CAPITAL CONTROLS AND INCOME INEQUALITY *

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ABSTRACT. We examine the implications of capital account policy, in the form of capital flow taxes, for income distribution in a small open economy with heterogeneous agents and financial frictions. Banks engage in costly intermediation between household savings and entrepreneur investment. Our model predicts that permanent liberalization of either capital inflows or outflows reduces income inequality, but temporary inflow surges disproportionately raise entrepreneur income, exacerbating inequality. Instrumental variable estimation with a panel of emerging market economies confirms our model's short-run predictions, with robust evidence that income inequality rises with private capital inflows and falls with outflows.

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I. INTRODUCTION

Surges in capital inflows driven by changes in global economic conditions can have adverse impacts on emerging market economies (EMEs) [e.g. Ghosh et al. (2014) and Ghosh et al. (2016)]. In the short run, capital inflows can benefit the destination economy by reducing the cost of financing domestic consumption and investment. Over time, however, capital flow reversals can cause painful "sudden stops" [e.g., Calvo (1998)], elevating the risks of domestic banking crises [e.g., Mendoza (2010) and Caballero (2016)]. Policymakers have acknowledged the potential adverse effects of excessive capital flows. For example, while the IMF advocated capital account openness, it has become more amenable in recent years to the use of capital account restrictions as a "... part of the policy toolkit to manage inflows" (Ostry et al., 2010).

Recent studies suggest that capital flows may also influence the distribution of income. In periods with inflow surges, the benefits of the inflows disproportionately accrue to agents who are more adept at capitalizing on them, exacerbating the skewness of the distribution of income. When capital flow reversals occur, the burdens are likely to fall disproportionately on the poor [e.g. de Haan and Sturm (2016)]. Furceri and Loungani (2018) document evidence that episodes of capital account liberalization are associated with increased inequality measured by the Gini coefficient. Furceri et al. (2019) obtain similar results using cross-country industry-level data.

Theoretical explanations of the link between capital account policies and income inequality are limited in the literature. Such links are likely to be complicated by the presence of other distortions, such as financial frictions.[1] Thus, understanding the general equilibrium impact of capital account liberalization on income distributions requires a coherent theoretical framework that incorporates the relevant frictions. In this paper, we construct a small open economy framework with heterogeneous agents and financial frictions to examine the relation between capital account policies and income inequality.

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[1]Furceri et al. (2019) find that countries with less developed financial systems experience larger increases in income inequality following capital account liberalization.

Our model features overlapping generations with two types of agents: households and entrepreneurs. Households work, consume, and save for retirement when they are young; and consume their accumulated wealth when they are old. Entrepreneurs consume, invest, and borrow to finance their spending when they are young, and consume their accumulated wealth after debt repayments when they are old. The households save in domestic banks and, depending on the capital outflow policy, they may choose to save in foreign banks as well. The entrepreneurs borrow from domestic banks and, depending on the capital inflow policy, they may also borrow from foreign investors to finance investment spending. Competitive and risk-neutral domestic banks take deposits from the households and extend loans to the entrepreneurs. Financial intermediation costs generate a spread between deposit and lending interest rates, as in Cúrdia and Woodford (2016). The government imposes taxes on both capital inflows and outflows, and rebates the tax revenues to domestic households and entrepreneurs.

Entrepreneurs invest in capital and borrow from banks to finance spending. Households do not have access to the capital accumulation technology. They save in risk-free bank deposits. Thus, changes in capital flows impact on income distributions through changes in capital returns. We use our model to study the implications of changes in capital account policies and external shocks to capital flows on the distribution of income between households and entrepreneurs. We further examine the welfare implications of capital account liberalization policies under a range of Pareto weights in the social planner's welfare objective.

Our analytical solution to the steady-state equilibrium shows that a permanent reduction in either capital inflow taxes or outflow taxes can raise the household share of income and thus reduce income inequality. Reducing outflow taxes directly raises the deposit interest rate facing the household and therefore increases household income. The financial intermediary passes through a part of the increase in the deposit rate to the lending rate faced by the entrepreneurs. However, since a fraction of the household savings is diverted abroad following the decline in outflow taxes, domestic loan-to-output ratio declines, reducing the

credit spread. Thus, the lending rate rises by a smaller proportion than does the deposit rate. In the steady state, the rate of return on capital investment equals the lending rate. Thus, the increase in capital returns is smaller than that in the deposit rate. As a result, the ratio of household income to entrepreneur income rises, reflecting a reduction in income inequality.

Perhaps more surprisingly, a permanent reduction in capital inflow taxes also raises the steady-state share of household income and thus reduces inequality. In the steady state equilibrium, the return on capital equals the domestic lending interest rate. The domestic deposit rate is pinned down by the foreign interest rate and the outflow tax rate, and is thus invariant to changes in inflow policies. Reducing the inflow taxes pushes down the domestic lending rate, lowering the entrepreneur's capital returns, but it has no effect on the domestic deposit rate and thus does not affect the household's return on savings. As a result, the share of household capital income rises, reducing inequality.

The short-run implications of capital flows for income inequality are different. For example, consider a temporary decline in the foreign interest rate that leads to a surge in capital inflows to the small open economy. These capital inflows reduce the financing costs for investment, boosting the value of capital (Tobin's q) and the entrepreneur's income. Given capital account policies, the shock to the foreign interest rate also reduces the domestic deposit rate, depressing the household's income. As a result, capital inflows skew the domestic income distribution in favor of the entrepreneur and raise the share of the entrepreneur's income during the transition periods. Policy responses, such as transitory tightening of capital inflow controls or relaxation of outflow controls can partly stabilize the changes in capital flows, and thereby mitigate the increases in income inequality.

We solve for optimal capital account policies for a planner with a range of Pareto weights over the two types of agents' welfare. We find that, in response to a transitory decline in the foreign interest rate, a planner who assigns a larger weight on household welfare chooses to raise inflow taxes or reduce outflow taxes more aggressively. In contrast, in the long run, a planners who favors households more would choose larger reductions in taxes on both inflows and outflows.

Our model's predicted relations between short-run capital flows and income inequality are supported by empirical evidence. We use a panel of 87 emerging market economies (EMEs) from 2001-2018 to examine the impact of changes in private capital flows—both inflows and outflows—induced by global interest rate shocks on income inequality measured by year-over-year changes in the Gini coefficient. Since capital flows are potentially endogenous to changes in domestic conditions, we instrument private capital flows by the interactions between changes in the two-year U.S. Treasury yields and a measure of financial remoteness constructed by Rose and Spiegel (2009) based on the great-circle distance from New York City, the financial center of the United States.[2]

Our empirical results indicate a significant impact of short-run changes in private capital flows on income inequality. Under our baseline specification, a one standard deviation increase in private capital inflows is associated on average with a 1.35 percentage point increase in the growth rate of a country's Gini coefficient, while a one standard deviation increase in private outflows is associated with a 1.56 percentage point decrease. We also find that increases in net inflows raise income inequality. Our point estimates indicate that a one standard deviation increase in net private inflows is associated with a 1.80 percentage point increase in the growth rate of a country's Gini coefficient. These numbers are statistically and economically significant. Our results are robust to a wide variety of empirical specifications, measurements, and sample perturbations. We also show that splitting the sample by either saving rates or labor income shares yields results consistent with the predictions of the model.

II. RELATED LITERATURE

Our paper contributes to the literature on the macroeconomic implications of capital account policies. Capital account restrictions can distort domestic financial markets (Edwards, 1999; Jeanne et al., 2012). They can also distort international trade, effectively mimicking

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[2]We also include three regional dummies as additional instruments to capture regional disparities in capital flows. Moreover, our specification allows us to introduce a variety of conditioning variables in the second-stage regressions to capture other disparities across the countries in our sample.

an increase in tariffs (Wei and Zhang, 2007; Costinot et al., 2014) or a devaluation of the real exchange rate, although there is limited evidence that capital controls themselves inhibit growth (Jeanne, 2013). Chang et al. (2015) argue that, following the sharp declines in foreign interest rates during the 2008-09 global financial crisis, China's costly sterilized intervention program needed to maintain its closed capital account constrained its central bank's ability to stabilize domestic inflation. By limiting the pressure for capital inflows, capital account restrictions help ease the need for undertaking such costly sterilization activity (Liu and Spiegel, 2015). Davis et al. (2020) show that, in the presence of frictions in foreign bond trading, optimal sterilized foreign exchange interventions are equivalent to optimal time-varying capital flow taxes. Ostry et al. (2010) argue that temporary capital account restrictions can help stabilize large fluctuations in capital inflows. However, the welfare effects of such capital flow taxes depend on whether or not policy commitment is available (Devereux et al., 2018). Properly designed, temporary capital account policies can serve as a useful tool to mitigate the effects of external shocks (Farhi and Werning, 2012; Unsal, 2013; Davis and Presno, 2017). Studies in the development literature suggest that liberalizing capital account can adversely impact an economy with poorly-developed financial markets (Eichengreen et al., 2011; Eichengreen and Leblang, 2003; Ju and Wei, 2010). Some have argued that relaxing capital account restrictions can lead to potential "secondary improvements" or "discipline effects" for domestic institutions stemming from exposures to foreign competition and standards (Kose et al., 2009; Wei and Tytell, 2004).[3]

Our work is related to the theoretical literature on capital account liberalization in an environment with financial frictions. Aoki et al. (2009) study a small open economy model with collateralized debts. They show that liberalizing the capital account is not necessarily beneficial if the domestic financial system is under-developed, because it can reduce long-run total factor productivity (TFP) or lower short-run employment and wages. Liu et al. (2019) examine the optimal capital account liberalization policy in the context of China.

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[3]See Wei (2018), Erten et al. (2019), and Rebucci and Ma (2019) for recent surveys of the literature on capital controls.

They consider a two-sector small open economy model with financial repression and capital controls over both inflows and outflows. In their model, state-owned entreprises (SOEs) are less productive than private firms, but they receive subsidized bank loans under prevailing government policy. Banks finance the subsidies on SOE loans by depressing the deposit interest rates for households and elevating the market loan rates faced by private firms. Capital account liberalization leads to a tradeoff between production allocative efficiency stemming from reallocations between the two sectors and intertemporal allocative efficiency stemming from the households' consumption-savings decisions. Unlike these studies, our focus here is on the impact of capital account liberalization on income distribution.

The distributional implications of capital account policies have also been considered by Bumann and Lensink (2016), who examine restrictions on *net* capital flows in a two-period model with heterogeneous agents and financial intermediation. In their model, liberalization of the domestic banking sector through a reduction in reserve requirements raises capital inflows. However, the distributional impacts of this policy change depend on the depth of financial sector development. With low depth, financial deepening effects dominate, and income distribution becomes less skewed. However, with an already-deep financial sector, the reduced costs of intermediation dominate, increasing the skewness of income distribution. In contrast, our analysis considers the implications of liberalization of *gross* capital flows. We show that changes in capital inflows and outflows can have quite different implications for income distributions, and the long-run distributional impact of capital flows is different from the short-run impact. Our analysis thus suggests that adopting distinct inflow and outflow policies can be important for achieving the desired distributional outcomes.

III. The model

We consider a small open economy model with overlapping generations and two types of agents: entrepreneurs and households. We normalize the population size to one and assume that the share of households is $\theta \in (0, 1)$. There is a homogeneous consumption

good produced by competitive firms using capital and labor. The main difference between households and entrepreneurs is that entrepreneurs externally finance and accumulate capital; while households do not have capital investment technology and invest in risk free bank deposits and foreign assets.

Entrepreneurs and households both live for two periods—young and old. The representative household works, consumes, and saves for retirement when young and consumes the accumulated savings when old. The representative entrepreneur works, consumes, accumulates capital and borrows when young, and consumes using returns from holding capital minus his debt obligations when old. The old cohorts, both entrepreneurs and households, transfer an exogenous fraction of their wealth to the next generation.[4] Young entrepreneurs finance the acquisition of capital through labor income, borrowing, and the transfers received from the old generation.

Banks operate in a perfectly competitive market, taking as given the market interest rates on deposits and loans. Banks face financial intermediation costs, which give rise to a credit spread, driving a wedge between the deposit and lending interest rates. The government implements capital account restrictions by taxing earnings on both capital inflows and outflows.

III.1. **Households.** In each period, the economy has a continuum of identical households with measure θ. We focus on the optimizing decisions of a representative household. The representative household born in period t has the utility function

$$U_{ht} = \ln(C_{ht}^y) + \beta \ln(C_{h,t+1}^o), \tag{1}$$

where C_{ht}^y denotes consumption of the household when young, $C_{h,t+1}^o$ denotes consumption of the household when old.

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[4]This assumption is made to facilitate our numerical solutions, and drives none of our results.

The household chooses consumption, bank deposits and foreign investment to maximize the utility function (1) subject to the budget constraints

$$C_{ht}^y + D_t + B_{ft}^d = w_t H_{ht} + \Gamma_{ht}, \tag{2}$$

and

$$C_{h,t+1}^o = R_t D_t + (1 - \tau_d) R_t^* B_{ft}^d + T_{h,t+1} - \Gamma_{h,t+1}. \tag{3}$$

When young, the household consumes C_{ht}^y and saves in domestic bank deposits D_t and foreign deposits B_{ft}^d. Each young household supplies H_{ht} hours to firms at the competitive wage rate w_t. The young household also receives bequest income Γ_{ht} from the previous old generation.

When old, the household consumes its asset holdings, which consist of interest earnings on domestic bank deposits $R_t D_t$ and after-tax earnings on foreign deposits $(1 - \tau_d) R_t^* B_{ft}$. Here, the term R_t denotes the risk-free deposit rate, R_t^* denotes the world interest rate, and τ_d denotes a tax on earnings from foreign assets (i.e., a tax on capital outflows). In addition, the old household also receives T_{ht}, the sum of dividend income from domestic banks and lump-sum transfers from the government. The old household leaves a bequest $\Gamma_{h,t+1}$ to the then-young generation. For simplicity, we assume that the bequest is a constant fraction Γ of the old individual's wealth, and it is given by

$$\Gamma_{h,t+1} = \Gamma \left\{ R_t D_t + (1 - \tau_d) R_t^* B_{ft}^d + T_{h,t+1} \right\}. \tag{4}$$

The interior optimizing decisions of the representative household imply the no-arbitrage condition

$$R_t = (1 - \tau_d) R_t^*. \tag{5}$$

A positive tax rate τ_d captures capital outflow controls. Thus, capital outflow controls drive a wedge between the domestic deposit rate and the world interest rate.

III.2. **Entrepreneurs.** There is also a continuum of identical entrepreneurs with measure $1 - \theta$. The representative entrepreneur born in period t has the utility function

$$U_{et} = \ln(C_{et}^y) + \beta \ln(C_{e,t+1}^o), \tag{6}$$

where C_{et}^y and $C_{e,t+1}^o$ denote the entrepreneur's consumption when young and old, respectively.

The entrepreneur chooses consumption, external borrowings B_{et}, and investment I_t to maximize the utility function (6) subject to the budget constraints

$$C_{et}^y + q_t^k K_t^o + I_t + \frac{\Omega_k}{2} \left(\frac{I_t}{K_t^o} - \frac{\bar{I}}{\bar{K}^o} \right)^2 K_t^o = w_t H_{et} + B_{et} + \Gamma_{et}, \tag{7}$$

$$C_{e,t+1}^o = \left[q_{t+1}^k (1 - \delta) + r_{t+1}^k \right] (K_t^o + I_t) - R_{lt} B_{et} + T_{e,t+1} - \Gamma_{e,t+1}. \tag{8}$$

where H_{et} denotes the young entrepreneur's inelastic labor supply.

When young, the entrepreneur consumes C_{et}^y, purchases existing capital from the then old generation (denoted by K_t^o) at the competitive price q_t^k, and makes new investment I_t subject to capital adjustment costs. The young entrepreneur finances these spending by wage income $w_t H_{et}$, external debt B_{et} at the loan interest rate R_{lt}, and bequest income Γ_{et} from the previous old generation.

When old, the entrepreneur receives the returns from holding the capital, including rental income from firms and capital gains net of depreciation. Here, r_{t+1}^k denotes the capital rental rate and $\delta \in [0, 1]$ denotes the capital depreciation rate. In addition, the old entrepreneur receives $T_{e,t+1}$, which includes lump-sum transfers from the government and dividends distributed from the bank. The old entrepreneur use these income to purchase consumption goods $C_{e,t+1}^o$, repays the outstanding debts $R_{lt} B_{et}$, and leaves bequests $\Gamma_{e,t+1}$ to the then-young generation. The bequest is a constant fraction of the old entrepreneur's accumulated wealth and is given by

$$\Gamma_{e,t+1} = \Gamma \left\{ \left[q_{t+1}^k (1 - \delta) + r_{t+1}^k \right] (K_t^o + I_t) - R_{lt} B_{et} + T_{e,t+1} \right\}. \tag{9}$$

Denote by K_t the stock of capital at the end of period t. The beginning-of-period capital is given by $K_t^o = (1 - \delta)K_{t-1}$, which is the amount of capital that young entrepreneurs purchased from the old. New investment I_t adds to the stock of capital, leading to the law of motion for the aggregate capital stock

$$K_t = (1 - \delta)K_{t-1} + I_t. \tag{10}$$

III.3. **Firms.** There is a continuum of firms with measure one, each facing perfectly competitive markets. The representative firm produces a homogeneous good Y_t using capital and labor inputs, with the constant returns technology

$$Y_t = A(K_{t-1})^{1-\alpha}(H_{ht} + H_{et})^{\alpha}, \tag{11}$$

where A denotes the total factor productivity, and the parameter $\alpha \in (0, 1)$ is the labor input elasticity in the production function.

Cost-minimizing implies the conditional factor demand functions

$$w_t(H_{ht} + H_{et}) = \alpha Y_t \tag{12}$$

and

$$r_t^k K_{t-1} = (1 - \alpha)Y_t. \tag{13}$$

III.4. **Banks.** There is a continuum of competitive banks with measure one. The representative bank takes deposits from households at the deposit interest rate R_t and lends to entrepreneurs at the lending interest rate R_{lt}.

Following Cúrdia and Woodford (2016), we assume that financial intermediation is costly. In the process of originating B_t units of loans, the bank needs to spend real resources $\Xi\left(\frac{B_t}{Y_t}\right) Y_t$ (in units of final output). And these resources must be produced and consumed in the period in which the loans are originated. The function $\Xi(\frac{B_t}{Y_t})$ takes the form

$$\Xi\left(\frac{B_t}{Y_t}\right) = \xi\left(\frac{B_t}{Y_t}\right)^{\eta}. \tag{14}$$

Following Cúrdia and Woodford (2016), we assume that $\eta > 1$, such that the intermediation cost function $\Xi(\cdot)$ is strictly increasing and strictly convex. The convexity of $\Xi(\cdot)$ reflects the bank's diminishing effectiveness for intermediating lending activity and enforcing loan contracts.

The bank collects deposits D_t from the household at the deposit rate R_t and lend B_t to entrepreneurs at the loan rate R_{lt}, subject to the constraint

$$R_{lt}B_t = R_t D_t. \tag{15}$$

At the end of the period, the bank distributes all excess funds received from depositors that are not lent out or used to pay the resource costs of loan origination to its shareholders (i.e., the households) in the form of dividend payments. The period-t bank dividend is given by

$$\Pi_t^b = D_t - B_t - \Xi\left(\frac{B_t}{Y_t}\right)Y_t. \tag{16}$$

The bank takes the interest rates and aggregate output as given and chooses the loan amount B_t and the deposit amount D_t to maximize its profits Π_t^b in Equation (16), subject to the constraint (15).

The first order condition for optimal credit supply is given by

$$R_{lt} = R_t\left[1 + \Xi'\left(\frac{B_t}{Y_t}\right)\right], \tag{17}$$

where the wedge between the loan rate and the deposit rate, $\Xi'\left(\frac{B_t}{Y_t}\right)$, is a credit spread that is endogenously determined by the bank loan to output radio $\frac{B_t}{Y_t}$.

III.5. **Foreign investors.** Foreign investors lend to domestic entrepreneurs at the market loan rate R_{lt}.[5] Foreign investors face an investment income tax τ_l, with the after-tax returns $(1 - \tau_l)R_{lt}$. External debt also requires a risk premium. Under these assumptions, no arbitrage implies that

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[5]As the deposit interest rate lies below the world interest rate (see Eq. (5)), foreign investors have no incentive to deposit funds in domestic banks.

$$(1 - \tau_l)R_{lt} = R_t^* \Phi \left(\frac{B_{ft}^l}{Y_t} \right). \tag{18}$$

where B_{ft}^l denotes the amount of firm loans granted by foreign investors and $\Phi \left(\frac{B_{ft}^l}{Y_t} \right)$ denotes the risk premium, which depends on the external debt to output ratio and is given by

$$\Phi \left(\frac{B_{ft}^l}{Y_t} \right) = \exp \left[\Phi_b \left(\frac{B_{ft}^l}{Y_t} - \kappa_f \right) \right]. \tag{19}$$

The dependence of the risk premium on the relative size of external debts implies an external spillover that leads to over-borrowing. Since individual firms take the loan interest rate (inclusive of the risk premium) as given, they do not internalize the effects of collective borrowing on the risk premium. The presence of the capital inflow tax and the risk premium drives a wedge between domestic loan interest rate and the world interest rate.

III.6. **Market clearing and equilibrium.** An equilibrium consists of sequences of allocations $\{C_t^y, C_t^o, I_t, K_t, Y_t, H_t, B_t, B_{ft}^l, NX_t\}$ and prices $\{w_t, R_t, q_t^k, R_{lt}\}$ that solve the optimizing problems for the workers, the entrepreneurs, and the banks. In the equilibrium, final goods market clearing implies that the trade surplus is given by

$$NX_t = Y_t - C_{ht}^y - C_{ht}^o - C_{et}^y - C_{et}^o - I_t - \frac{\Omega_k}{2} \left(\frac{I_t}{K_t^o} - \frac{\bar{I}}{\bar{K}^o} \right)^2 K_t^o - \Xi(\frac{B_t}{Y_t})Y_t. \tag{20}$$

The loan market clearing condition is given by

$$B_t + B_{ft}^l = B_{et}. \tag{21}$$

The labor market clearing condition is given by

$$H_{ht} + H_{et} = 1. \tag{22}$$

The aggregate production function is then given by

$$Y_t = AK_{t-1}^{1-\alpha}. \tag{23}$$

In each period, the government collects capital control taxes and transfers these taxes to the household and the entrepreneur. Meanwhile, banks distribute their profits to the household and the entrepreneur as their shareholders. Both the capital flow taxes and the bank's profit are distributed to the household and the entrepreneur as a lump sum, with the transfer amount proportional to the population share of each type of agents.

$$T_{ht} = \theta(\tau_d R^*_{t-1} B^d_{f,t-1} + \tau_l R_{l,t-1} B^l_{f,t-1} + \Pi^b_t). \tag{24}$$

$$T_{et} = (1 - \theta)(\tau_d R^*_{t-1} B^d_{f,t-1} + \tau_l R_{l,t-1} B^l_{f,t-1} + \Pi^b_t). \tag{25}$$

In addition, by summing up all sectors' budget constraints, we obtain the balance of payments condition

$$NX_t + (R^*_{t-1} - 1)B^d_{f,t-1} - \left[R^*_{t-1}\Phi\left(\frac{B^l_{f,t-1}}{Y_{t-1}}\right) - 1\right]B^l_{f,t-1} = (B^d_{ft} - B^l_{ft}) - (B^d_{f,t-1} - B^l_{f,t-1}). \tag{26}$$

Real GDP equals final output net of the costs of loan origination and investment adjustments. The national income account identity holds such that,

$$GDP_t = C^y_{ht} + C^o_{ht} + C^y_{et} + C^o_{et} + I_t + NX_t. \tag{27}$$

III.7. **Income inequality and planner objective.** The household's capital income includes interest earnings from domestic deposits and foreign asset holdings. It is given by

$$W^c_{ht} = (R_{t-1} - 1)D_{t-1} + [(1 - \tau_d)R^*_{t-1} - 1]B^d_{f,t-1}. \tag{28}$$

The entrepreneur's capital income consists of returns on capital net of interest payments on debt and expenditures on investment. It is given by

$$W^c_{et} = \left[q^k_t(1 - \delta) + r^k_t\right](K^o_{t-1} + I_{t-1}) - (R_{l,t-1} - 1)B_{e,t-1}$$

$$- \left[q^k_{t-1}K^o_{t-1} + I_{t-1} + \frac{\Omega_k}{2}\left(\frac{I_{t-1}}{K^o_{t-1}} - \frac{\bar{I}}{\bar{K}^o}\right)^2 K^o_{t-1}\right]. \tag{29}$$

The labor incomes for the household and the entrepreneur are given by

$$W_{ht}^l = w_t H_{ht} = \theta w_t, \quad W_{et}^l = w_t H_{et} = (1 - \theta)w_t, \tag{30}$$

where we have used the assumption that labor supplies are inelastic and that the population sizes of the households and the entrepreneurs are θ and $1 - \theta$, respectively.

The planner's objective is a weighted average of the welfare of the two types of agents and it is given by

$$U_t = \omega \left[\ln(C_{ht}^y) + \ln(C_{ht}^o)\right] + (1 - \omega) \left[\ln(C_{et}^y) + \ln(C_{et}^o)\right] + E_t \beta U_{t+1}. \tag{31}$$

where ω denotes the Pareto weight on the household's welfare.

IV. ANALYTICAL STEADY-STATE RESULTS

This section provides some analytical characterizations of the steady-state implications of capital controls for income distributions between the two types of agents. We focus on the interior equilibrium with positive gross capital flows (both inflows and outflows).[6] To keep the analytics tractable, we focus on the special case with no bequests ($\Gamma = 0$) and no lump-sum transfers ($T_{ht} = T_{et} = 0$).[7]

IV.1. **Domestic interest rates and output.** We first examine how changes in capital controls affect domestic interest rates and output. In the interior equilibrium, the no-arbitrage condition Eq. (5) pins down the domestic deposit rate

$$R = (1 - \tau_d)R^*. \tag{32}$$

This relation implies that liberalizing capital outflow controls (decreasing τ_d) raises the domestic deposit rate.

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[6]We provide detailed derivations of the analytical steady-state equilibrium in the Appendix.

[7]With no lump-sum transfers, we are implicitly assuming that the government collects income taxes on capital flows and bank profits to finance some exogenous government spending that does not affect the private agents' welfare. Under our calibration, the amount of such spending is small, accounting for less than 2% of aggregate output in the steady state.

The optimal credit supply condition Eq. (17) implies that the domestic lending rate depends on the deposit rate and the credit spread

$$R_l = R \left[1 + \xi \eta \left(\frac{B}{Y} \right)^{\eta-1} \right] \tag{33}$$

Under the assumption that $\eta > 1$, the credit spread increases with the loan-to-output ratio $\frac{B}{Y}$.

Reducing capital inflow taxes τ_l encourages foreign lending to domestic firms, crowding out domestic lending. Thus, the domestic loan-to-output ratio $\frac{B}{Y}$ falls, as does the credit spread. This in turn lowers the domestic lending interest rate, as we formally show in Proposition IV.1 below.

Reducing capital outflow taxes τ_d has two opposing effects on the domestic lending rate. First, it raises the deposit rate R, and thus raises the lending rate R_l. Second, it induces more capital outflows and thus reduces domestic bank deposits, leading to a decline in the loan-to-output ratio $\frac{B}{Y}$ and a reduction in the credit spread and the domestic lending rate. Despite these two opposing effects, Proposition IV.1 shows that reducing capital outflow taxes raises the domestic lending rate in equilibrium, suggesting that the first effect (through raising domestic deposit rate) dominates.

Proposition IV.1. *Denote by $\mathcal{R}(\tau_d, \tau_l)$ the equilibrium lending interest rate as a function of the policy parameters τ_d and τ_l. In the steady-state equilibrium, the lending rate $\mathcal{R}(\tau_d, \tau_l)$ decreases with τ_d ($\frac{\partial \mathcal{R}}{\partial \tau_d} < 0$) and increases with τ_l ($\frac{\partial \mathcal{R}}{\partial \tau_l} > 0$).*

Proof. We provide a proof in the Appendix. $\square$

Changes in the domestic lending rate drive changes in capital returns, which in turn determine the equilibrium levels of capital stock and output. With diminishing marginal product of capital, an increase in the lending rate implies a decline in capital stock and therefore in aggregate output. In particular, as we show in the Appendix, aggregate output

is related to the domestic lending rate by

$$Y = \left(\frac{1 - \alpha}{R_l - 1 + \delta} \right)^{\frac{1-\alpha}{\alpha}}. \tag{34}$$

The following proposition summarizes the relation between capital account policies and aggregate output, which works through the domestic lending rate.

Proposition IV.2. *Denote by $\mathcal{Y}(\tau_d, \tau_l)$ the aggregate output as a function of the policy parameters τ_d and τ_l. In the steady state equilibrium, aggregate output $\mathcal{Y}(\tau_d, \tau_l)$ increases with τ_d ($\frac{\partial \mathcal{Y}}{\partial \tau_d} > 0$) and decreases with τ_l ($\frac{\partial \mathcal{Y}}{\partial \tau_l} < 0$).*

Proof. This result follows immediately from Proposition IV.1 and the negative relation between Y and R_l shown in Eq. (34). □

IV.2. **Household income.** We now examine the steady-state implications of capital account policies for the representative household's labor income and capital income. Eq. (12) implies that the household's labor income is a constant fraction of output given by

$$W_h^l = \alpha\theta\mathcal{Y}(\tau_d, \tau_l). \tag{35}$$

Thus, from Proposition IV.2, the household's labor income increases with τ_d and decreases with τ_l.

Under the optimal intertemporal decisions, the household saves a constant fraction $\frac{\beta}{1+\beta}$ of their labor income in bank deposits and foreign assets, and consumes the rest. In particular, total savings are given by

$$D + B_f^d = \frac{\beta\alpha\theta}{1 + \beta}\mathcal{Y}(\tau_d, \tau_l). \tag{36}$$

The household's capital income is then given by,

$$W_h^c = [(1 - \tau_d)R^* - 1](D + B_f^d) = [(1 - \tau_d)R^* - 1]\frac{\beta\alpha\theta}{1 + \beta}\mathcal{Y}(\tau_d, \tau_l). \tag{37}$$

This relation implies that liberalizing capital outflow controls (decreasing τ_d) increases the household's capital income by raising their return to savings. However, the consequent

increase in domestic interest rates depresses output (see Proposition IV.2). Depressed output leads to a fall in the household's labor income and decreases the funds available for saving, which partially offsets the positive effect on the household's capital income through returns to savings. Note that this offsetting effect is stronger the greater is the share of capital in production $(1 - \alpha)$. As implied by Eq. (34), the larger the production share of capital, the more sensitive is the output response to the domestic lending rate, and therefore the larger the decline in the household's labor income and their funds available for saving. However, the positive return-to-savings effect always dominates the negative total-savings effect unless the production share of capital is extremely large.[8]

By comparison, liberalizing capital inflow controls (decreasing τ_l) has a positive effect on the household's labor income, without affecting the returns on household savings. Consequently, reducing inflow taxes unambiguously raises household capital income.

The following proposition summarizes the relation between capital account policies and the household capital income.

Proposition IV.3. *Denote by $\mathcal{W}_h(\tau_d, \tau_l)$ the household's capital income as a function of the policy parameters τ_d and τ_l. In the steady-state equilibrium, the household's capital income $\mathcal{W}_h(\tau_d, \tau_l)$ decreases with τ_l (i.e., $\frac{\partial \mathcal{W}_h}{\partial \tau_l} < 0$). Furthermore, if the labor share α in production is sufficiently large (in particular, if $\frac{\alpha}{1-\alpha} > \frac{(1-\tau_d)R^*-1}{(1-\tau_d)R^*}$), then $\mathcal{W}_h(\tau_d, \tau_l)$ also decreases with τ_d (i.e., $\frac{\partial \mathcal{W}_h}{\partial \tau_d} < 0$).*

Proof. We provide a proof in the Appendix. □

IV.3. **Entrepreneur income.** We next examine the steady-state implications of capital account policies for the representative entrepreneur's income. The optimal cost-minimizing solution (12) implies that the entrepreneur's labor income is a constant fraction of output given by

$$W_e^l = \alpha(1 - \theta)\mathcal{Y}(\tau_d, \tau_l). \tag{38}$$

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[8]In the appendix, we prove that the household's capital income decreases with the capital outflow tax under the condition that $(\frac{\alpha}{1-\alpha} > \frac{R-1}{R})$, where R is the steady-state domestic deposit rate. In EMEs with the labor share α no less than 50%, this condition is always satisfied.

Therefore, in the steady state, the entrepreneur's labor income increases with the outflow tax and decreases with the inflow tax, as does the household labor income.

The optimizing intertemporal decisions imply that the entrepreneur has the steady-state net worth

$$K - B_e = \frac{\beta\alpha(1-\theta)}{1+\beta}\mathcal{Y}(\tau_d, \tau_l). \tag{39}$$

The entrepreneur's capital income is then given by

$$
\begin{aligned}
W_e^c &= (R_l - 1)(K - B_e) \\
&\equiv [\mathcal{R}(\tau_d, \tau_l) - 1]\frac{\beta\alpha(1-\theta)}{1+\beta}\mathcal{Y}(\tau_d, \tau_l).
\end{aligned}
\tag{40}
$$

Changes in the domestic lending rate affect the entrepreneur's capital income through two channels. First, an increase in domestic lending rate raises the entrepreneur's capital returns and therefore increases the entrepreneurs' capital income. Second, an increase in the lending rate depresses investment and output, reducing the entrepreneur's labor income and net worth. The reduction in net worth partially offsets the positive effect of increased capital returns. The negative net-worth effect becomes weaker the smaller the production share of capital $(1-\alpha)$. As implied by Eq.(34), the smaller the production share of capital, the less sensitive the output responds to the domestic lending rate, and therefore the smaller the decline in the entrepreneur's labor income and the funds available for investment. The positive capital-return effect always dominates unless the production share of capital is extremely large.[9]

The following proposition summarizes the relation between capital account policies and the entrepreneur's capital income.

Proposition IV.4. *Denote by* $\mathcal{W}_e(\tau_d, \tau_l)$ *the entrepreneur's capital income as a function of the policy parameters* τ_d *and* τ_l. *If the labor share* α *is sufficiently large (in particular, if*

---

[9]In the appendix, we prove that the entrepreneurs' capital income increases with the domestic lending rate under the condition that $(\frac{\alpha}{1-\alpha} > \frac{R_l - 1}{R_l})$, where R_l is the steady-state domestic lending rate. In EMEs with the labor share α no less than 50%, this condition is always satisfied.

$\frac{\alpha}{1-\alpha} > \frac{\mathcal{R}(\tau_d,\tau_l)-1}{\mathcal{R}(\tau_d,\tau_l)}$), then the entrepreneur's capital income $\mathcal{W}_e(\tau_d,\tau_l)$ decreases with τ_d (i.e., $\frac{\partial \mathcal{W}_e}{\partial \tau_d} < 0$) and increases with τ_l (i.e., $\frac{\partial \mathcal{W}_e}{\partial \tau_l} > 0$).

Proof. We provide a proof in the Appendix. □

IV.4. **Income distribution.** We now examine how capital account policies affect the income distribution between the household and the entrepreneur. Since the labor income of each type of agents is a constant fraction of aggregate output (see Eq. (30)), the relative labor income of household is also constant and invariant to capital account policy:

$$\frac{W_h^l}{W_e^l} = \frac{\theta}{1-\theta}. \tag{41}$$

Therefore, the capital control policies affect the income distribution between the household and the entrepreneur through their effects on the capital income distribution. From Equations (37) and (40), the capital income ratio is given by,

$$\frac{W_h^c}{W_e^c} = \frac{[(1-\tau_d)R^* - 1]\frac{\beta\alpha\theta}{1+\beta}\mathcal{Y}(\tau_d,\tau_l)}{[\mathcal{R}(\tau_d,\tau_l) - 1]\frac{\beta\alpha(1-\theta)}{1+\beta}\mathcal{Y}(\tau_d,\tau_l)} = \frac{\theta}{1-\theta}\frac{(1-\tau_d)R^* - 1}{\mathcal{R}(\tau_d,\tau_l) - 1}. \tag{42}$$

Thus, the household-to-entrepreneur capital income ratio depends on the ratio between the household's return to saving, which equals the net deposit rate $(1 - \tau_d)R^* - 1$, and the entrepreneur's return to capital, which equals the net lending rate $\mathcal{R}(\tau_d,\tau_l) - 1$.

Lowering capital inflow taxes (i.e., decreasing τ_l) reduces the domestic lending rate and thus the entrepreneur's returns on capital, but it has no impact on the domestic deposit rate and thus does not affect the household's return on savings. As a result, liberalizing capital inflows increases the household's share in capital income.

Lowering capital outflow taxes (i.e., decreasing τ_d) raises the household's return on savings and the entrepreneur's return on capital at the same time, but with different magnitudes. In particular, liberalizing capital outflows directly raises the domestic deposit rate through the no-arbitrage condition (Eq. (32)). The bank does not fully pass through the increases in the deposit rate to the lending rate, because the household shifts a fraction of their deposits abroad (i.e., capital outflows increase), resulting in a decline in the loan-to-output ratio and

reducing the credit spread. Since the magnitude of the increases in the entrepreneur's return on capital (which equals the lending rate) is smaller than that in the increases in the household's return to savings, liberalizing capital outflows raises the household's share in capital income.

The following proposition summarizes the relation between capital account policies and the capital income distribution between the household and the entrepreneur.

Proposition IV.5. *Denote by $\mathcal{W}_c(\tau_d, \tau_l)$ the household-to-entrepreneur capital income ratio as a function of the policy parameters τ_d and τ_l. The household's relative capital income $\mathcal{W}_c(\tau_d, \tau_l)$ decreases with both τ_d and τ_l (i.e., $\frac{\partial \mathcal{W}_c}{\partial \tau_d} < 0$ and $\frac{\partial \mathcal{W}_c}{\partial \tau_l} < 0$).*

Proof. We provide a proof in the Appendix. □

V. QUANTITATIVE RESULTS

Our analytical results show the steady-state relations between capital account policies and income distribution in the special case without bequests and government transfers. We now examine the equilibrium in our more general model setup and study the model's transition dynamics following a foreign interest rate shock. For this purpose, we solve the model numerically based on calibrated parameters.

V.1. **Calibration.** A period in our overlapping generations model corresponds to 10 years. We set the subjective discount factor to $\beta = 0.665$, which implies an annualized discount factor of 0.96. We set $\delta = 0.651$, implying an annual depreciation rate of 10%. We set the capital adjustment cost parameter to $\Omega_k = 5$, which lies in range of the empirical estimates in the literature. We set the foreign interest rate to $R^* = 1.480$, implying an annualized interest rate of 4%. Our calibrated bequest ratio of $\Gamma = 0.53$ implies a steady-state domestic credit to output ratio ($\frac{B}{Y}$) of 0.08, which lies within the range of the credit-to-output ratio in emerging market economies.[10] We calibrate the labor income share to $\alpha = 0.5$, in line

---

[10]The domestic credit-to-output ratio varies widely across EMEs. For example, the World Bank data show that the private domestic bank credit as a share of GDP per annum ranges from 20% in Mexico to 60% in Brazil, and to over 120% in Malaysia and Vietnam.

with the estimates by Brandt et al. (2008) for China and slightly lower but close to the range of global labor income share estimated by Karabarbounis and Neiman (2014). We set $\theta = \frac{2}{3}$ such that the population share of the entrepreneur is $1 - \theta = \frac{1}{3}$, consistent with the employment share of the self-employed in EMEs such as Brazil, Mexico, and Malaysia.

For the parameters related to external debt, we set the risk premium parameter on foreign debt to $\Phi_b = 3$, which is consistent with the estimate for the elasticity of emerging market sovereign bond spread to external debt-to-output ratio estimated by Bellas et al. (2010). We set the desirable foreign debt-to-output ratio $\kappa_f = 0.04$, following the 2002 "sustainability framework" of the IMF, which notes that 40% is the suggested ratio of external debt to annual output that should not be breached on a long-term basis.[11]

Following Cúrdia and Woodford (2016), we set $\xi = 0.57$ such that the steady-state credit spread equals 2.0 percentage points per annum. We set $\eta = 1.6$ such that a 1% increase in the volume of domestic bank credit increases the credit spread by 0.01% per annum.[12]

For the policy parameters, we set the weight of the household in the planner's objective function $\omega = 0.5$ (equally weighting the utilities of the households and entrepreneurs) as the baseline case. We choose the capital control policy parameters τ_d and τ_l as the optimal values that maximize the planner's objective function (31) in the steady state. Under our calibration, $\tau_d = 1.64\%$ and $\tau_l = 10.17\%$.[13]

The calibrated value of the parameters are summarized in Table I.

V.2. **Changes in capital account policies and transition dynamics.** We solve the perfect-foresight model based on the calibrated parameters. We use the model to study the transition dynamics following transitory changes in capital account policies.

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[11]International Monetary Fund, 2002, "Assessing Sustainability," SM/02/06.

[12]This implies that $\frac{d\ln(\frac{R_l}{R})}{d\ln(B)} = 0.01 \times 10 = 0.1$ in our decadal model, where $\frac{d\ln(\frac{R_l}{R})}{d\ln(B)} = \frac{\xi\eta(\eta-1)B^{\eta-1}}{1+\xi\eta B^{\eta-1}} = \frac{(\eta-1)(\frac{R_l}{R}-1)}{\frac{R_l}{R}}$ can be derived using Eq. (17). This credit spread elasticity is obtained by regressing the annual growth in spread between bank prime loan rate and 1 year Treasury bills rate on the annual growth in commercial and industrial loans using U.S. quarterly data from 2001 to 2018.

[13]The high capital inflow tax is driven by the planner's desire to correct the over-borrowing externality arising from the risk premium on external debt.

V.2.1. *Temporary changes in capital inflow taxes.* We consider a temporary increase in the capital inflow tax, which follows the process

$$\tau_{lt} = \rho\tau_{l,t-1} + (1 - \rho)\bar{\tau}_l + \epsilon_{lt}. \tag{43}$$

where $\bar{\tau}_l$ denotes the capital inflow tax in the steady state. ϵ_{lt} denotes the unexpected change in the capital inflow tax. The persistence parameter ρ is set to 0.9^{10}, implying an annualized autocorrelation ratio of 0.9 in the capital inflow tax.

Figure I displays the impulse responses to a 5% temporary increase in the capital inflow tax ($\epsilon_{l1} = 5\%$). The increase in capital inflow taxes reduces capital inflows such that the entrepreneurs have to rely more on domestic bank loans. The increase in domestic loan demand raises the credit spread and thus the lending rate. The higher domestic lending rate reduces capital investment and aggregate output. It also reduces the relative price of capital, lowering the entrepreneurs' capital income. However, the inflow tax shock does not affect the domestic deposit rate, because the deposit rate is pinned down by the foreign interest rate and the outflow tax rate. Thus, the shock does not affect the households' capital income. The decline in the entrepreneurs' capital income therefore raises the households' share of capital income and total income, as shown in the figure.

V.2.2. *Temporary changes in capital outflow taxes.* We now consider a temporary increase in the capital outflow tax, which follows the process

$$\tau_{dt} = \rho\tau_{d,t-1} + (1 - \rho)\bar{\tau}_d + \epsilon_{dt}. \tag{44}$$

where $\bar{\tau}_d$ denotes the capital outflow tax in the steady state. ϵ_{dt} denotes the unexpected change in the capital outflow tax. The persistence parameter ρ is set to 0.9^{10}, implying an annualized autocorrelation ratio of 0.9 in the capital outflow tax.

Figure II displays the impulse responses to a 5% temporary increase in the capital outflow tax ($\epsilon_{d1} = 5\%$). The increase in capital outflow taxes reduces the after-tax return on foreign assets and thus reduces the domestic deposit rate under the no arbitrage condition. The

decline in the deposit rate depresses the households' capital income. Banks responds to the decline in the deposit interest rate by lowering the market lending rate, boosting the entrepreneurs' investment and aggregate output. The relative price of capital also rises, raising the entrepreneur's capital income. Thus, the households' share of capital income falls. Although the expansion in aggregate output raises the labor income for both the households and the entrepreneurs, the households' share of total income declines, reflecting that the effects of the shock on capital income dominate.

V.3. **Foreign interest rate shocks and transition dynamics.** Following the onset of the 2008-09 global financial crisis, monetary policy easing in advanced economies have led to surges in capital inflows to emerging market economies (EMEs). We now examine the implications of capital flows induced by a reduction in the foreign interest rate for the macro economy and income distribution. We also study optimal responses of capital account policies following the foreign interest rate shock.

In particular, we consider a counterfactual experiment in which the foreign interest rate R^* falls from $R_0^* = 1.04^{10}$ in period zero (the initial steady-state value) to $R_1^* = 1.03^{10}$ in period $t = 1$ and gradually returns to the initial level thereafter. In particular, the foreign interest rate follows the process

$$R_t^* = \begin{cases} R_0^* = 1.04^{10}, & \text{if } t = 0, \\ R_1^* = 1.03^{10}, & \text{if } t = 1, \\ R_{t-1}^{*\rho} R_0^{*1-\rho}, & \text{if } t \geq 2. \end{cases} \tag{45}$$

where we set the persistence parameter ρ to 0.9^{10}, implying an annualized autocorrelation of 0.9.

V.3.1. *Baseline capital account policies.* We first examine the baseline case with capital account policies held constant. Figure III displays the impulse responses to a temporary decline in the foreign interest rate. The shock reduces the household's return on foreign deposits, discouraging capital outflows and pushing down domestic deposit rate. The lower

foreign interest rate also induces foreign capital inflows, pushing down the domestic lending interest rate. The fall in the domestic lending rate stimulates investment and production.

The expansion in domestic production raises the labor income for both types of agents. However, the capital income of the households and that of the entrepreneurs move in the opposite directions. The households' capital income declines because their earnings on bank deposits fall. The short-run surge in capital inflows stimulates investment, boosting the relative price of capital and thus raising the entrepreneurs' capital income. As the entrepreneurs' demand for loans increases, the credit spread widens, partially dampening the stimulus effect of the capital inflows. Over time, the stock of capital rises, the returns on capital gradually declines. Overall, the transitory declines in the foreign interest rate reduces the households' share of both capital income and total income, as the figure shows. Thus, when the capital flow tax rates are held constant at their baseline levels, a lower foreign interest-rate skews the income distributions in favor of the entrepreneurs at the expense of the households.

V.3.2. *Optimal capital account policies.* We now consider the impact of the same foreign interest rate shock when the small open economy can optimally adjust its capital control taxes. To keep our analysis tractable, we consider optimal policy for inflow taxes and outflow taxes separately.

In the case with optimal capital outflow taxes, we hold the inflow tax rate constant at the calibrated value. Let τ_{d0}, τ_{d1} and τ_{d2} represent the tax rates on capital outflows in the initial steady state, the first period during transition, and the final steady state, respectively. The transition path of the capital outflow tax rate is then given by

$$
\tau_{dt} = \begin{cases} \tau_{d0}, & \text{if } t = 0, \\ \tau_{d1}, & \text{if } t = 1, \\ \rho\tau_{d,t-1} + (1-\rho)\tau_{d2}, & \text{if } t \geq 2. \end{cases} \tag{46}
$$

Similarly, in the case with optimal inflow taxes, we hold the outflow tax rate constant at the calibrated value. Denote by τ_{l0}, τ_{l1} and τ_{l2} the tax rate on capital inflows in the initial steady state, in the first period during the transition, and in the final steady state respectively. The outflow tax rate follows the path

$$
\tau_{lt} = \begin{cases} \tau_{l0}, & \text{if } t = 0, \\ \tau_{l1}, & \text{if } t = 1, \\ \rho\tau_{l,t-1} + (1-\rho)\tau_{l2}, & \text{if } t \geq 2. \end{cases}
\tag{47}
$$

The planner's welfare objective is a weighted average of the household welfare and the entrepreneur welfare and it is given by

$$
V(\tau_{d1}, \tau_{d2}, \tau_{l1}, \tau_{l2}, \omega) = \omega V_h(\tau_{d1}, \tau_{d2}, \tau_{l1}, \tau_{l2}) + (1-\omega)V_e(\tau_{d1}, \tau_{d2}, \tau_{l1}, \tau_{l2}),
\tag{48}
$$

where $V_h(\cdot)$ and $V_e(\cdot)$ denote the transition welfare of the households and of the entrepreneurs, respectively, and ω is the Pareto weight that the planner assigns on the households' welfare. The welfare of the two types of agents are given by

$$
V_h(\tau_{d1}, \tau_{d2}, \tau_{l1}, \tau_{l2}) = \sum_{t=1}^{\infty} \beta^t \left[\ln(C_{ht}^y) + \ln(C_{ht}^o) \right],
\tag{49}
$$

and

$$
V_e(\tau_{d1}, \tau_{d2}, \tau_{l1}, \tau_{l2}) = \sum_{t=1}^{\infty} \beta^t \left[\ln(C_{et}^y) + \ln(C_{et}^o) \right],
\tag{50}
$$

where C_{ht}^y and C_{ht}^o denote young and old household consumption, and C_{et}^y and C_{et}^o denote young and old entrepreneur consumption along the transition path.

We solve for the capital account policy parameters τ_{d1}, τ_{d2}, τ_{l1} and τ_{l2} to maximize the planner's objective function $V(\tau_{d1}, \tau_{d2}, \tau_{l1}, \tau_{l2}, \omega)$ under a range of values of ω. Table II shows the optimal policy parameters. For comparison, the table also shows the benchmark policy parameters [see Column (1)].

Consider first the optimal response of capital inflow tax policy to the decline in the foreign interest rate, holding the outflow tax rate constant [Columns (2)-(4)]. In the benchmark

case where the planner assigns equal weights to the household and the entrepreneur (i.e., $\omega = 0.5$), the planner chooses to tighten inflow controls by raising the inflow tax rate, both in the short run and in the long run [see Column (3) in Table II].

In the short run, an increase in capital inflow taxes (τ_{l1}) curbs capital inflows induced by the foreign interest rate shock. Entrepreneurs rely more on domestic bank loans to finance investment and production. The increased demand for bank loans raises the domestic lending rate, stabilizing the investment and output booms driven by the surge in capital inflows. The more the planner favors the household (i.e., the larger the value of ω), the higher the optimal capital inflow tax rate in the short run (i.e., the higher the value of τ_{l1}).

In the long run, raising the capital inflow tax rate (τ_{l2}) leads to an increase in the domestic lending rate and in the enterpreneur's capital returns. But the increased lending rate depresses production and reduces labor income, hurting the household. The more the planner favors the household, the lower the long-run capital inflow tax rate (i.e., the value of τ_{l2} declines as ω rises), consistent with our analytical steady-state results in Section IV.

Next, consider the optimal response of the capital outflow tax policy to the foreign interest rate shock, holding the inflow tax rate constant [Columns (5)-(7) in Table II]. In the short run, the planner chooses to increase the capital outflow tax rate (τ_{d1}) relative to the benchmark level, resulting in a decline in the domestic deposit rate. In response, banks reduce the lending rate and increase the amount of loans. This leads to a boom in investment and production, raising the labor income for both the households and the entrepreneurs. The entrepreneurs' capital income rises relative to the household's, because the investment boom raises the capital price while the increase in the outflow tax rate depresses the household's returns on savings. The more the planner favors the household, the lower the short-run outflow tax rate. For a sufficiently large Pareto weight assigned to the household's welfare (e.g., $\omega = 0.7$), the planner chooses to subsidize capital outflows (i.e., $\tau_{d1} < 0$).

With the benchmark Pareto weight ($\omega = 0.5$), the long-run capital outflow tax rate is much lower than that in the short run [i.e., $\tau_{d2} < \tau_{d1}$, see Column (6) of the table]. The decline in the outflow tax rate raises the capital income of both agents in the long run, with

the households benefiting more than the entrepreneurs. The more the planner favors the households, the lower the long-run capital outflow tax rate, which is also consistent with our steady state analysis.

Overall, we find that shocks to foreign interest rates, working through its impact on capital flows, can potentially drive changes in welfare and income distributions in the small open economy. This finding holds true for both the baseline and the optimal capital account policies.

VI. EMPIRICAL EVIDENCE

Our model predicts that a shock that increases capital inflows should raise the income share of the entrepreneurs and thereby increase income inequality, whereas a shock that increases capital outflows should reduce inequality. In this section, we demonstrate that these model predictions are supported by empirical evidence.

VI.1. **Methodology and Data.** We examine the impact of changes in capital flows on income distributions using a panel of 87 emerging market economies, with annual data from 2002 to 2018.[14] We estimate our baseline regression model using an unbalanced panel with 968 country-year observations.[15]

We measure gross private capital inflows by changes in national liabilities, obtained from Lane and Milesi-Ferretti (2017), net of government borrowing, obtained from the World Debt Tables. Gross private capital outflows are measured by changes in national assets, also obtained from Lane and Milesi-Ferretti (2017), net of changes in total official reserves minus gold, obtained from the IMF *International Financial Statistics*.[16] We measure income inequality based on the World Bank's estimates of the Gini coefficient. We exclude

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[14]With our baseline conditioning variables included, the number of countries in our sample falls to 77. However, we demonstrate below that our results are robust to dropping these conditioning variables and examining the full 87 country sample.

[15]Our baseline model includes GDP and population series as conditional variables. These series are obtained from the Penn-World Tables 9.1, which imposes constraints on our sample size. Without the conditioning variables, our sample expands to 87 countries with 1,165 observations (after dropping missing observations).

[16]We thank Gian Maria Milesi-Ferretti and Nan Li for sharing the national assets and liabilities data, updated through 2018.

the offshore financial centers (OFC) from our sample based on the definition by Rose and Spiegel (2007).[17]

Since capital flows are potentially endogenous to domestic economic conditions, we use instrumental-variables (IV) estimation to isolate exogenous movements in capital flows and their implications for income inequality. Our model suggests that changes in the world interest rates can work through capital flows to drive changes in income distributions in a small open economy. We consider the countries in our sample to be relatively small, and thus changes in the world interest rates represent exogenous shocks. We measure the world interest rate by movements in the two-year U.S. Treasury yields, obtained from FRED of the Federal Reserve Bank of St. Louis.

To distinguish the impact of movements in two year U.S. Treasury yields across countries, we interact the interest rate movements with a measure of financial remoteness, and use this interaction variable as an instrument for capital flows, termed $INTREMOTE$. We follow Rose and Spiegel (2009) and measure financial remoteness by the logarithm of the great-circle distance of a country from New York City, the financial center of the United States.[18] A large literature documents that costs of financial intermediation increase with geographic distance, with physical distance impacting both returns and lending behavior. Indeed, Portes and Rey (2005) demonstrate that physical distance is a superior predictor of patterns in financial flows than in trade flows associated with the well-known "gravity model." As a result, some studies have found that financial remoteness is associated with enhanced business cycle volatility [e.g., Rose and Spiegel (2009)] and reduced global monetary policy "discipline" [e.g., Spiegel (2009)].

Since our baseline regression includes both inflows and outflows as independent variables, it requires more than one instrument. We therefore expand the set of IV variables by including regional dummies identifying EMEs from Asia ($ASIA$), Africa ($AFRICA$), or

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[17]Examples of offshore financial centers include Cayman Island, Cyprus, Monaco, Hong Kong, and Panama. See Rose and Spiegel (2007) for a complete list.

[18]Rose and Spiegel (2009) identify remoteness as the minimum distance of a country to either New York, London, or Tokyo. However, since our interacted variable is the two-year US treasury rate, remoteness from the United States seems more appropriate for our purposes.

the Western Hemisphere ($WESTHEM$). By including these regional dummies as instruments, we implicitly assume that the regional location of a country affects annual changes in its income distribution only through its impact on capital flows. Because we have more than one endogenous regressor, we report the CLR statistics for weak-instrument robust tests.[19]

Our use of regional fixed effects as instruments precludes the use of country fixed effects in the second stage, so we also introduce a battery of conditioning variables to control for other characteristics that may influence changes in income distribution over the course of our sample in our base specification. The set of conditioning variables includes the Chinn and Ito (2008) measure of capital account openness ($CAPOPEN$), the trade openness ($TRDOPEN$) measured by the share of exports plus imports in GDP, the World Bank governance indicator for "control of corruption" ($LOWCORR$), and the production-based GDP per capita ($GDPPCAP$) and population size (POP) from the Penn World Tables 9.1. Since the two-year Treasury yields are likely to influence global conditions, we also control for time fixed effects in our specifications.

We consider two alternative empirical specifications to study the relation between changes in income inequality and private capital flows, one for gross flows and the other for net flows. Our baseline second-stage specification for gross private flows satisfies

$$GGINI_{i,t} = c + \beta_1 PINFLOWS_{i,t} + \beta_2 POUTFLOWS_{i,t} + \beta X_{i,t} + \theta_t + \epsilon_{i,t} \quad (51)$$

where $GGINI_{i,t}$ denotes the change in country i's Gini coefficient from year $t-1$ to year t, $PINFLOWS_{i,t}$ denotes private capital inflows into country i in year t as a share of GDP, $POUTFLOWS_{i,t}$ denotes private capital outflows from country i in year t as a share of GDP, $X_{i,t}$ denotes the set of conditioning variable discussed above, θ_t represents

---

[19]See Pflueger and Wang (2015) for discussions of weak instrument tests in linear IV regressions and Finlay et al. (2014) for Stata implementations of weak-instrument robust tests. We have also calculated robust F statistics for the first-stage weak instrument test. Although such F statistics may have questionable accuracy in regressions with more than one endogenous regressor, they reject the null of weak instruments in our first-stage regressions (detailed results are available upon request).

time fixed effects, and $\epsilon_{i,t}$ represents the regression residual, with standard errors clustered

by year.

Similarly, our baseline second-stage specification for *net* private inflows satisfies

$$GGINI_{i,t} = c + \beta_1 NPINFLOWS_{i,t} + \beta X_{i,t} + \theta_t + \epsilon_{i,t} \tag{52}$$

where $NPINFLOWS_{i,t}$ represents net private inflows into country i in year t as a share

of GDP, calculated as the difference between $PINFLOWS_{i,t}$ and $POUTFLOWS_{i,t}$, and

other regressors are the same as the previous specification.

Table III displays the summary statistics for the sample used in our baseline regressions.

The data show a lot of variability, with outliers in both changes in the GINI coefficient and

capital flows. We therefore consider the robustness of our results to winsorizing the data in

our robustness checks, discussed below.

Overall, changes in the GINI coefficient in our sample on average are modest. Average

net inflows in our sample of emerging market countries are positive, and around 5 percent of

GDP per year. However, there are clearly large surges in both capital inflows and outflows

in our data, with inflows in some years in our sample exceeding the value of a country's

GDP.

Note that while our measures of private gross inflows and outflows are positive on aver-

age, we also observe large negative movements in these flows. Essentially, our convention

takes changes in private asset holdings as outflows, and changes in private liability holdings

as inflows. As such, for example, a large principal payment on private debt issuance would

be considered a negative movement in private inflows, and could result in a negative value

for overall annual private inflows. As these transactions are often lumpy, it is not surprising

that the absolute values of negative values for private inflows can exceed GDP for some

observations. This could be particularly true for "risk off" episodes in our sample, includ-

ing the global financial crisis. We therefore consider the implications of omitting the crisis

years from our sample in one of our robustness exercises below.

VI.2. **Baseline results.** Table IV shows the regression results under our baseline empirical specifications. Consistent with the theory's predictions, the regression results indicate that an increase in gross capital inflows is associated with an increase in income inequality, while an increase in gross outflows is associated with a decrease in income inequality [see Column (1)]. Both estimated coefficients are statistically significant at the 1% confidence level.

Based on the summary statistics in Table III, the point estimates in Column (1) of Table IV indicate that a one standard deviation annual increase in private inflows is associated on average with a 1.35 percentage point increase in the growth of a country's Gini coefficient in that year, while a one standard deviation increase in private outflows is associated with a 1.56 percentage point decrease.[20] These numbers are not just statistically significant, but also economically important. The CLR statistic strongly rejects the null of weak instruments, with a p-value of less than 1%.

Column (2) in Table IV reports the regression results in the specification for net private inflows. The estimation results show that an increase in net private inflows is associated with increased income inequality, again with statistical significance at a 1% confidence level. Our point estimate indicates that a one standard deviation increase in net private inflows is associated with a 1.80 percentage point increase in the growth of country's Gini coefficient in that year. As in the case for the gross flow regression in Column (1), the CLR statistic here rejects the null of weak instruments.

Our baseline estimation results are not driven by the second-stage conditioning variables. Dropping the conditioning variables from our second-stage regressions and running our full 87 country sample yields similar results to the baseline specification. These results are reported in Columns (3) and (4) in Table IV. Increases in gross (or net) private capital inflows continue to raise inequality, while increases in gross outflows continue to reduce it.

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[20]To get these numbers, we multiply the standard deviation of the private capital inflows (0.1267) or outflows (0.0591) by the point estimates of the coefficient on these two variables in the baseline regression (0.1068 and -0.2633, respectively), and scale the results by 100 to obtain the percentage point changes in the growth rate of the Gini coefficient.

These effects are statistically significant at the 1% level, and the magnitudes are comparable to those in the baseline specifications. Moreover, running the regression using the baseline sample (with 77 countries) but without the conditioning variables yields similar results as the baseline estimation [see columns (5) and (6) of the table].

VI.3. **Splitting the sample by saving rates or labor income shares.** Our model also predicts that the sensitivity of income distribution to capital flows may depend on the saving rate and the labor income share.

Since households are savers in our model, one may interpret an economy with a high saving rate as one with a large share of households. Our model suggests that, in such an economy, income inequality would be more sensitive to gross capital outflows than to gross (or net) inflows. With a high domestic saving rate, entrepreneurs can rely more on domestic bank credits for financing investment and production, such that capital inflows would have a smaller impact on income distribution. However, income distribution remains sensitive to changes in capital outflows because outflows raise earnings on foreign asset holdings by households.

In an economy with a higher labor share, the income distribution would depend more on labor income and less on capital income. Our model implies that, in an economy with a higher labor share, changes in capital inflows or outflows would have a smaller impact on income inequality.

To examine whether these predictions are supported by the data, we split our baseline sample in half based on average saving rates and labor shares over our sample periods. We obtain the data on saving rates and labor shares from the Penn World Tables 9.1. We then re-estimate the baseline specifications in Equations (51) and (52) to examine the impact of capital flows on income distribution. An economy is included in the "high savings" subsample if its average saving rate (averaged across time) exceeds the median. For those economies with average saving rates below the median, we group them in the "low savings" sub-sample. Similarly, if an economy has a labor income share above (below) the median, then it is included in the sub-sample of "high (low) labor share."

We report the estimation results in Table V. Columns (1)-(4) show that income inequality in a high-savings economy is less sensitive to gross (or net) capital inflows, but more sensitive to capital outflows, than in a low-savings economy. This is consistent with our theory, although the differences of the point estimates across high vs. low savings economies are statistically insignificant.

Columns (5)-(8) show the estimation results for the subsamples with high vs. low labor income shares. Income inequality in a high labor share economy is not sensitive to capital flows [Columns (5)-(6)], reflecting that income inequality is primarily driven by labor income, not by capital income. In contrast, income inequality in an economy with a low labor share is sensitive to both capital inflows and outflows [Columns (7)-(8)]. These results are consistent with our model's predictions.

VI.4. **Robustness.** We have conducted a battery of further robustness checks. To conserve space, we present those results in Table VI, Table VII and Table VIII.

Table VI shows the estimation results for a variety of perturbations to the empirical specifications and control variables. These include using different measures of capital account restrictions constructed by Fernández et al. (2016) (FKRSU) in place of the Chinn-Ito index (Models 1 and 2), including years of schooling as an additional control variable (Model 3), including additional controls (one at a time) the World Governance Indicators (WGI) for voice and accountability, political stability, government effectiveness, regulatory quality, or rule of law (Models 4-8), adding the log distance from New York City as a remoteness variable on its own (Model 9), and using country fixed effects instead of regional dummies as instruments (Model 10).

In all cases, the estimated coefficients on the variables of interest continue to enter with the predicted signs and similar levels of statistical significance. An exception is the case for capital outflows in the model with the education variable added. Even in that case, the

outflow variable continues to enter negatively with a similar point estimate, although the standard error is relatively large.[21]

Table VII examines the robustness of our results to a variety of changes in sample. We drop the extreme observations with very large or very small private inflows and outflows one at a time, with the outliers defined as the observations more than three standard deviations from the sample mean. We also drop the observations with exceptionally unequal or exceptionally equal income distributions, and those with exceptionally remote or proximate countries, again one at a time with the outliers defined as the realizations more than three standard deviations from the sample mean. We also drop the observations coinciding with the 2008 and 2009 global financial crisis. For all of these perturbations, we re-estimate our base specification and cluster the standard errors by year. Our estimation results are robust to all of these perturbations. The estimated coefficients on the variables of interest all enter with the predicted signs and with strong statistical significance.

Finally, Table VIII examines the robustness of our results to changes in estimation methods. First, to demonstrate that our baseline estimation results are not driven by outliers in the data, we winsorize the sample at the 1% level. Next, we re-estimate our baseline specification with White's heteroskedasticity-robust standard errors, and then with regular standard errors. Finally, instead of clustering by year, we cluster by region and then by country. All of the specifications continue to enter with statistical significance and with point estimates similar to what we obtain under the base specification.

Overall then, consistent with our theory, the empirical results provide robust evidence that private capital inflows, both gross and net, are associated with short-run increases in income inequality, while private capital outflows are associated with short-run declines in inequality.

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[21]The issue here appears to be about the sample, rather than the inclusion of the education variable: the sample is reduced to 776 observations when we include the education variable. To confirm this conjecture, we estimate our baseline specification without the education variable, but with this smaller sample. We find that the statistical significance of the estimated coefficient on private capital outflows marginally misses the 10% confidence level.

VII. Conclusion

We build a small open economy model with heterogeneous agents and financial frictions to illustrate the channels through which capital flows can impact on income inequality. The model implies that, in the steady state, liberalizing capital inflows or outflows would raise the households' share of income and thus reduce inequality. In the short run, however, the model predicts that changes in capital inflows and outflows have different impacts on income distributions. In particular, a surge in capital inflows led by transitory declines in the world interest rate would benefit borrowers (entrepreneurs) at the expense of savers (households) and thus raises income inequality, whereas a short-run increase in capital outflows reduces it.

We solve for optimal policies for the social planner with a range of Pareto weights over the welfare of the two types of agents. Our results suggest that a planner that favors the households responds to a temporary decline in the foreign interest rate by increasing controls on inflows and reducing controls on outflows. In contrast, in the steady state, the planner who favors the households would choose to reduce taxes on both inflows and outflows.

Our model's predicted short-run implications of capital flows for income inequality are supported by the data. Using a panel of emerging market economies, and instrumenting for the potential endogeneity of capital flows, we demonstrate that private capital inflows are associated with transitory increases in income inequality while private capital outflows are associated with declines in inequality. These results are robust and provide empirical support to our model's mechanism.

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APPENDIX A. STEADY STATE SOLUTION

The household's intertemporal optimizing decisions are given by

$$1 = \mathrm{E}_t \beta R_t \frac{\Lambda_{h,t+1}^o}{\Lambda_{ht}^y}, \tag{A1}$$

$$1 = \mathrm{E}_t \beta (1 - \tau_d) R_t^* \frac{\Lambda_{h,t+1}^o}{\Lambda_{ht}^y}, . \tag{A2}$$

where $\Lambda_{ht}^y = \frac{1}{C_{ht}^y}$ and $\Lambda_{ht}^o = \frac{1}{C_{ht}^o}$ denote the Lagrangian multipliers associated with the budget constraints for the young and the old households, respectively.

In the interior equilibrium, the no-arbitrage condition Eq. (5) solves for the domestic deposit rate:

$$R = (1 - \tau_d) R^*. \tag{A3}$$

In what follows, we first take the lending rate R_l as given and solve for expressions of saving, debt, capital and income as a fraction of output. We then use these expressions to solve for the lending rate and the output as functions of τ_d and τ_l .

We first derive the expressions for the household's income as a fraction of output. The optimal cost-minimizing solution (12) implies that households' labor income is a constant fraction of the output,

$$\frac{W_h^l}{Y} = \alpha\theta. \tag{A4}$$

With the household's budget constraints, we have,

$$\frac{C_h^y}{Y} = \alpha(1 - \theta) - \left(\frac{D}{Y} + \frac{B_f^d}{Y}\right), \tag{A5}$$

$$\frac{C_h^o}{Y} = R\frac{D}{Y} + (1 - \tau_d)R^*\frac{B_f^d}{Y} = (1 - \tau_d)R^*\left(\frac{D}{Y} + \frac{B_f^d}{Y}\right). \tag{A6}$$

By substituting the above expressions into the household's optimal saving condition (A1), we can solve for the household's total saving amount:

$$\frac{D}{Y} + \frac{B_f^d}{Y} = \frac{\beta\alpha\theta}{1 + \beta}. \tag{A7}$$

The household's capital income is then given by,

$$\frac{W_h^c}{Y} = [(1 - \tau_d)R^* - 1](\frac{D}{Y} + \frac{B_f^d}{Y}) = [(1 - \tau_d)R^* - 1]\frac{\beta\alpha\theta}{1 + \beta}. \tag{A8}$$

We now derive the expressions for the entrepreneur's income as a fraction of output.

The entrepreneur's intertemporal optimizing decisions are summarized by the following equations:

$$1 = \mathrm{E}_t\beta R_{lt}\frac{\Lambda_{e,t+1}^o}{\Lambda_{et}^y}, \tag{A9}$$

$$q_t^k + \frac{\Omega_k}{2}(\frac{I_t}{K_t^o} - \frac{\bar{I}}{\bar{K}^o})^2 - \Omega_k(\frac{I_t}{K_t^o} - \frac{\bar{I}}{\bar{K}^o})\frac{I_t}{K_t^o} = \mathrm{E}_t\beta[q_{t+1}^k(1-\delta) + r_{t+1}^k]\frac{\Lambda_{e,t+1}^o}{\Lambda_{et}^y} \tag{A10}$$

$$1 + \Omega_k(\frac{I_t}{K_t^o} - \frac{\bar{I}}{\bar{K}^o}) = \mathrm{E}_t\beta[q_{t+1}^k(1-\delta) + r_{t+1}^k]\frac{\Lambda_{e,t+1}^o}{\Lambda_{et}^y} \tag{A11}$$

where $\Lambda_{et}^y = \frac{1}{C_{et}^y}$ and $\Lambda_{et}^o = \frac{1}{C_{et}^o}$ denote the Lagrangian multipliers associated with the budget constraints for the young and the old entrepreneurs, respectively.

The optimal cost-minimizing solution (12) implies that entrepreneurs' labor income is a constant fraction of the output,

$$\frac{W_e^l}{Y} = \alpha(1 - \theta). \tag{A12}$$

The entrepreneur's optimal conditions Eq. (A9) - Eq. (A11) implies that, in the steady state, the entrepreneur's return to capital equals the domestic lending rate:

$$1 - \delta + r^k = R_l. \tag{A13}$$

With the entrepreneur's budget constraints, we have,

$$\frac{C_e^y}{Y} = \alpha(1 - \theta) - \frac{N_e}{Y}, \tag{A14}$$

$$\frac{C_e^o}{Y} = R_l\frac{N_e}{Y}. \tag{A15}$$

where $\frac{N_e}{Y}$ is the ratio of the entrepreneur's net worth to total output:

$$\frac{N_e}{Y} \equiv \frac{K}{Y} - \frac{B}{Y} - \frac{B_f^l}{Y}. \tag{A16}$$

By substituting the above expressions into the entrepreneur's optimal borrowing condition (A9), we can solve for the entrepreneur's net worth:

$$\frac{N_e}{Y} = \frac{\beta\alpha\theta(1-\theta)}{1+\beta}. \tag{A17}$$

The entrepreneur's capital income is then given by,

$$\frac{W_e^c}{Y} = (R_l - 1)\frac{N_e}{Y} = (R_l - 1)\frac{\beta\alpha(1-\theta)}{1+\beta}. \tag{A18}$$

We now solve for the domestic lending rate R_l. We first use (13),(17) and (18) to express $\frac{K}{Y}$, $\frac{B}{Y}$ and $\frac{B_f^l}{Y}$ as a function of the lending interest rate R_l,

$$\frac{K}{Y} = \frac{1-\alpha}{r^k} = \frac{1-\alpha}{R_l - 1 + \delta}, \tag{A19}$$

$$\frac{B}{Y} = (\frac{\frac{R_l}{R}-1}{\xi\eta})^{\frac{1}{\eta-1}} = (\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta})^{\frac{1}{\eta-1}}, \tag{A20}$$

$$\frac{B_f^l}{Y} = \kappa_f + \frac{1}{\Phi_b}\ln\left[\frac{(1-\tau_l)R_l}{R^*}\right]. \tag{A21}$$

By substituting the above expressions into (A16), we can express $\frac{N_e}{Y}$ as a function of R_l, τ_l and τ_d,

$$\frac{N_e}{Y} \equiv f(R_l, \tau_d, \tau_l) = \frac{1-\alpha}{R_l - 1 + \delta} - (\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta})^{\frac{1}{\eta-1}} - \kappa_f - \frac{1}{\Phi_b}\ln\left[\frac{(1-\tau_l)R_l}{R^*}\right]. \tag{A22}$$

We can then solve for R_l as a function of τ_d and τ_l by combining (A22) with (39). In particular, define $R_l \equiv \mathcal{R}(\tau_d, \tau_l)$. The function $\mathcal{R}(\cdot, \cdot)$ is then given by,

$$f(\mathcal{R}(\tau_d, \tau_l), \tau_d, \tau_l) = \frac{\beta\alpha\theta(1-\theta)}{1+\beta}. \tag{A23}$$

Last, we solve for the output. Using the cost-minimizing solution (13), we obtain,

$$\frac{K}{Y} = \frac{1-\alpha}{r^k} \tag{A24}$$

where the capital rent rate r^k is given by Eq.(A13).

With some algebra, we can solve for the output as a function of the domestic lending rate R_l,

$$Y = \left(\frac{K}{Y}\right)^{\frac{1-\alpha}{\alpha}} = \left(\frac{1-\alpha}{r^k}\right)^{\frac{1-\alpha}{\alpha}} = \left(\frac{1-\alpha}{R_l - 1 + \delta}\right)^{\frac{1-\alpha}{\alpha}}. \tag{A25}$$

APPENDIX B. PROOFS OF PROPOSITIONS

B.1. **Proof for Proposition IV.1.**

Proof. For convenience of references, we rewrite Equation (A23), which solves for $R_l \equiv \mathcal{R}(\tau_d, \tau_l)$ as a function of τ_d and τ_l:

$$f(\mathcal{R}(\tau_d, \tau_l), \tau_d, \tau_l) = \frac{\beta\alpha\theta(1-\theta)}{1+\beta}.$$

where the function $f(\cdot)$ is given by Equation (A22):

$$f(R_l, \tau_d, \tau_l) = \frac{1-\alpha}{R_l - 1 + \delta} - \left(\frac{\frac{R_l}{(1-\tau_d)R^*} - 1}{\xi\eta}\right)^{\frac{1}{\eta-1}} - \kappa_f - \frac{1}{\Phi_b}\ln\left[\frac{(1-\tau_l)R_l}{R^*}\right].$$

Given that the right hand side of Equation (A23) is a constant, we have,

$$\frac{\partial f}{\partial \tau_d} = f_1\frac{\partial \mathcal{R}}{\partial \tau_d} + f_2 = 0, \tag{A26}$$

$$\frac{\partial f}{\partial \tau_l} = f_1\frac{\partial \mathcal{R}}{\partial \tau_l} + f_3 = 0. \tag{A27}$$

where

$$f_1 = -\frac{1-\alpha}{(R_l - 1 + \delta)^2} - \frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*} - 1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{1}{(1-\tau_d)R^*\xi\eta} - \frac{1}{\Phi_b R_l} < 0 \tag{A28}$$

$$f_2 = -\frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*} - 1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{R_l}{R^*\xi\eta}\frac{1}{(1-\tau_d)^2} < 0, \tag{A29}$$

$$f_3 = \frac{1}{\Phi_b(1-\tau_l)} > 0. \tag{A30}$$

Then, we solve for the first derivatives of $\mathcal{R}(\cdot, \cdot)$,

$$\frac{\partial \mathcal{R}}{\partial \tau_d} = -\frac{f_2}{f_1} < 0, \tag{A31}$$

$$\frac{\partial \mathcal{R}}{\partial \tau_l} = -\frac{f_3}{f_1} > 0. \tag{A32}$$

$\square$

B.2. **Proof for Proposition IV.3.**

Proof. For convenience of references, we rewrite Equation (37), which expresses the household's capital income as a function of τ_d and τ_l:

$$W_h^c \equiv \mathcal{W}_h(\tau_d, \tau_l) = [(1 - \tau_d)R^* - 1]\frac{\beta\alpha\theta}{1+\beta}\mathcal{Y}(\tau_d, \tau_l).$$

Then, the first derivatives of the household's capital income with respect to τ_l is given by,

$$\frac{\partial \mathcal{W}_h}{\partial \tau_l} = [(1 - \tau_d)R^* - 1]\frac{\beta\alpha\theta}{1+\beta}\frac{\partial \mathcal{Y}}{\partial \tau_l} < 0.$$

The first derivatives of the household's capital income with respect to τ_d is given by,

$$\frac{\partial \mathcal{W}_h}{\partial \tau_d} = \frac{\beta\alpha\theta}{1+\beta}\{-R^*\mathcal{Y}(\tau_d, \tau_l) + [(1 - \tau_d)R^* - 1]\frac{\partial \mathcal{Y}}{\partial \tau_d}\}.$$

where

$$\frac{\partial \mathcal{Y}}{\partial \tau_d} = y'(R_l)\frac{\partial \mathcal{R}}{\partial \tau_d}$$

$$= \frac{1-\alpha}{\alpha}\frac{Y}{R_l}\frac{-\frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{R_l}{R^*\xi\eta}\frac{1}{(1-\tau_d)^2}}{-\frac{1-\alpha}{(R_l-1+\delta)^2}-\frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{1}{(1-\tau_d)R^*\xi\eta}-\frac{1}{\Phi_b R_l}}$$

$$= \frac{1-\alpha}{\alpha}\frac{Y}{(1-\tau_d)}\frac{\frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{1}{R^*\xi\eta}\frac{1}{(1-\tau_d)}}{\frac{1-\alpha}{(R_l-1+\delta)^2}+\frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{1}{(1-\tau_d)R^*\xi\eta}+\frac{1}{\Phi_b R_l}}$$

$$< \frac{1-\alpha}{\alpha}\frac{Y}{(1-\tau_d)}.$$

Then, we have,

$$\frac{\partial \mathcal{W}_h}{\partial \tau_d} = \frac{\beta\alpha\theta}{1+\beta}\{-R^*\mathcal{Y}(\tau_d, \tau_l) + [(1-\tau_d)R^* - 1]\frac{\partial \mathcal{Y}}{\partial \tau_d}\}$$

$$< \frac{\beta\alpha\theta}{1+\beta}\{-R^*\mathcal{Y}(\tau_d, \tau_l) + [(1-\tau_d)R^* - 1]\frac{1-\alpha}{\alpha}\frac{\mathcal{Y}(\tau_d, \tau_l)}{(1-\tau_d)}\}$$

$$= \frac{\beta\alpha\theta}{1+\beta}\frac{\mathcal{Y}(\tau_d, \tau_l)}{(1-\tau_d)}\{-(1-\tau_d)R^* + [(1-\tau_d)R^* - 1]\frac{1-\alpha}{\alpha}\}$$

If the labor share α is large enough so that $(\frac{\alpha}{1-\alpha} > \frac{(1-\tau_d)R^*-1}{(1-\tau_d)R^*})$, then

$$\frac{\partial \mathcal{W}_h}{\partial \tau_d} < \frac{\beta\alpha\theta}{1+\beta}\frac{\mathcal{Y}(\tau_d, \tau_l)}{(1-\tau_d)}\{-(1-\tau_d)R^* + [(1-\tau_d)R^* - 1]\frac{1-\alpha}{\alpha}\} < 0.$$

$\square$

B.3. **Proof for Proposition IV.4.**

Proof. For convenience of references, we rewrite Equation (40), which expresses the entrepreneur's capital income as a function of the lending interest rate R_l:

$$W_h^e \equiv w_e(R_l) = (R_l - 1)\frac{\beta\alpha(1-\theta)}{1+\beta}y(R_l).$$

where $y(R_l)$ expresses the output as a function of R_l,

$$y(R_l) = (\frac{1-\alpha}{R_l - 1 + \delta})^{\frac{1-\alpha}{\alpha}}.$$

Then, the first derivatives of the entrepreneur's capital income with respect to R_l is given by,

$$w_e'(R_l) = \frac{\beta\alpha(1-\theta)}{1+\beta}[y(R_l) + (R_l - 1)y'(R_l)]$$

$$= \frac{\beta\alpha(1-\theta)}{1+\beta}[y(R_l) - (R_l - 1)\frac{1-\alpha}{\alpha}\frac{y(R_l)}{R_l}]$$

$$= \frac{\beta\alpha(1-\theta)}{1+\beta}\frac{y(R_l)}{R_l}[R_l - (R_l - 1)\frac{1-\alpha}{\alpha}].$$

If the labor share α is large enough so that $(\frac{\alpha}{1-\alpha} > \frac{R_l-1}{R_l})$, then the entrepreneur's capital income is an increasing function of the lending interest rate R_l

$$w_e'(R_l) = \frac{\beta\alpha(1-\theta)}{1+\beta}\frac{y(R_l)}{R_l}[R_l - (R_l - 1)\frac{1-\alpha}{\alpha}] > 0.$$

Denote $\mathcal{R}(\tau_d, \tau_l)$ as a function of the policy parameters τ_d and τ_l that solves for the steady-state domestic lending rate R_l for given values of τ_d and τ_l. Then, we can express the entrepreneur's capital income as a function of τ_d and τ_l:

$$W_h^e \equiv \mathcal{W}_e(\tau_d, \tau_l) = w_e(\mathcal{R}(\tau_d, \tau_l)).$$

Then, using Proposition IV.1, the first derivatives of the entrepreneur's capital income with respect to τ_d and τ_l are given by,

$$\frac{\partial \mathcal{W}_e}{\partial \tau_d} = w_e'(R_l)\frac{\partial \mathcal{R}}{\partial \tau_d} < 0,$$
$$\frac{\partial \mathcal{W}_e}{\partial \tau_l} = w_e'(R_l)\frac{\partial \mathcal{R}}{\partial \tau_l} > 0.$$

$\square$

B.4. **Proof for Proposition IV.5.**

Proof. For convenience of references, we rewrite Equation (42), which expresses the capital income ratio between the household and the entrepreneur as a function of τ_d and τ_l:

$$\frac{W_h^c}{W_e^c} \equiv \mathcal{W}_c(\tau_d, \tau_l) = \frac{\theta}{1-\theta}\frac{(1-\tau_d)R^* - 1}{\mathcal{R}(\tau_d, \tau_l) - 1}.$$

where $\mathcal{R}(\tau_d, \tau_l)$ solves for the steady-state domestic lending rate R_l as a function of τ_d and τ_l, given by Proposition IV.1.

Then, the first derivatives of the capital income ratio with respect to τ_l is given by,

$$\frac{\partial \mathcal{W}_c}{\partial \tau_l} = -\frac{\theta}{1-\theta}\frac{(1-\tau_d)R^* - 1}{[\mathcal{R}(\tau_d, \tau_l) - 1]^2}\frac{\partial \mathcal{R}}{\partial \tau_l} < 0.$$

The first derivatives of the capital income ratio with respect to τ_d is given by,

$$\frac{\partial \mathcal{W}_c}{\partial \tau_d} = \frac{\theta}{1-\theta} \frac{-R^*[\mathcal{R}(\tau_d, \tau_l) - 1] - [(1-\tau_d)R^* - 1]\frac{\partial \mathcal{R}}{\partial \tau_d}}{[\mathcal{R}(\tau_d, \tau_l) - 1]^2}.$$

where $\frac{\partial \mathcal{R}}{\partial \tau_d}$ is given by,

$$\frac{\partial \mathcal{R}}{\partial \tau_d} = -\frac{-\frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{R_l}{R^*\xi\eta}\frac{1}{(1-\tau_d)^2}}{-\frac{1-\alpha}{(R_l-1+\delta)^2} - \frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{1}{(1-\tau_d)R^*\xi\eta} - \frac{1}{\Phi_b R_l}}$$

$$= -\frac{R_l}{(1-\tau_d)} \frac{\frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{1}{R^*\xi\eta}\frac{1}{(1-\tau_d)}}{\frac{1-\alpha}{(R_l-1+\delta)^2} + \frac{1}{\eta-1}\left(\frac{\frac{R_l}{(1-\tau_d)R^*}-1}{\xi\eta}\right)^{\frac{1}{\eta-1}-1}\frac{1}{(1-\tau_d)R^*\xi\eta} + \frac{1}{\Phi_b R_l}}$$

$$> -\frac{R_l}{(1-\tau_d)} = -\frac{\mathcal{R}(\tau_d, \tau_l)}{(1-\tau_d)}.$$

Then, we have,

$$\frac{\partial \mathcal{W}_c}{\partial \tau_d} = \frac{\theta}{1-\theta} \frac{-R^*[\mathcal{R}(\tau_d, \tau_l) - 1] - [(1-\tau_d)R^* - 1]\frac{\partial \mathcal{R}}{\partial \tau_d}}{[\mathcal{R}(\tau_d, \tau_l) - 1]^2}$$

$$< \frac{\theta}{1-\theta} \frac{-R^*[\mathcal{R}(\tau_d, \tau_l) - 1] + [(1-\tau_d)R^* - 1]\frac{\mathcal{R}(\tau_d,\tau_l)}{(1-\tau_d)}}{[\mathcal{R}(\tau_d, \tau_l) - 1]^2}$$

$$= \frac{\theta}{1-\theta} \frac{R^* - \frac{\mathcal{R}(\tau_d,\tau_l)}{(1-\tau_d)}}{[\mathcal{R}(\tau_d, \tau_l) - 1]^2}$$

Note that under financial frictions, the domestic lending rate is absolutely higher than the domestic deposit rate, which implies that,

$$\mathcal{R}(\tau_d, \tau_l) = R_l > R = R^*(1 - \tau_d).$$

Then

$$\frac{\partial \mathcal{W}_c}{\partial \tau_d} < \frac{\theta}{1-\theta} \frac{R^* - \frac{\mathcal{R}(\tau_d,\tau_l)}{(1-\tau_d)}}{[\mathcal{R}(\tau_d, \tau_l) - 1]^2} < 0.$$

$\square$

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TABLE I. Calibration

Parameter	Description	Value
β	Household discount rate	0.665
δ	Capital depreciation rate	0.651
Ω_k	Scale of capital adjustment cost	5
r^*	Foreign interest rate	1.480
Γ	Transfer from old to young	0.53
α	Labor income share	0.5
θ	Household labor income share	0.67
Φ_b	Elasticity of risk premium on external debt	3
κ_f	Steady-state ratio of external debt to output	0.04
ξ	Scale of intermediation cost	0.57
η	Elasticity of intermediation cost	1.6
ω	Pareto weight on household welfare	0.5
τ_d	Tax rate on foreign asset	1.64%
τ_l	Tax rate on foreign debt	10.17%

TABLE II. Optimal capital account policies following transitory declines in
the foreign interest rate

	Benchmark policy	Optimal inflow tax			Optimal outflow tax		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ω	0.5	0.3	0.5	0.7	0.3	0.5	0.7
τ_{l1}	10.17%	15.35%	18.43%	20.69%	−	−	−
τ_{l2}	10.17%	27.07%	22.60%	19.16%	−	−	−
τ_{d1}	1.64%	−	−	−	22.81%	8.68%	−30.98%
τ_{d2}	1.64%	−	−	−	10.07%	1.74%	−27.27%

TABLE III. Summary Statistics

Variables	(1) N	(2) Mean	(3) Std. Dev.	(4) Min	(5) Max
$GGINI$	968	-0.002	0.006	-0.030	0.027
$PINFLOWS$	968	0.07	0.13	-0.92	1.13
$POUTFLOWS$	968	0.02	0.06	-0.89	0.31
$NPINFLOWS$	968	0.05	0.13	-1.04	1.04

Note: Summary statistics of the data sample for the baseline regressions. $GGINI$ denotes the change in the GINI coefficient, $PINFLOWS$ denotes the private capital inflows, $POUTFLOWS$ denotes the private capital outflows, and $NPINFLOWS$ denotes the net private capital inflows. See the text for detailed descriptions of these variables.

Source: IMF International Financial Statistics and the World Bank.

TABLE IV. Baseline regression results

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
$PINFLOWS$	0.107***		0.083***		0.116***	
	(0.042)		(0.028)		(0.026)	
$POUTFLOWS$	-0.263***		-0.315***		-0.338***	
	(0.100)		(0.056)		(0.109)	
$NPINFLOWS$		0.141***		0.086***		0.112***
		(0.031)		(0.024)		(0.023)
$CAPOPEN$	-0.003*	-0.003**				
	(0.002)	(0.002)				
$TRDOPEN$	-0.004	-0.010***				
	(0.000)	(0.003)				
$LOWCORR$	-0.000	-0.001				
	(0.006)	(0.001)				
$GDPPCAP$	-0.004	-0.010				
	(0.001)	(0.007)				
POP	0.007	0.010**				
	(0.005)	(0.005)				
$Constant$	0.001	-0.002	0.006***	-0.001***	-0.003	-0.009***
	(0.002)	(0.001)	(0.002)	(0.000)	(0.004)	(0.002)
Observations	968	968	1,165	1,165	968	968
CLR	12.76	12.12	14.00	13.60	13.07	12.37
P-value	0.01	0.01	0.01	0.01	0.01	0.01

Note: Two-stage least squares estimation with $INTREMOTE$ and regional dummies as instruments for $PINFLOWS$, $POUTFLOWS$, $NPINFLOWS$. Year fixed effects are included in all specifications. See the text for the variable definitions. For models (1), (2), we use the base sample with the conditioning variables. For models (3), and (4), we drop the conditioning variables, and thus expanding the sample size. For models (5) and (6), we use the base sample but drop the conditioning variables. Robust standard errors are shown in parentheses. P-values are for the CLR test of weak instruments. Statistical significance levels are indicated by the asterisks: *** p<0.01, ** p<0.05, and * p<0.10.

TABLE V. Samples split by savings rates and labor shares

VARIABLES	High Savings		Low Savings		High Labor Share		Low Labor Share	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$PINFLOWS$	0.048***		0.115*		0.063		0.095**	
	(0.018)		(0.070)		(0.076)		(0.044)	
$POUTFLOWS$	-0.173**		-0.134**		-0.126		-0.295***	
	(0.068)		(0.061)		(0.100)		(0.089)	
$NPINFLOWS$		0.070***		0.121**		0.081		0.123**
		(0.013)		(0.058)		(0.054)		(0.052)
$CAPOPEN$	-0.003	-0.002	-0.005***	-0.005**	-0.003	-0.003	-0.002	-0.002
	(0.003)	(0.001)	(0.002)	(0.000)	(0.003)	(0.002)	(0.002)	(0.002)
$TRDOPEN$	0.000	-0.000***	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$LOWCORR$	0.001	0.001**	-0.002	-0.003	-0.000	-0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
$GDPPCAP$	0.000	-0.000**	0.000	0.000	-0.000	-0.000**	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
POP	0.001*	-0.000***	0.000	-0.000	0.000**	0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Constant$	0.001	-0.001	-0.000	-0.001	-0.002	-0.003	0.000	-0.002
	(0.001)	(0.001)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Observations	437	437	437	437	479	479	489	489
CLR	12.02	11.10	14.53	14.24	12.81	11.89	13.69	13.39
PVAL	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01

Note: Two-stage least squares estimation with INTREMOTE and country fixed effects as instruments for $PINFLOWS$; $POUTFLOWS$; $NPINFLOWS$. Year fixed effects in all specifications, suppressed here for space considerations. See text for variable definitions. Robust standard errors are shown in parentheses. Statistical significance levels are indicated by the asterisks: *** p<0.01, ** p<0.05, and * p<0.10.

TABLE VI. Alternative specifications

Model	(1) PINFLOWS	(2) POUTFLOWS	(3) NPINFLOWS
(1) FKRSU Total	0.221**	-0.310**	0.234***
	(0.088)	(0.144)	(0.082)
(2) FKRSU Inf. and Out.	0.205***	-0.316**	0.218***
	(0.078)	(0.139)	(0.076)
(3) Education	0.143**	-0.261	0.159***
	(0.056)	(0.194)	(0.048)
(4) Voice and Acct.	0.123**	-0.299**	0.141***
	(0.048)	(0.145)	(0.041)
(5) Pol. Stab.	0.109***	-0.270**	0.141***
	(0.041)	(0.105)	(0.031)
(6) Govt. Eff.	0.105**	-0.264***	0.148***
	(0.047)	(0.097)	(0.031)
(7) Reg. Qual.	0.105**	-0.254**	0.149***
	(0.047)	(0.108)	(0.029)
(8) Rule of Law	0.093**	-0.248***	0.131***
	(0.045)	(0.093)	(0.029)
(9) Remoteness	0.055**	-0.162***	0.084***
	(0.025)	(0.047)	(0.025)
(10) Country FEs	0.021***	-0.054***	0.021***
	(0.005)	(0.006)	(0.004)

Note: Two-stage least squares estimation with $INTREMOTE$ and regional fixed effects as instruments for $PINFLOWS$, $POUTFLOWS$, $NPINFLOWS$ with standard errors clustered by year (except where indicated otherwise). Models (1) and (2) apply Fernández et al. (2016) (FKRSU) restrictions. Model (3) adds years of schooling. Model (4) adds the WGI voice and accountability variable. Model (5) adds the WGI political stability variable. Model (6) adds the WGI government effectiveness measure. Model (7) adds the WGI regulatory quality. Model (8) adds the WGI rule of law. Model (9) adds the log of distance from New York City. Model (10) uses country dummies instead of regions as instruments. Year fixed effects are included throughout. See text for variable definitions. Statistical significance levels indicated by asterisks: *** $p<0.01$, ** $p<0.05$, and * $p<0.10$.

TABLE VII. Alternative samples

Model	(1) PINFLOWS	(2) POUTFLOWS	(3) NPINFLOWS
(1) Drop Large Inflows	0.141*	-0.331**	0.194***
	(0.077)	(0.140)	(0.066)
(2) Drop Small Inflows	0.133**	-0.204*	0.156***
	(0.056)	(0.111)	(0.029)
(3) Drop Large Outflows	0.104**	-0.278***	0.139***
	(0.043)	(0.104)	(0.031)
(4) Drop Small Outflows	0.118***	-0.305**	0.139***
	(0.036)	(0.129)	(0.035)
(5) Drop High GINI	0.109**	-0.247***	0.143***
	(0.042)	(0.093)	(0.030)
(6) Drop Low GINI	0.101**	-0.279***	0.134***
	(0.041)	(0.104)	(0.031)
(7) Drop Most Remote	0.107**	-0.263***	0.141***
	(0.042)	(0.100)	(0.031)
(8) Drop Least Remote	0.107**	-0.263***	0.141***
	(0.042)	(0.100)	(0.031)
(9) Drop Crisis Years	0.077**	-0.297**	0.110***
	(0.034)	(0.118)	(0.023)

Note: Two-stage least squares estimation with $INTREMOTE$ and country fixed effects as instruments for $PINFLOWS$, $POUTFLOWS$, $NPINFLOWS$ with standard errors clustered by year (except where indicated otherwise). Year fixed effects included throughout. See text for variable definitions. Models (1) through (8) drop observations with variables more than three standard errors from sample means. Model (9) drops crisis years 2008 and 2009. Statistical significance levels indicated by asterisks: *** p<0.01, ** p<0.05, and * p<0.10.

TABLE VIII. Alternative estimation methods

Model	(1) PINFLOWS	(2) POUTFLOWS	(3) NPINFLOWS
(1) Winzorize 1%	0.132**	-0.289**	0.160***
	(0.052)	(0.119)	(0.040)
(2) Robust SEs	0.107**	-0.263***	0.141***
	(0.045)	(0.096)	(0.038)
(3) Standard SEs	0.107**	-0.263***	0.141***
	(0.052)	(0.090)	(0.031)
(4) Cluster by Region	0.107***	-0.263***	0.141***
	(0.028)	(0.040)	(0.034)
(5) Cluster by Country	0.107**	-0.263***	0.141***
	(0.050)	(0.100)	(0.051)

Note: Two-stage least squares estimation with $INTREMOTE$ and country fixed effects as instruments for $PINFLOWS$, $POUTFLOWS$, $NPINFLOWS$ with standard errors clustered by year (except where indicated otherwise). Year fixed effects included throughout. See text for variable definitions. Models (1) winsorizes at the 1% level. Model (2) estimated with robust standard errors. Model (3) estimated with conventional standard errors. Model (4) clusters by country FEs. Statistical significance levels indicated by asterisks: *** $p<0.01$, ** $p<0.05$, and * $p<0.10$.
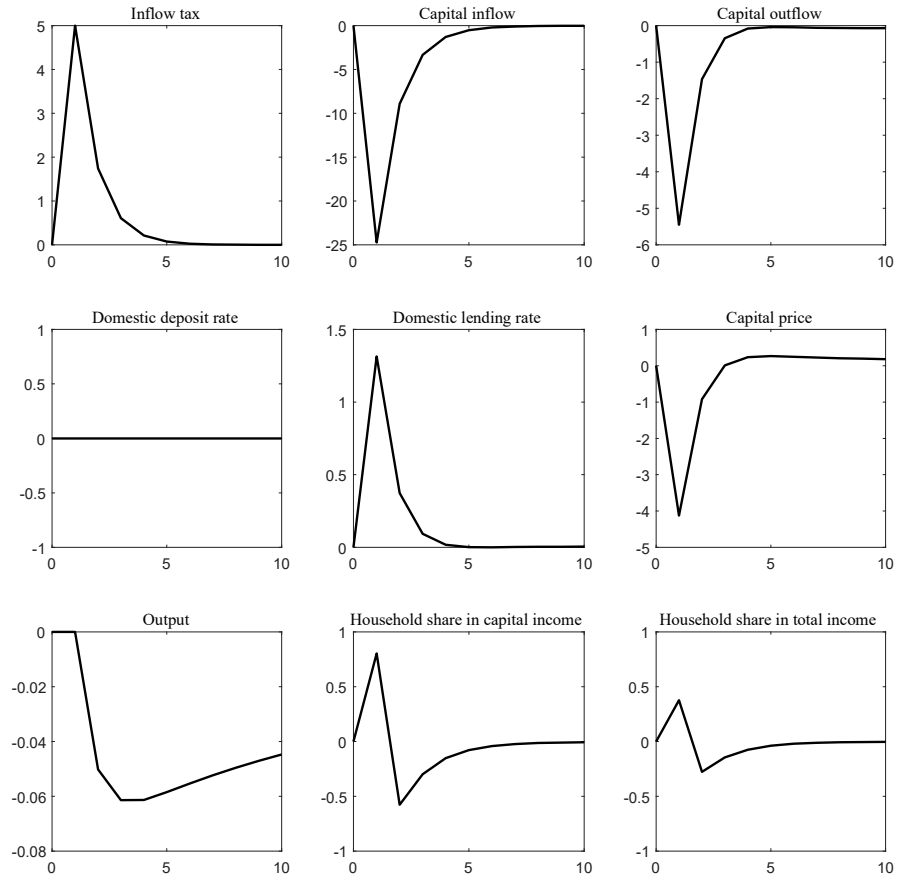
FIGURE I
The transition path following a temporary rise in the inflow tax τ_l.

The vertical axis units of the inflow tax and the credit spread ($\frac{R_l}{R} - 1$) are the percentage-point deviations from the steady state level. The vertical axis units of all other variables are percent deviations from the steady state levels.
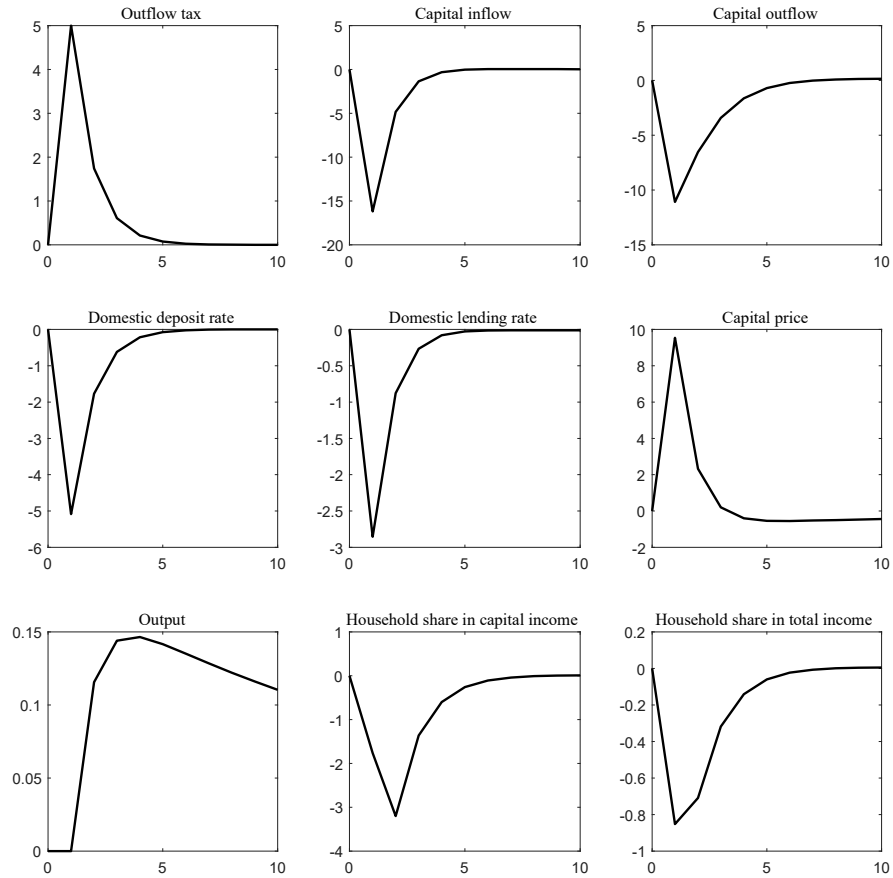
FIGURE II

The transition path following a temporary rise in the outflow tax τ_d.

The vertical axis units of the outflow tax and the credit spread ($\frac{R_l}{R} - 1$) are the percentage-point deviations from the steady state level. The vertical axis units of all other variables are percent deviations from the steady state levels.
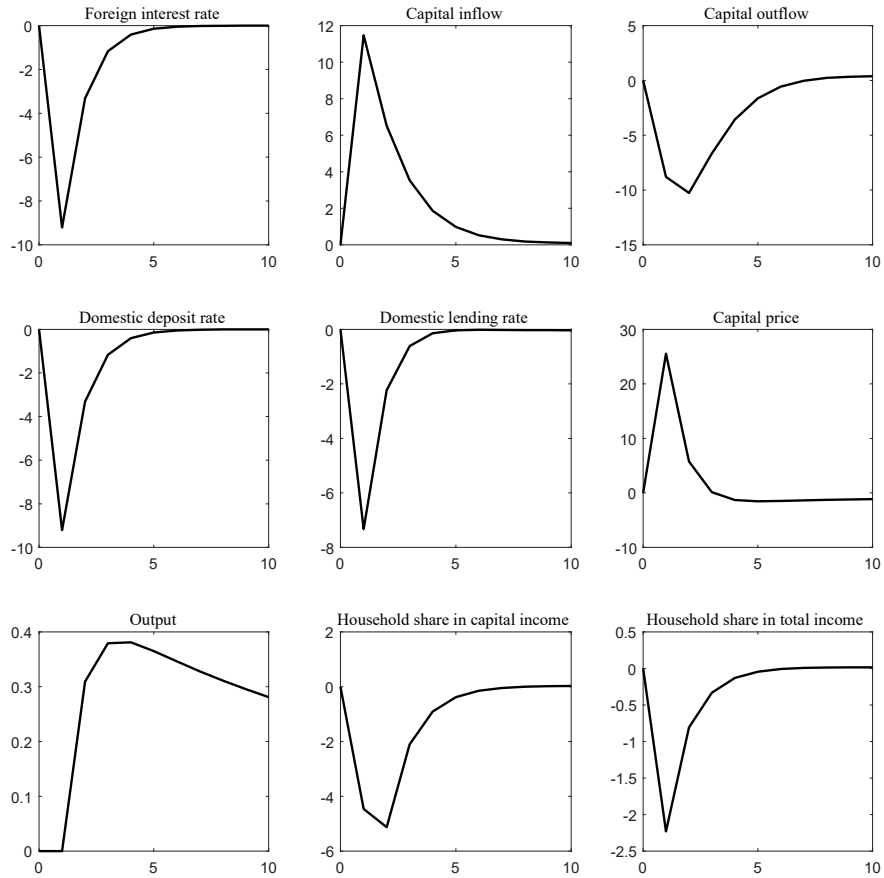
FIGURE III
The transition path following a temporary fall in foreign interest rate.

The vertical axis unit of the credit spread ($\frac{R_l}{R} - 1$) is the percentage-point deviations from the steady state level. The vertical axis units of all other variables are percent deviations from the steady state levels.