statistics

Variables	OECD countries				
Growth rates					
	Obs.	Mean	S. D.	Min	Max
GDPg	1122	2.78	3.07	-14.57	18.18
GNPg	1072	2.72	3.08	-14.90	12.45
CONg	1082	2.59	2.72	-18.07	24.11
Domestic Finance					
MCap	388	57.19	57.64	.19	549.87
Turn	255	72.16	54.11	.7	380.3
CredPriv	1094	61.79	37.06	1.68	203.17
CredBank	1094	78.95	43.48	14.24	319.38
M3	789	60.76	31.53	9.94	199.56
Spread	628	4.10	2.57	-9.25	20.46
Int. Finance: Gross					
FDI	420	23.57	19.96	.64	127.22
PortEq	308	15.70	20.95	.25	160.98
TotEq	303	45.93	37.36	4.40	251.34
IntBank	515	77.76	69.40	9.77	546.17
PortDebt	355	25.72	22.90	.037	95.64
TotDebt	348	100.16	94.35	10.54	606.55
TotDebt$'$					
Int. Finance: Net					
FDI	420	-1.79	10.67	-55.15	34.40
PortEq	308	-1.65	7.99	-59.26	23.84
TotEq	303	-3.25	11.69	-46.29	22.41
IntBank	515	-14.75	23.61	-194.83	28.34
PortDebt	355	-8.61	20.27	-53.72	75.04
TotDebt	348	-16.04	28.41	-92.28	99.74
TotDebt$'$					

Table 1 (Continued). Summary statistics

Variables	Non-OECD countries				
Growth rates					
	Obs.	Mean	S. D.	Min	Max
GDPg	4785	1.70	5.91	-19.73	42.99
GNPg	4561	1.76	6.38	-19.74	47.35
CONg	3289	1.98	7.47	-19.54	47.56
Domestic Finance					
MCap	754	32.13	50.57	0	385.12
Turn	523	27.63	45.89	0	475.46
CredPriv	4189	26.82	23.96	.56	180.17
CredBank	4056	39.65	33.27	.00	333.99
M3	4223	38.49	34.16	0	753.98
Spread	2241	8.02	8.51	-8.85	91.76
Int. Finance: Gross					
FDI	1438	15.17	18.10	0	124.28
PortEq	1416	2.01	14.10	0	343.32
TotEq	1368	17.30	27.04	0	438.11
IntBank					
PortDebt					
TotDebt	628	60.97	33.86	11.02	204.84
TotDebt$'$	730	72.61	41.14	12.42	242.59
Int. Finance: Net					
FDI	1438	-12.67	16.34	-110.90	32.38
PortEq	1416	-0.66	10.11	-246.83	97.14
TotEq	1368	-13.39	18.98	-258.80	45.65
IntBank					
PortDebt					
TotDebt	628	-59.11	34.46	-204.84	-10.05
TotDebt$'$	730	-32.46	59.63	-192.23	377.17

Table 2. Correlation Coefficients

A. Growth Rates

	GDPg	GNPg	CONSg
GDPg	1		
GNPg	0.9136*	1	
CONSg	0.5448*	0.5452*	1

B. Financial Variables

	CredPriv	CreditBank	M3	Spread	MCap	Turn
CredPriv	1					
CredBank	0.7647*	1				
M3	0.7284*	0.7592*	1			
Spread	-.0524*	-.0308	-.0445*	1		
MCap	0.6237*	0.4875*	0.5656*	-.0612	1	
Turn	0.2787*	0.2591*	0.2067*	-.1986*	0.1590*	1
FDI	0.2949*	0.1515*	0.2452*	-0.0305	0.4850*	0.0373*
PortEq	0.4797*	0.3673*	0.3900*	-0.0314	0.5739*	0.2103*
TotEq	0.4258*	0.2701*	0.3513*	-0.0377	0.5866*	0.1309*
TotDebt	0.043	0.2520*	0.2444*	-0.0317	0.2195*	0.2662*
TotDebt$'$	0.1115*	0.2915*	0.3381*	-0.0123	0.0089	0.0734

	FDI	PortEq	TotEq	TotDebt
CredPriv				
CredBank				
M3				
Spread				
MCap				
Turn				
FDI	1			
PortEq	0.5080*	1		
TotEq	0.7220*	0.6842	1	
TotDebt	0.0140	-0.1305*	-0.0350	1
TotDebt$'$	0.0450	-0.0048	0.0178	0.9238*

Note: * indicates significant at 5% level

Table 3. Results of GNP growth on GDP growth for worldwide sample

A. Domestic Measurements

	(1)	(2)	(3)
GDPg	1.014** (0.002)	1.028**(0.005)	1.043**(0.005)
MCap	-0.032**(0.007)		-0.033**(0.011)
Turn		-0.012**(0.005)	-0.007**(0.002)
Const.	0.037**(0.014)	0.018**(0.012)	0.015**(0.004)
Obs.	1133	767	761

B. International Measurements: Gross

	(1)	(2)	(3)	(4)
GDPg	1.017** (0.004)	1.014**(0.004)	1.016** (0.004)	1.017**(0.004)
FDI	0.021(0.026)			-0.003(0.036)
PortEq		0.068(0.045)		0.061(0.060)
TotEq			0.020 (0.018)	
Const.	-0.053**(0.015)	-0.036*(0.015)	-0.041**(0.015)	-0.042**(0.016)
Obs.	1772	1642	1589	1589

C. International Measurements: Net

	(1)'	(2)'	(3)'	(4)'
GDPg	1.017**(0.004)	1.016**(0.004)	1.015**(0.004)	1.015**(0.004)
FDI	-0.029(0.037)			-0.050^{+}(0.038)
PortEq		0.071(0.103)		-0.094(0.101)
TotEq			-0.036(0.036)	
Const.	-0.056**(0.015)	-0.033**(0.015)	-0.042**(0.016)	-0.045**(0.016)
Obs.	1772	1642	1589	1589

D. International Measurements: Dummy

	(1)"	(2)"	(3)"	(4)"
GDPg	1.023**(0.005)	1.015**(0.004)	1.024**(0.005)	1.024**(0.005)
FDI	-0.001(0.013)			-0.019^{+}(0.014)
PortEq		0.005(0.009)		-0.004(0.012)
TotEq			-0.023^{+}(0.014)	
Const.	-0.066**(0.019)	-0.034*(0.016)	-0.053**(0.020)	-0.052**(0.021)
Obs.	1772	1642	1589	1589

Note: $^{+}$(*, **) indicates statistical significance at the 10% (5%, 1%) confidence level; number in parentheses is standard error.

Table 4. Results of GNP Growth on GDP Growth for OECD countries

A. Domestic Measurements

	(1)	(2)	(3)
GDPg	1.010**(0.032)	0.885**(0.091)	0.948**(0.052)
MCap	-0.067**(0.020)		-0.116(0.105)
Turn		-0.084$^+$(0.053)	-0.079**(0.038)
Const.	0.014(0.068)	0.073(0.118)	0.014(0.123)
Obs.	388	255	254

B. International Measurements: Gross

	(1)	(2)	(3)	(4)
GDPg	1.019**(0.011)	1.018**(0.014)	1.022**(0.016)	1.053**(0.016)
FDI	-0.010(0.044)			-0.220**(0.068)
PortEq		0.113*(0.060)		0.274**(0.078)
TotEq			0.018(0.031)	
Const.	-0.033(0.027)	-0.065**(0.031)	-0.057*(0.032)	-0.069**(0.030)
Obs.	325	246	245	245

C. International Measurements : Net

	(1)'	(2)'	(3)'	(4)'
GDPg	1.020**(0.009)	1.032**(0.011)	1.036**(0.010)	1.033**(0.011)
FDI	0.002**(0.001)			0.002**(0.001)
PortEq		0.003*(0.002)		0.002(0.002)
TotEq			0.002**(0.001)	
Const.	-0.030(0.027)	-0.045$^+$(0.033)	-0.052*(0.030)	-0.047$^+$(0.031)
Obs.	310	231	230	230

D: International Measurements: Dummy

	(1)"	(2)"	(3)"	(4)"
GDPg	1.005**(0.011)	1.026**(0.013)	1.007**(0.013)	1.009**(0.015)
FDI	0.032**(0.013)			0.043**(0.016)
PortEq		0.004(0.011)		-0.003(0.010)
TotEq			0.051**(0.013)	
Const.	-0.040$^+$(0.027)	-0.053*(0.032)	-0.058**(0.028)	-0.050$^+$(0.032)
Obs.	310	231	230	230

Note: $^+$(*, **) indicates statistical significance at the 10% (5%, 1%) confidence level; number in parentheses is standard error.

Table 5. Results of GNP Growth on GDP Growth for non-OECD countries

A. Domestic Measurements

	(1)	(2)	(3)
GDPg	1.044**(0.002)	1.064**(0.011)	1.111**(0.018)
MCap	-0.018**(0.002)		-0.021**(0.005)
Turn		-0.014**(0.003)	-0.008**(0.003)
Const.	0.078**(0.013)	0.022$^+$(0.013)	0.014$^+$(0.010)
Obs.	743	511	506

B. International Measurements: Gross

	(1)	(2)	(3)	(4)
GDPg	1.012**(0.006)	1.011**(0.005)	1.011**(0.006)	1.011**(0.006)
FDI	0.055(0.043)			0.043(0.047)
PortEq		0.202(0.150)		0.113(0.151)
TotEq			0.055(0.047)	
Const.	-0.056**(0.026)	-0.050$^+$(0.026)	-0.053**(0.026)	-0.053*(0.026)
Obs.	1115	1164	1111	1111

C. International Measurements: Net

	(1)'	(2)'	(3)'	(4)'
GDPg	1.008**(0.006)	1.013**(0.005)	1.007**(0.006)	1.007**(0.006)
FDI	-0.001**(0.000)			-0.001**(0.000)
PortEq		0.001(0.002)		0.001(0.002)
TotEq			-0.001**(0.000)	
Const.	-0.057**(0.025)	-0.046*(0.026)	-0.052**(0.025)	-0.052**(0.025)
Obs.	1115	1164	1111	1111

D: International Measurements: Dummy

	(1)"	(2)"	(3)"	(4)"
GDPg	1.029**(0.006)	1.011**(0.005)	1.028**(0.006)	1.027**(0.006)
FDI	-0.101**(0.049)			-0.103**(0.050)
PortEq		0.013(0.020)		0.015(0.022)
TotEq			-0.059$^+$(0.039)	
Const.	-0.064**(0.028)	-0.051*(0.026)	-0.061**(0.028)	-0.061**(0.028)
Obs.	1115	1164	1111	1111

Note: $^+$(*, **) indicates statistical significance at the 10% (5%, 1%) confidence level; number in parentheses is standard error.

Table 6. Results of consumption growth on GNP growth for world-wide sample

A. Domestic Measurements

	(1)	(2)	(3)	(4)
GNPg	0.679**(0.016)	0.689**(0.017)	0.675**(0.019)	0.651**(0.013)
CredPriv	-0.087**(0.026)			
CredBank		-0.079**(0.023)		
M3			-0.060*(0.030)	
Spread				0.043(0.061)
Const.	0.739**(0.046)	0.732**(0.046)	0.682**(0.050)	0.638**(0.042)
Obs.	3968	3956	3707	2302

B. International Measurements: Gross

	(1)	(2)
GNPg	0.829**(0.028)	0.891**(0.028)
TotDebt	-0.133**(0.028)	
TotDebt$'$		-0.207**(0.027)
Const.	0.317**(0.064)	0.262**(0.066)
Obs.	748	811

Table 6 (Continued). Results of consumption growth on GNP growth for worldwide sample

C. International Measurements: Net

	(1)'	(2)'
GNPg	0.719**(0.029)	0.628**(0.021)
TotDebt	-0.034(0.050)	
TotDebt$'$		-0.200**(0.037)
Const.	0.315**(0.071)	0.401**(0.065)
Obs.	747	811

D. International Measurements: Dummy

	(1)"	(2)"
GNPg	0.735**(0.019)	0.734**(0.019)
TotDebt	-0.290**(0.055)	
TotDebt$'$		-0.392**(0.052)
Const.	0.359**(0.063)	0.389**(0.067)
Obs.	747	811

Note: $^{+}$(*, **) indicates statistical significance at the 10% (5%, 1%) confidence level; number in parentheses is standard error.

Table 7. Results of consumption Growth on GNP Growth for OECD countries

A. Domestic Measurements

	(1)	(2)	(3)	(4)
GNPg	0.714**(0.030)	0.720**(0.029)	0.706**(0.036)	0.526**(0.028)
CredPriv	-0.149**(0.036)			
CreditBank		-0.131**(0.032)		
M3			-0.124**(0.048)	
Spread				1.904**(0.506)
Const.	0.864**(0.063)	0.869**(0.063)	0.832**(0.073)	0.767**(0.063)
Obs.	993	993	708	617

B. International Measurements: Gross

	(1)	(2)	(3)	(4)
GNPg	0.635**(0.037)	0.668**(0.040)	0.679**(0.043)	0.650**(0.043)
IntBank	-0.081**(0.038)		-0.032(0.048)	
PortDebt		-0.339**(0.103)	0.301**(0.126)	
TotDebt				-0.091**(0.032)
Const.	0.675**(0.081)	0.694**(0.084)	0.691**(0.084)	-0.689**(0.084)
Obs.	346	281	280	280

Table 7 (continued). Results of consumption Growth on GNP Growth for OECD countries

C. International Measurements: Net

	(1)'	(2)'	(3)'	(4)'
GNPg	0.528**(0.029)	0.521**(0.031)	0.515**(0.032)	0.515**(0.032)
IntBank	-0.005**(0.001)		-0.001(0.002)	
PortDebt		-0.002**(0.001)	-0.002*(0.001)	
TotDebt				-0.002**(0.001)
Const.	0.738**(0.082)	0.685**(0.082)	0.694**(0.085)	0.705**(0.083)
Obs.	346	281	280	280

D. International Measurements: Dummy

	(1)"	(2)"	(3)"	(4)"
GNPg	0.612**(0.030)	0.570**(0.030)	0.601**(0.030)	0.588**(0.029)
IntBank	-0.093**(0.043)		-0.095**(0.039)	
PortDebt		-0.070(0.056)	-0.080*(0.056)	
TotDebt				-0.188**(0.057)
Const.	0.677**(0.086)	0.745**(0.085)	0.791**(0.085)	0.736**(0.084)
Obs.	331	266	265	265

Note: $^{+}$(*, **) indicates statistical significance at the 10% (5%, 1%) confidence level; number in parentheses is standard error.

Table 8. Results of consumption growth on GNP Growth for non-OECD countries

A. Domestic Measurements

	(1)	(2)	(3)	(5)
GNPg	0.747**(0.043)	0.731**(0.054)	0.718**(0.067)	0.537**(0.034)
CredPriv	-0.030**(0.013)			
CredBank		-0.019$^+$(0.015)		
M3			-0.017(0.019)	
Spread				0.073**(0.014)
Const.	0.560**(0.069)	0.522**(0.068)	0.535**(0.068)	0.533**(0.088)
Obs.	2975	2897	2999	1660

B. International Measurements: Gross

	(1)	(2)
GNPg	0.906**(0.054)	0.938**(0.038)
TotDebt	-0.184**(0.077)	
TotDebt$'$		-0.233**(0.043)
Const.	0.128(0.126)	0.121(0.118)
Obs.	418	493

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Table 8 (continued). Results of consumption growth on GNP Growth for non-OECD countries

C. International Measurements: Net

	(1)'	(2)'
GNPg	0.751**(0.109)	0.647**(0.047)
TotDebt	-0.000*(0.000)	
TotDebt$'$		-0.002**(0.000)
Const.	0.054(0.221)	0.094(0.214)
Obs.	394	464

D. International Measurements: Dummy

	(1)[9]"	(2)"
GNPg	0.648 **(0.010)	0.779**(0.025)
TotDebt		
TotDebt$'$		-0.364**(0.101)
Const.	0.537**(0.069)	0.267**(0.117)
Obs.	2471	493

Note: [+](*, **) indicates statistical significance at the 10% (5%, 1%) confidence level; number in parentheses is standard error.

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[9] The data for net stock of international debt for non-OECD countries are all negative so that all associated dummy variables are equal to zero. The interaction term between *GNPg* and *TotDebt* therefore is dropped from the regression.

Table 9. Both domestic credit and international debt variables for OECD and non-OECD countries

A. OECD countries

Variables	(1)	(2)
GNPg	0.906**(0.083)	0.902**(0.081)
Domestic		
CredPriv	-0.249**(0.083)	
CredBank		-0.204**(0.076)
International		
TotDebt	-0.061$^+$(0.042)	-0.071$^+$(0.053)
TotDebt$'$		
Const.	0.564**(0.064)	0.589**(0.065)
Obs.	278	278

B. non-OECD countries

Variables	(3)	(4)	(5)	(6)
GNPg	0.866**(0.066)	0.751**(0.055)	0.891**(0.062)	0.759**(0.054)
Domestic				
CredPriv	0.086$^+$(0.070)	0.111$^+$(0.074)		
CredBank			0.060(0.069)	0.091(0.070)
International				
TotDebt	-0.195**(0.078)		-0.215**(0.083)	
TotDebt$'$		-0.106$^+$(0.078)		-0.127*(0.082)
Const.	0.147(0.131)	0.562**(0.137)	0.153(0.129)	0.562**(0.137)
Obs.	416	666	416	666

Note: $^+$(*, **) indicates statistical significance at the 10% (5%, 1%) confidence level; number in parentheses is standard error.

Table 10. Results of consumption growth on GDP growth for worldwide sample

A. Domestic Measurements

GDPg	0.906**(0.015)	0.955**(0.011)
CredPriv	-0.156**(0.034)	
CredBank		-0.195**(0.025)
MCap	-0.105*(0.058)	-0.140**(0.050)
CredPriv $*$ MCap	0.071$^+$(0.047)	
CredBank $*$ MCap		0.098*(0.041)
Const.	0.327**(0.062)	0.324**(0.061)
Obs.	901	904

B. International Measurements: Gross

	(1)	(2)
GDPg	0.956**(0.041)	1.068**(0.043)
TotDebt	-0.093*(0.040)	
TotDebt$'$		-0.265**(0.048)
TotEq	-0.360**(0.120)	-0.374**(0.096)
TotDebt $*$ TotEq	0.125*(0.060)	
TotDebt $*$ TotEq		0.244**(0.066)
Const.	0.211**(0.070)	0.091(0.072)
Obs.	713	775

C. International Measurements: Net

	(1)'	(2)'
GDPg	0.767**(0.030)	0.710**(0.025)
TotDebt	-0.067(0.053)	
TotDebt$'$		-0.189**(0.047)
TotEq	-0.466**(0.135)	-0.224**(0.104)
TotDebt $*$ TotEq	0.000(0.000)	
TotDebt$'$ $*$ TotEq		0.000*(0.000)
Const.	0.143$^+$(0.074)	0.246**(0.071)
Obs.	713	775

D. International Measurements: Dummy

	(1)"	(2)"
GDPg	0.843**(0.020)	0.862**(0.022)
TotDebt	-0.334**(0.113)	
TotDebt$'$		-0.131*(0.071)
TotEq	-0.131**(0.022)	-0.145**(0.026)
TotDebt $*$ TotEq	0.151$^{(1)}$(0.124)	
TotDebt$'$ $*$ TotEq		0.301**(0.129)
Const.	0.212**(0.067)	0.162**(0.077)
Obs.	713	775

Notes: $^+$(*, **): statistical significance at the 10% (5%, 1%) confidence level; $^{(1)}$ significant at 25%; number in parentheses is standard error.

Table 11. Results of consumption Growth on GDP Growth for OECD countries

A. Domestic Measurements

	(1)	(2)
GDPg	0.910**(0.073)	0.963**(0.072)
CredPriv	-0.285**(0.080)	
CredBank		-0.290**(0.064)
MCap	-0.258**(0.096)	-0.298**(0.084)
CredPriv * MCap	0.199*(0.085)	
CredBank * MCap		0.211**(0.068)
Const.	0.451**(0.078)	0.442**(0.075)
Obs.	371	371

B. International Measurements: Gross

GDPg	0.837**(0.074)
TotDebt	-0.067(0.062)
TotEq	-0.052**(0.139)
TotDebt * TotEq	0.147*(0.071)
Const.	0.516**(0.082)
Obs.	239

C. International Measurements: Net

GDPg	0.567**(0.035)
TotDebt	-0.001**(0.000)
TotEq	-0.004*(0.002)
TotDebt *TotEq	0.000(0.000)
Const.	0.648**(0.082)
Obs.	239

D. International Measurements: Dummy

GDPg	0.697**(0.030)
TotDebt	-0.212**(0.096)
TotEq	-0.034^{+}(0.025)
TotDebt *TotEq	-0.020(0.107)
Const.	0.517**(0.793)
Obs.	224

Note: $^{+}$(*, **) indicates statistical significance at the 10% (5%, 1%) confidence level; number in parentheses is standard error.

Table 12. Results of consumption Growth on GDP Growth for non-OECD countries

A. Domestic Measurements

GDPg	1.308**(0.139)	1.426**(0.097)
CredPriv	-0.140**(0.045)	
CredBank		-0.146**(0.033)
MCap	-0.060^{+}(0.047)	-0.112**(0.047)
CredPriv $*$ MCap	0.023*(0.013)	
CredBank $*$ MCap		0.032**(0.012)
Const.	0.276**(0.094)	0.267**(0.096)
Obs.	530	518

B. International Measurements: Gross

	(1)	(2)
GDPg	1.066**(0.102)	1.190**(0.058)
TotDebt	-0.236^{+}(0.148)	
TotDebt$'$		-0.348**(0.063)
TotEq	-0.247(0.561)	-0.760**(0.289)
TotDebt $*$ TotEq	0.180(0.890)	
TotDebt$'$ $*$TotEq		0.714**(0.308)
Const.	-0.09*(0.140)	-0.038 (0.127)
Obs.	414	488

C. International Measurement:net

	(1)'	(2)'
GDPg	1.006**(0.107)	0.814**(0.046)
TotDebt	0.001(0.002)	
TotDebt$'$		-0.002**(0.001)
TotEq	0.004(0.006)	0.002(0.002)
TotDebt $*$ TotEq	0.000(0.000)	
TotDebt$'$ $*$TotEq		0.000*(0.000)
Const.	0.058(0.141)	0.065(0.127)
Obs.	391	461

D. International Measurements: Dummy

	(1)"	(2)"
GDPg	0.740**(0.034)	0.889**(0.029)
TotDebt		
TotDebt$'$		-0.096(0.083)
TotEq		-0.143(0.156)
TotDebt $*$ TotEq		
TotDebt$'$ $*$TotEq		-0.753**(0.288)
Const.	0.388**(0.145)	-0.022(0.132)
Obs.	2490	488

Notes: $^{+}$(*, **) indicates statistical significance at the 10% (5%, 1%) confidence level; number in parentheses is standard error.

Table 13. Estimated elasticity of relative variances w.r.t. financial variables

A. Elasticity of variance of GNP growth (relative to GDP growth) w.r.t. equity market variables

	World	OECD	Non-OECD
MCap	-0.027	-0.079	-0.012
Turn	-0.023	-0.129	-0.008

B. Elasticity of variance of consumption growth (relative to GNP growth) w.r.t. debt market variables

	World	OECD	Non-OECD
CredPriv	-0.06	-0.20	-0.02
CredBank	-0.08	-0.23	-0.02[10]
IntBank		-0.12	
PortDebt		-0.20	
TotDebt	-0.23	-0.19	-0.28
TotDebt$'$	-0.46[11]		-0.48

C. Elasticity of variance of consumption growth (relative to GDP growth) w.r.t. debt and equity market variables

	World	OECD	Non-OECD
CredBank	-0.202	-0.594	-0.123
MCap	-0.121	-0.410	-0.075
TotDebt	-0.362	-0.144	-0.538
TotEq	-0.167	-0.052	-0.301

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[10] The estimated regression coefficient is not significant at 10% percent level. See Table 8.
[11] The estimated regression coefficient is not significant at 10% percent level. See Table 6.

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Appendix: Variable Definition and Data Sources

- Growth rates

GDPg : Annual percentage growth rate of GDP per capita based on constant local currency. Per capita number is obtained by dividing total GDP by midyear population (Source: WDI).

GNPg : Annual percentage growth rate of GNP per capita based on constant local currency (Source: WDI).

CONg : Annual percentage growth rate of per capita final consumption based on constant local currency. Final consumption is the sum of household final consumption expenditure and general government final consumption expenditure (Source: WDI).

- Domestic financial variables

MCap : Stock market capitalization as a percent of GDP. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year (Source: WDI).

Turn : Stock market turnover ratio computed as the total value of shares traded during the period divided by the average market capitalization for the period (Source: WDI).

CredPriv : Domestic debt to private sector as a percent of GDP. This domestic debt is financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include debt to public enterprises (Source: WDI).

CredBank : Domestic debt provided by banking sector as a percent of GDP. Debt is on a gross basis, with the exception of debt to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions, such as savings and mortgage loan institutions, building and loan associations (Source: WDI).

M3 : Liquid liabilities as a percent of GDP. Liquid liabilities are the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travelers checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents (Source: WDI).

Spread : Interest rate spread. The spread is the interest rate charged by banks on loans to prime customers minus the interest rate paid by commercial or similar banks for demand, time, or savings deposits (Source: WDI).

- International financial variables

FDI : Stock of foreign direct investment assets and liabilities as a percent of GDP. Estimated by Milesi-Ferretti using cumulative flow adjusted for relative price variations (Source: Lane and Milesi-Ferretti, 2001).

PortEq : Stock of portfolio equity assets and liabilities a percent of GDP. Estimated by Lane and Milesi-Ferretti using cumulative flow adjusted for relative price variations (Source: Lane and Milesi-Ferretti, 2001).

TotEq: Gross stock of international equity as a percent of GDP. Sum of *FDI* and *Portfolio-Equity* (Source: Lane and Milesi-Ferretti, 2001).

IntBank : Gross stock of other investment assets and liabilities as a percent of GDP. Other investment includes trade credit, loans, currency and deposit, etc. For developed countries (Source: BOPS and IFS, International Investment Position).

PortDebt : Gross stock of portfolio debt assets and liabilities as a percent of GDP. For developed countries (Source: BOPS and IFS, International Investment Position).

TotDebt (OECD) : Gross stock of total debt assets and liabilities as a percent of GDP. Sum of *IntBank* and *Portfolio-debt*; For developed countries.

TotDebt (non-OECD) and *TotDebt' (non-OECD):* Gross stock of portfolio debt and other investment (Mainly from Bank) as a percent of GDP. For developing countries (Source: OECD and Lane & Milesi-Ferretti, 2001). Alternative measures of the stock of total debt assets, namely ASSETS2 and CUMLOAN appearing in Lane & Milesi-Ferretti original data set, are added respectively to OECD collected data on total debt liability, leading to TotDebt and TotDebt' correspondingly.

TotDebt (for the world) and *TotDebt' (for the world):* These series combine *TotDebt (OECD)* for OECD countries with two alternative measures, *TotDebt (non-OECD)* and *TotDebt' (non-OECD),* for non-OECD countries leading to two alternative worldwide measures of gross debt. The alternative *TotDebt* and *TotDebt'* gross indebtedness measures for non-OECD countries are the sums of one series of debt liabilities provided by the OECD and two alternative measures of debt assets as estimated by Lane and Milesi-Ferretti (2001).