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ABSTRACT

This paper investigates the association between commercial and financial openness of developing countries. The data suggest that, controlling for GDP/Capita changes and allowing for country specific effects, increase in a developing country's (exports + imports)/GDP is associated with a highly significant increase in financial openness [measured by (gross private capital inflows + gross private outflows)/GDP]. I outline a model accounting for some of the endogenous linkages between financial and trade openness. I show that developing countries, characterized by high costs of tax collection and enforcement, opt to use financial repression as an implicit tax on savings. The resultant financial repression provides the impetus for capital flight. A frequent mechanism facilitating illicit capital movements is to over invoice imports and under invoice exports with the scale of these activities being proportional to the commercial openness of the economy. This linkage is subject to costly control by the fiscal authorities, where curtailing illicit capital flows requires spending resources on monitoring and enforcement of existing capital controls. The effectiveness of capital controls would increase with the resources spent on monitoring and enforcement per one dollar of international trade. Under these circumstances, greater commercial openness increases the effective cost of enforcing financial repression, thereby reducing the usefulness of financial repression as an implicit tax. This in turn implies that financial reforms tend to be the by-product of greater trade integration.

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1.   Introduction and overview

A salient feature of the global economy in recent decades has been the embrace, by developing countries, of financial reforms. The adjustment process to the growing financial integration has been rocky, frequently associated with financial crises. These developments have led to a spirited debate concerning the wisdom of unrestricted capital mobility between OECD and emerging market countries. Various studies have identified circumstances in which unlimited capital mobility may be sub-optimal.[1] This paper argues that, notwithstanding the above debate, the strongest argument for financial opening may be the pragmatic one. Like it or not, greater trade integration erodes the effectiveness of restrictions on capital mobility. Hence, for successful emerging markets that engage in trade integration, financial opening is not a question of if, but of when and how.

Some insight into the possible linkages between financial and trade opening is obtained by looking at the patterns of changes in openness in the last thirty years. Figure 1 traces the association between changes in commercial openness and financial openness [plotted horizontally and vertically, respectively].[2] The units of observations are non-overlapping five year changes in the openness measures, throughout 1969-1998, for all countries [subject to data availability]. The figure suggests the presence of a positive association between the two. Figure 2 reports a similar association, for a sample excluding extreme observations [defined by financial openness exceeding 100%, or trade openness exceeding 60%].   It depicts a similar

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[1] A useful survey of financial liberalization is Williamson and Mahar (1998). See Diaz-Alejandro, (1985), Rodrik (1999) and Hellmann, Murdock, and Stiglitz (2000) for skeptical assessments of the gains from financial liberalization. See Arteta, Eichengreen and Wyplosz (2001) for a cost/benefit study of financial opening. For studies dealing with the financial instability associated with capital account opening see the papers in Edwards and Frankel (2002) and Feldstein (2003), and Aizenman (2003) for an overview of the challenges associated with financial opening.

[2] Financial openness measures the (gross private capital inflows + gross private outflows)100/GDP, using the data documented and applied by Wei and Wu (2002), and Prasad, Rogoff, Wei and Kose (2003). Trade openness measures (exports + imports)100/GDP, using the WDI data.

positive association between the two. In order to evaluate the statistical significance of these linkages, I apply a panel regression methodology. Table 1 presents the regressions, where the dependent variable is the change in financial openness. The explanatory variables are changes in trade openness, and changes in the GDP per capita level, allowing for country fixed effects.[3] Regression 1 reports all developing countries (subject to data availability). To control for the possibility that the results are driven by extreme points, regression 2 excludes from the sample developing economies countries that are characterized by financial openness that exceeds 100%, or by trade openness that exceeds 60%, and small island economies.[4] Finally, regression 3 deals only with the OECD countries.[5] The first two regressions indicate a highly significant positive association between changes in financial and commercial openness in developing countries. A ten percent increase in commercial openness is associated with, on average, a 2.6% increase in financial openness for all the developing countries, and with a 0.7% increase in financial openness in the trimmed sample of developing countries. The size of this effect in the OECD countries is 2%, but at a substantially lower significance level. The impact of changes in GDP per capita on financial openness are relatively large and highly significant for the sample of all developing countries, and for the OECD countries, but weakly significant in the trimmed developing countries sample.

Needless to say, these regressions are only suggestive, and do not provide information on the economic forces inducing the existence of linkages between the two openness measures. This paper outlines one possible linkage between the two, operating via public finance channels. Specifically, I argue that the pragmatic case for financial reforms in the presence of growing trade integration follows from the endogenous linkages between financial and trade openness.

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[3] The inclusion of the GDP per capita as an explanatory variable is suggested by the linkages between the GDP per capital level and financial depth.

[4] Small island economies serve frequently as tax havens, inducing large financial openness driven by gaps in tax codes.

[5] The regressions covers 1969-1998, non overlapping observations, each reporting a five year average.

I show that the relatively costly collection of taxes in developing countries implies that financial repression would be part of the menu of taxes. The impact of financial repression is to allow the government to recycle its domestic debt at a lower real interest rate than one that would have prevailed with full financial integration, and to tax the option of saving in foreign assets. Hence, one should view the drop in the interest rate facing domestic savers as an implicit tax on domestic savings.[6] This tax provides the impetus for capital flight, in search of a higher return on savings. A frequent mechanism facilitating capital flight is over invoicing of imports and under invoicing of exports.[7] The scale of these activities is proportional to the commercial openness of the economy. This in turn implies that greater trade openness increases the effective financial openness, by providing more opportunities for capital flight.

This linkage, however, is subject to the costly control of the fiscal authorities. Curtailing illicit capital flows requires spending resources on monitoring and enforcement of existing capital controls. Under these circumstances, the effectiveness of capital controls would increase with the resources spent on monitoring and enforcement per additional dollar of international trade.

I characterize the pattern of taxes that would maximize consumer's utility, subject to the need to finance a given fiscal outlay (this process is equivalent to minimizing the deadweight loss associated with a given fiscal expenditure). I show that more costly collection of taxes and lower commercial openness increase the level of financial repression adopted by the policy maker. A key result of this framework is that greater commercial openness *reduces* the financial repression chosen by developing countries. This follows from the observation

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[6] See Giovannini and de Melo (1993) for documenting and measuring financial repression as an implicit tax on savings, and Kletzer and Kohli (2003) for analysis of the fiscal implications of financial repression in India. See Dooley (1996) for an overview of financial controls.

[7] Further discussion of trade misinvoicing as a mechanism for illicit capita flight, see Claessens and Naudé (1993), Ajayi (1997), Boyce and Ndikumana (2001), Eggerstedt *et al.* 1995; and Collier *et al. (*2001). These studies concluded that trade misinvoicing is an important channel of capital flight. For example, Boyce and Ndikumana (2001) estimated that for twenty five Sub-Saharan countries, trade misinvoicing led to $40.6 billion of capital flight in the years 1970-1996.

that greater commercial openness increases the effective cost of enforcing financial repression, thereby reducing the usefulness of financial repression as an implicit tax. Hence, financial reforms may be the by-product of greater trade integration. My model also suggests that financial reforms are sustainable only if they do not ignore the fiscal implications of the drop in fiscal revenue, and the consequent increase in the cost of recycling the public debt. Hence, sustainability of financial reform requires finding alternative means of taxation, or reducing government expenditure.

This paper is related to several independent strands in the literature, including endogenous enforcement and institutions [see Anderson and Marcouiller (1998)], the sequencing of reforms literature [see Edwards and van Wijnbergen (1986)], and the association between sovereign lending and international trade [see Rose and Spiegel (2002)]. Its main conclusion is that optimal financial and commercial openness are intertwined, and that the pressure to open the financial system is a by-product of successful trade integration.

Section 2 outlines the model, and presents the main results. Section 3 concludes with a discussion. The Appendix derives the main results.

2. <u>The model</u>

The following section outlines a model describing realistic conditions under which greater trade openness leads to financial openness. I consider a developing country where fiscal outlays are financed by means of two taxes: a direct income tax, and an implicit tax induced by capital controls. Both taxes are costly: the income tax is associated with deadweight losses due to collection and enforcement costs. Similarly, enforcing capital controls entails costly prevention of illicit capital flight.

I illustrate the design of optimal policies by considering a small, two goods, two periods economy. The utility of the representative consumer is given by[8]

$$(1) \qquad V = u(X_1^a Y_1^b) + \frac{u(X_2^a Y_2^b)}{1+r}; \quad u'>; u''\le 0; a+b=1,$$

where X is the domestic good , and Y is the foreign, imported good. To simplify, I normalize the prices of both goods to one, and denote consumption by

$$C_1 = X_1 + Y_1; \quad C_2 = X_2 + Y_2.$$

Consumers are endowed each period with $\overline{X}$ units of the domestic good. The authorities tax the income form the endowment $\overline{X}$ at a rate t. The consumer saves in period one $\overline{D}$, allocating it between domestic and foreign bonds, D and D^*, respectively:

$$(2) \qquad \overline{X}(1-t) + \overline{D}_{-1}(1+r_{-1}) - C_1 = \overline{D},$$

where $\overline{D} = D + D^*$, and $\overline{D}_{-1}(1+r_{-1})$ is the income from the old bonds that are repaid in period one.

The international real interest rate is r^*. The authorities impose capital control in the form of a tax on the foreign bond. Let f denote the tax rate, implying that the domestic interest rate, r, is determined by

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[8] The present model extends Aizenman and Guidotti (1994), by allowing the endogenous linkage between commercial and financial openness.

(3) $1 + r = (1 + r*)(1 - f)$.

Consequently, the tax determines the premium between the foreign and domestic real interests

(3') $f = \dfrac{r^* - r}{1 + r^*}$.

The premium f is also a measure of the intensity of financial controls. The existence of the premium implies that consumers would have the incentive to engage in illicit capital flight, in order to avoid the tax. This capital flight is intermediated via the trade account, hence its potential magnitude would be determined by the volume of imports (Y_1) and exports ($\overline{X} - X_1$). Preventing illicit capital flows induced by a premium f requires spending $t\overline{X}$ on enforcement. I assume that enforcement and the resultant premium are linked by the following reduced form:[9]

(4) $f = f[t\overline{X} / Y_1]$; $f > 0$; $f' < 0$.

This formulation assumes that larger trade openness requires an equi-proportionate increase in enforcement in order to support the given premium. It also recognizes the diminishing marginal efficacy of enforcement. It will be convenient to focus later on the case of a constant elasticity premium:

(4') $f = h[t\overline{X} / Y_1]^w$; $0 < w < 1$; $0 < h$.

The tax on foreign bonds and the enforcement of financial repression implies that the consumer is indifferent between the domestic and the foreign bond. Hence, the second period budget constraint is

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[9]   The potential capital flight is assumed to be proportional to imports. Similar results would hold if one assumed that potential capital flight to be proportional to (imports+exports).

(5) $\overline{X}(1-t)+\overline{D}(1+r)=C_2$

I consolidate the periodic budget constraints (2) and (5) into the intertemporal one::

(6) $\overline{X}(1-t)[1+\dfrac{1}{1+r}]+D_{-1}(1+r_{-1})=C_1+\dfrac{C_2}{1+r}.$

Enforcement of the income tax is associated with collection cost l per one dollar of gross taxes, implying that the net tax collected by a tax t is

(7) $(1-l)t\overline{X}$

The net revenue from the income tax, plus the revenue from the domestic bond sold in period one finances the fiscal expenditure on public spending (G), plus the cost of the enforcement of capital controls, plus the repayment of old debt:

(8) $t(1-l)\overline{X}+D=G+t\overline{X}+D_{-1}(1+r_{-1})$.

Similarly, the second period fiscal budget constraint is

(9) $t(1-l)\overline{X}+f(1+r^*)D^*=G+D(1+r).$

Applying (3), (8), (9) I consolidate the two budget constraints into the intertemporal one:

(10) $t(1-l)\overline{X}[1+\dfrac{1}{1+r*}]+f\overline{D}=G[1+\dfrac{1}{1+r*}]+t\overline{X}+D_{-1}(1+r_{-1}).$

Financial repression imposes taxes on domestic savings at the premium rate, f. This tax has two components: first, it taxes foreign bonds, $D*$ directly, at the premium rate. In addition, it reduces the cost of financing the domestic debt, D, at the premium rate. The sum of both

implies that financial repression taxes domestic savings, $D*+D$. Unlike the private sector, the effective real interest rate facing the fiscal authorities equals the foreign one.

      I characterize the optimal depth of financial repression in two stages. First, I identify the consumer's behavior. Next, I find the pattern of taxes that maximizes the consumer's utility. Using the properties of a Cobb Douglas, I infer that, up to a multiplicative constant

$$(11) \quad V = u(C_1) + \frac{u(C_2)}{1+r}; \quad X_1 = aC_1; \quad Y_1 = bC_1; \quad X_2 = aC_2; \quad Y_2 = bC_2.$$

The intertemporal consumption pattern is characterized by the conventional FOC:

$$(12) \quad u'(C_1) = \frac{1+r}{1+r} u'(C_2).$$

      The policy maker chooses the tax rates t, and the enforcement $\mathbf{t}$ that would maximize the utility of the representative agent, subject to the fiscal and the private budget constraints, (6), (10), and the first order conditions (11) and (12). This process is facilitated by consolidating the private and the public budget constraints, (6) and (10), into the budget constraint that links the consumer's consumption patterns with the fiscal intertemporal budget constraint:

$$(13) \quad C_1 + \frac{C_2}{1+r} = \overline{X}[1+\frac{1}{1+r}] - \left\{ G[1+\frac{1}{1+r*}] - f\overline{D} \right\} - \left[t\overline{X} + t\overline{X}\Omega \right]$$

where $\Omega = \left(1+\dfrac{1}{1+r}\right) - (1-\mathbf{I})\left(1+\dfrac{1}{1+r*}\right) \geq 0$. The consumption's net present value (discounted at the consumer's real interest rate), equals the net present value of the (before tax) endowment, minus the present value of the government's demand for goods and services net of the tax revenue from financial repression (discounted at the government's real interest rate), minus the cost of the distortions associated with raising taxes (the last two terms in the brackets, measuring the deadweight loss associated with the taxes). If all taxes are lump sum,

the deadweight terms would be zero. In the absence of financial repression, $\tau = 0$, these terms are the net present value of the income tax collection cost, $It\left(1 + \frac{1}{1+r*}\right)\overline{X}$. Equation (13) defines the intertemporal budget constraint determining the trade-off between the income tax (t) and financial repression enforcement (t). To simplify notation, I use the normalization $\overline{X} = 1$. Applying consumption's first order condition (12) it follows:

$$(14) \quad dV = u'(C_1)\left(dC_1 + \frac{1}{1+r}dC_2\right).$$

Applying (14) I infer that a marginal perturbation of (dt, dt), subject to the intertemporal budget constraint (13), impacts consumer's welfare by

$$(15) \qquad \frac{dV}{dt}\frac{1}{u'(C_1)} = \frac{d[f\overline{D}]}{dt} - 1 - \Omega\frac{dt}{dt} - \frac{1+r*}{1+r}\frac{f}{bC_1}\overline{D} \; ;$$

where, from (10)

$$(16) \quad \frac{dt}{dt} = \frac{1 - \frac{d[f\overline{D}]}{dt}}{\overline{X}[1 + \frac{1}{1+r*}](1-I)} .$$

Note that determining the optimal enforcement of capital controls also establishes the optimum level of financial repression, as summarized by the premium f. A useful benchmark is full financial integration, $\tau = 0$, thereby $\Omega = I\left(1 + \frac{1}{1+r*}\right)$, $f = 0$. Applying this to (15) I find that

$$(17) \quad \text{sgn}\frac{dV}{dt}\Big|_{r=r*} = \text{sgn}\left[I\overline{D}\left\{\frac{1}{bC_1}\frac{df}{dt}\Big|_{t=0}\right\} - 1\right].$$

Equation (15) evaluates the welfare change associated with shifting the tax burden from income tax to the tax on savings associated with financial repression. Equation (17) evaluates the sign of (15) in the absence of financial repression. The marginal benefit resulting from one dollar spent on imposing financial repression equals the tax revenue generated by the increase tax on domestic savings [a rate $\dfrac{1}{bC_1}\dfrac{df}{dt}$ times the tax base $\overline{D}$], times the collection cost parameter, λ. This product measures the resource gain associated with the reduction in the income tax. If this gain exceeds the dollar spent on enforcing capital controls, financial repression would be applied as an implicit tax on saving. Higher income tax collection cost, lower trade openness (lower b), and higher domestic savings increase the prospect of financial repression.

If $\lambda \overline{D}\left\{\dfrac{1}{bC_1}\dfrac{df}{dt}|_{t=0}\right\} > 1$, the optimal financial repression is determined by:

$$(18) \quad \frac{dV}{dt}\frac{1}{u'(C_1)} = \frac{d[f\overline{D}]}{dt} - 1 - \Omega\frac{dt}{dt} - \frac{1+r^*}{1+r}\frac{f}{bC_1}\overline{D} = 0.$$

The following characterizes the pattern of optimal taxes and resulting financial repression (see Appendix A for derivation):

Claim 1:

-   Full financial integration is optimal in the presence of lump sum taxes (i.e., where λ = 0).

-   Costly collection of taxes and low enough commercial openness implies that financial repression would be part of the menu of taxes.

- Higher savings and more costly collection of taxes increase the optimal level of financial repression [for $l > 0$ & $\overline{D} > 0$, $\dfrac{d\tilde{f}}{dl} > 0$; $\dfrac{d\tilde{f}}{d\overline{D}} > 0$, where $\tilde{f}$ stands for the optimal financial repression premium].

- Greater commercial openness (defined by the consumption share of imports, b), tends to reduce the optimal level of financial repression, $\dfrac{d\tilde{f}}{db} < 0$. This follows from the observation that greater commercial openness increases the effective cost of financial repression, reducing thereby the usefulness of financial repression as an implicit tax.

Further insight is gained by considering a simulation of the case where aggregate saving is inelastic with respect to the interest rate. Figure 3 reports the association of financial repression tax, f, drawn against the commercial openness, b. The higher curve corresponds to a higher cost of tax collection.

Discussion

I simplified the analysis by assuming the same income tax (t) in both periods. Allowing for intertemporal variation of the income tax would imply that the taxes are set to equate the marginal tax distortion across both time periods [as in Barro (1979)], but this modification would not impact the characterization of financial repression.

I also assumed away uncertainty. The analysis can be extended to the case where monitoring implies random interception of illicit capital flight. Such an extension imply the existence of well defined demands for the domestic and the foreign bonds [recall that in the present model, the two bonds are perfect substitutes in equilibrium]. Yet, this modification would not change the main results dealing with the factors determining the optimal level of financial repression [see Aizenman and Noy (2003)].

Another simplifying assumption has been a constant marginal collection cost of income taxes (i.e., $\dfrac{dl}{dt} = 0$). A plausible alternative is increasing marginal collection cost, $\dfrac{dl}{dt} > 0$.

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The main modification induced by this change would be that higher outstanding public debt, or higher fiscal expenditure, would increase the optimal level of financial repression.

Our openness measure is utility based, being related to the consumption weight of the foreign good. One may argue that the openness of the economy is impacted both by the supply and demand side. Yet, the logic of our discussion is unrelated to the exact determinants of openness, as it follows from the enforcement technology, defined by (4). To illustrate this point, Appendix B focuses on the dual case, where there is only one traded good, the production function is a Cobb-Douglas in the domestic and the foreign input, and trade is determined by the demand for imported inputs. It is shown there that an exact version of the above claim continues to hold.

The paper ignored the possibility that tariffs could be used for fiscal purposes, as had been the case in most developing countries in the mid part of the Twentieth Century. A reason for this omission is that in recent years, tariff rates declined dramatically. One can add tariffs to the model, without impacting the logic of Claim 1.

3.   Concluding remarks

The arguments advanced in this paper imply that trade opening will inevitably lead to financial opening, increasing thereby the cost of public debt. Hence, sustainability of the resultant financial opening requires a deep fiscal restructuring. Argentina stands as a sad example of this logic. There, the impact of adopting financial opening without a deep enough fiscal restructuring was a massive increase in the cost of refinancing the public debt. In general, while it may take some time for the debt build up to induce a crisis, at the end of the process financial repression and inflation remain the default taxes used by weak fiscal systems.

The public finance linkage between trade and financial openness is only one of the possible channels explaining the association between the two. A unique characteristic of financial repression is in its being a hidden link. Other, more transparent channels include trade credits, which imply a direct association between commercial and financial openness. Understanding all the hidden linkages between trade and financial opening requires studying other important issues. I close the paper with a review of these issues:

- The exact sequencing of the linkages between trade and financial opening, including the possibility of periodic reversals due to financial crises.[10]

- The possibility of reverse linkages between financial opening and trade opening.[11]

- The potential importance of political economy considerations in determining the opening process.

- The heterogeneity of the linkages: the degree to which the impact of commercial opening differs between the various sub accounts of the financial flows [such as trade credit, FDI, short term flows, etc.].

In a follow up paper [Aizenman and Noy (2003)], we use annual data and find that financial openness depends positively on lagged trade openness and the GDP/Capita; and negatively on measures of democracy and corruption. Further investigation of the issues described above is left for future research.

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[10] On the association between financial opening and financial crises see Williamson and Mahar (1998), Demirgüç-Kunt and Detragiache (1998) and Kaminsky and Reinhart (1999).

[11] For example, greater financial openness my reduce the cost of trade credit and encourage FDI, and both adjustments may facilitate more commercial trade.

Appendix A

The purpose of this Appendix is to derive the results summarized in Claim 1. Suppose that there are no lump sum taxes ($\lambda > 0$), and the public debt is positive, leading to an internal equilibrium where financial repression is part of the tax menu. The first order condition characterizing the financial repression is [see (15) and (16)]:

$$\text{(A1)} \quad \left(\frac{d[f\overline{D}]}{dt} - 1\right)\left(1 + \frac{\Omega}{[1 + \frac{1}{1+r^*}](1 - \mathbf{l})}\right) - \frac{1+r^*}{1+r}\frac{\mathbf{f}}{\mathbf{b}C_1}\overline{D} = 0.$$

Note that (A1) implies that $\frac{d[f\overline{D}]}{dt} - 1 > 0$. This condition has a simple interpretation. The graph $(\mathbf{t}; f\overline{D} - \mathbf{t})$ is the financial tax Laffer curve, plotting the association between the enforcement cost $\mathbf{t}$ and the net revenue from the financial repression. The optimal level of public financing requires being on the left side of the tax Laffer curve, where one dollar spent on enforcing capital controls yields more than one dollar of tax revenue.

Denoting the LHS of (A1) by L, applying the implicit function theorem, and the second order condition for maximization, it follows that:

$$\text{(A2)} \quad sign\frac{d\tilde{f}}{d\mathbf{l}} = sign\frac{\partial L}{\partial \mathbf{l}}; \quad sign\frac{d\tilde{f}}{d\overline{D}} = sign\frac{\partial L}{\partial \overline{D}}; \quad sign\frac{d\tilde{f}}{d\mathbf{b}} = sign\frac{\partial L}{\partial \mathbf{b}}.$$

Note that

$$\text{(A3)} \quad sign\frac{\partial L}{\partial \mathbf{l}} = sign\left[-\Omega\frac{1 - \frac{d[f\overline{D}]}{dt}}{[1 + \frac{1}{1+r^*}](1 - \mathbf{l})^2} - \frac{1 - \frac{d[f\overline{D}]}{dt}}{1 - \mathbf{l}}\right] = sign\left[\frac{d[f\overline{D}]}{dt} - 1\right] > 0.$$

and

$$\text{(A4)} \quad sign\frac{\partial L}{\partial \overline{D}} = sign\left[\Omega\frac{\mathbf{f}}{[1 + \frac{1}{1+r^*}](1 - \mathbf{l})} + \mathbf{f} - \frac{1+r^*}{1+r}\frac{\mathbf{f}}{\mathbf{b}C_1}\right].$$

Applying (A1) to (A4), collecting terms, I infer that

$$(A5) \quad sign \frac{\partial L}{\partial \overline{D}} = sign\left[f\overline{D} + 1 - \frac{d[f\overline{D}]}{dt} \right].$$

Note that

$$(A6) \quad f\overline{D} + 1 - \frac{d[f\overline{D}]}{dt} > f\overline{D} - t - \frac{d[f\overline{D} - t]}{dt} = (f\overline{D} - t)\left\{ 1 - \frac{d\log[f\overline{D} - t]}{d\log t} \right\}.$$

The term $\dfrac{d\log[f\overline{D} - t]}{d\log t}$ is the elasticity of the net tax collection from financial repression with respect to the enforcement cost. This elasticity would be less then one as long as the Laffer curve is convex with respect to τ, implying that in these circumstances

$$(A7) \quad \frac{d\log[f\overline{D} - t]}{d\log t} < 1 \quad \Rightarrow sign \frac{\partial L}{\partial \overline{D}} > 0.$$

Finally, I turn to the derivation of $sign \dfrac{\partial L}{\partial b}$. I focus on the case of the constant elasticity premium, (4'). I denote the semi-elasticity of aggregate saving with respect to the premium by h, where

$$(A8) \quad h = -\frac{d\log \overline{D}}{df}.$$

Note that changing the premium reduces the consumer's interest rate. Applying (3) I infer that

$$(A8') \quad h = (1 + r^*)\frac{d\log \overline{D}}{dr}.$$

Hence, the semi-elasticity of aggregate saving with respect to the premium corresponds to the elasticity of aggregate saving with respect to the real interest rate, h. The presumption is that this elasticity is rather small.[12] Applying this notation, the first order condition (A1) can be rewritten as

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[12] Note that, in the absence of costly enforcement of capital controls, one expects the elasticity of the demand for the domestic bond with respect to the domestic interest rate to be large due to the incentive to engage in illicit capital flight.

$$(A1') \quad \left[f\overline{D}(1-fh)\frac{w}{t}-1\right]m-\frac{f}{1-f}\overline{D}\frac{w}{t}=0, \quad \text{where} \quad m=\frac{1+\dfrac{1}{(1+r^*)(1-f)}}{(1-l)\left(1+\dfrac{1}{1+r*}\right)}.$$

Applying (A1'), I infer that, after several iterations of substitutions

$$\text{sgn}\frac{\partial L}{\partial b}=\text{sgn}\frac{\partial\left(\left[f\overline{D}(1-fh)\dfrac{w}{t}-1\right]m-\dfrac{f}{1-f}\overline{D}\dfrac{w}{t}\right)}{\partial b}=$$

(A9)

$$-\text{sgn}\left([(1-fh)^2-fh](1-f)m-(1-fh)\cdot\frac{f}{1-f+\dfrac{1}{1+r*}}\right).$$

There are two useful benchmarks for evaluating the sign of (A9). First, in the limiting case of full financial integration,

(A10) $$\lim_{f\to 0}\left([(1-fh)^2-fh](1-f)-m(1-fh)\cdot\frac{f}{1-f+\dfrac{1}{1+r*}}\right)=\frac{l}{1-l}.$$

This in turn implies that for small premiums f, $\text{sgn}\dfrac{\partial L}{\partial b}<0$. Recall that full financial integration is optimal with lump sum taxes (i.e, $l=0$ implies $\tilde{f}=0$). Hence, for large enough collection costs inducing financial repression, greater commercial openness would be associated with lower financial openness.

Another interesting benchmark is the case where aggregate savings is inelastic with respect to the real interest rate, and where the international real interest rate is zero ($h=0; r*=0$). In these circumstances,

(A11) $$\text{sgn}\frac{\partial L}{\partial b}=-\text{sgn}(l+0.25f^2-f).$$

Hence, higher commercial openness is associated with lower financial repression for premiums that are below the cost of tax collection.[13]

Appendix B

The purpose of this Appendix is to illustrate that Claim 1 holds also for the case where openness is solely determined by the supply side of the economy. Specifically, suppose that the utility is

$$(B1) \quad V = u(Z_1) + \frac{u(Z_2)}{1+r}; \quad u'>; u''\leq 0,$$

where Z is a final consumption good, the production of which is given by:

$$(B2) \quad Z_i = X_i^a Y_i^b \; ; i = 1, 2 \;\; ; a + b = 1,$$

where X and Y are the domestic and foreign input, respectively. The endowment of the domestic input is $\overline{X}$. Both inputs are traded, and their price is normalized to 1. It is easy to verify that in this case, the price of good Z is one, and that

$$(B3) \quad Y_i = \overline{X} - X_i = bZ_i.$$

Furthermore, the various budget constraint equations (2)-(10) and (12)-(13) continue to hold in this case, where C now measures the consumption of the final good, Z.[14] From this it readily follows that the characterization of the optimal finance of government's expenditure, and claim 1, continue to hold for the case outlined in this Appendix.

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[13] The exact condition is $f < 2(1 - \sqrt{1-I})$.

[14] Equation (11) links aggregate consumption with consumption of both domestic and foreign goods in the model outlined in the paper. Hence, it does not hold when trade is in intermediate inputs.

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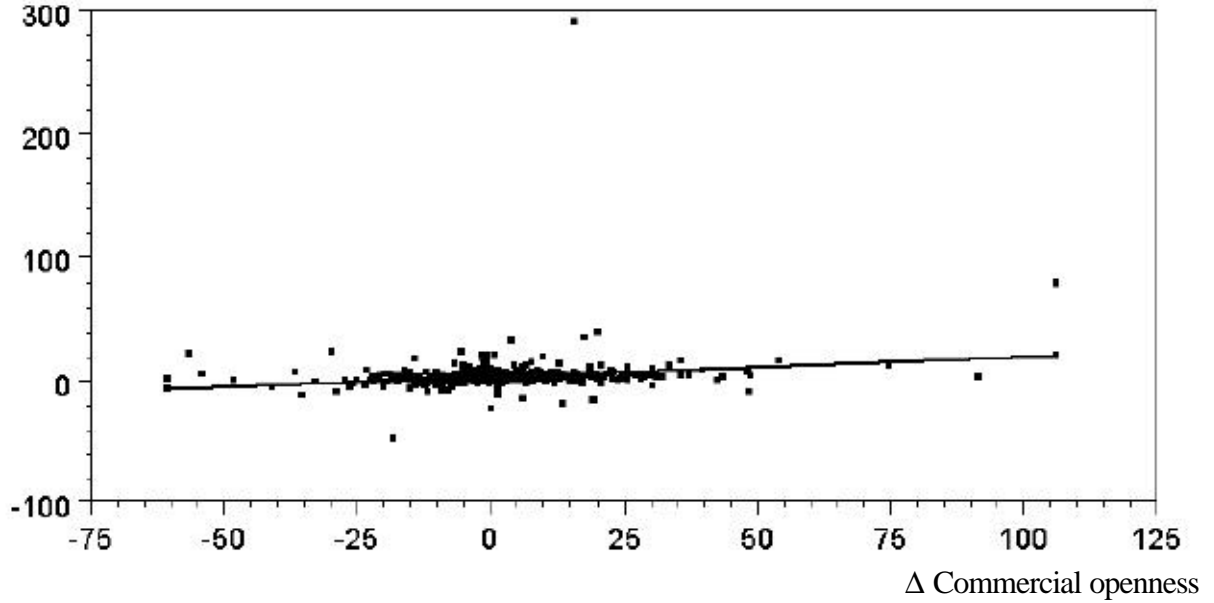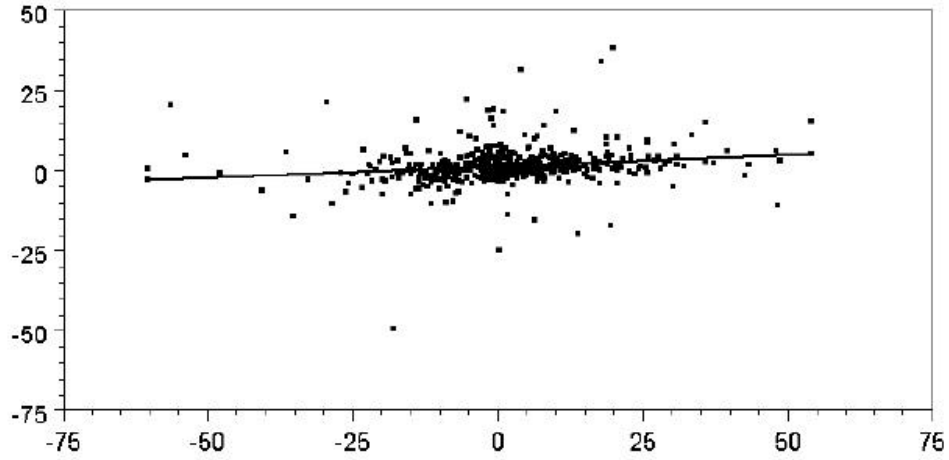
Δ financial openness

Figure 1

Changes in financial and commercial openness, 1969-1998, the full sample.

The fitted regression line is   Δ financial openness = 1.41 + 0.16 Δ Commercial openness. Financial openness measures the (gross private capital inflows + gross private outflows)100/GDP, using the data documented and applied by Wei and Wu (2002), and Prasad, Rogoff, Wei and Kose (2003). Trade openness measures (exports + imports)100/GDP, using the WDI data. The units of observations are non-overlapping five year changes in the openness measures, throughout 1969-1998, for all countries [subject to data availability].

Δ financial openness

Figure 2

Changes in financial and commercial openness, 1969-1998, all countries, excluding extreme points [defined as financial openness > 100%, or commercial openness > 60%].

The fitted regression line is   Δ financial openness = .92 + 0.07 Δ Commercial openness. Financial openness measures the (gross private capital inflows + gross private outflows)100/GDP, using the data documented and applied by Wei and Wu (2002), and Prasad, Rogoff, Wei and Kose (2003). Trade openness measures (exports + imports)100/GDP, using the WDI data. The units of observations are non-overlapping five year changes in the openness measures, throughout 1969-1998, for all countries [subject to data availability].
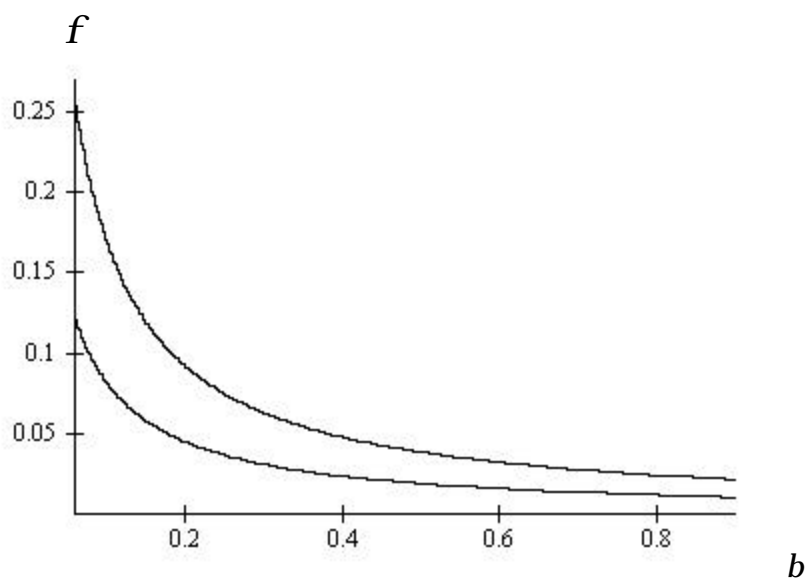
Figure 3
Optimal financial repression and commercial openness, drawn for
$$h = 1; \boldsymbol{w} = 0.5; \quad \overline{D} = 0.1.$$
The higher (lower) curve corresponds to $\boldsymbol{l} = 0.4$ $(\boldsymbol{l} = 0.2)$, respectively.

Table one
Explaining changes in financial openness
1969-1998

	(1)	(2)	(3)
Sample specification	Developing countries	Developing – extreme val.[15]	OECD
Δ Comm. openness	0.26***	0.067***	0.2*
	(3.55)	(2.68)	(1.9)
Δ GDP pre capita	.0047**	0.0012*	0.0032***
	(2.1)	(1.607)	(4.83)
R-squared	0.27	0.43	0.44
N	447	309	87

Dependent variable: Δ financial openness

All regressions include country fixed effects. Constant terms not reported.
The t value are reported below the corresponding coefficients.

A "****", "**" , "*" indicate statistical significance at the 1, 5 and 10 percent level, respectively.

Financial openness measures the (gross private capital inflows + gross private outflows)100/GDP, using the data documented and applied by Wei and Wu (2002), and Prasad, Rogoff, Wei and Kose (2003).

Trade openness measures (exports + imports)100/GDP, using the WDI data. The units of observations are non-overlapping five year changes in the openness measures, throughout 1969-1998.

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[15] The developing countries, excluding island economies, and countries whose financial openness exceeds 100%, and trade openness exceeds 60%.