American Economic Review 2018, 108(12): 3541–3582
https://doi.org/10.1257/aer.20151510

Bad Investments and Missed Opportunities? Postwar Capital Flows to Asia and Latin America[†]

By Lee E. Ohanian, Paulina Restrepo-Echavarria, and Mark L. J. Wright*

After World War II, international capital flowed into slow-growing Latin America rather than fast-growing Asia. This is surprising as, everything else equal, fast growth should imply high capital returns. This paper develops a capital flow accounting framework to quantify the role of different factor market distortions in producing these patterns. Surprisingly, we find that distortions in labor markets, rather than domestic or international capital markets, account for the bulk of these flows. Labor market distortions that indirectly depress investment incentives by lowering equilibrium labor supply explain two-thirds of observed flows, while improvement in these distortions over time accounts for much of Asia's rapid growth. (*JEL* E22, E24, E32, F21, F32, O16, O47)

After World War II, the economies of East Asia boomed while the economies of Latin America stagnated. At the same time, international capital flowed into Latin America in much greater quantities than it did into East Asia. Figure 1 shows that net exports for East Asia (Japan, South Korea, Singapore, Hong Kong, and Taiwan) were close to zero after World War II, while the net exports of Latin America (Argentina, Brazil, Chile, Colombia, Mexico, and Peru) were consistently negative. This is surprising because, all else equal, rapidly growing countries should generate higher returns and thus should receive more capital than slow-growing countries.

Why didn't capital flow into rapidly growing East Asia after World War II? And why didn't it flow out of slow-growing Latin America? An enormous literature has attempted to explain international capital flows as the result of capital market imperfections, both domestic and international, that limit the opportunities and distort

*Ohanian: Hoover Institution, Stanford University, 405 Hilgard Avenue, Los Angeles, CA 90089, UCLA, and NBER (email: ohanian@econ.ucla.edu); Restrepo-Echavarria: Federal Reserve Bank of St. Louis, One Federal Reserve Bank Plaza, Broadway and Locust Street, St. Louis, MO 63166 (email: paulinares@me.com); Wright: Federal Reserve Bank of Minneapolis, 90 Hennepin Avenue, Minneapolis, MN 55401, and NBER (email: markwright@minneapolisfed.org). This paper was accepted to the *AER* under the guidance of Mark Aguiar, Coeditor. The authors thank Patrick Kehoe as well as numerous seminar participants, and three anonymous referees for helpful comments, and Maria Alejandra Arias, Salomon Garcia, and Brian Reinbold for outstanding research assistance. We dedicate this paper to the memory of Alejandro Justiniano whose comments immeasurably improved this paper and whose friendship immeasurably improved our lives. The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Federal Reserve Banks of Minneapolis and St. Louis or the Federal Reserve System. The authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

[†]Go to https://doi.org/10.1257/aer.20151510 to visit the article page for additional materials and author disclosure statement(s).

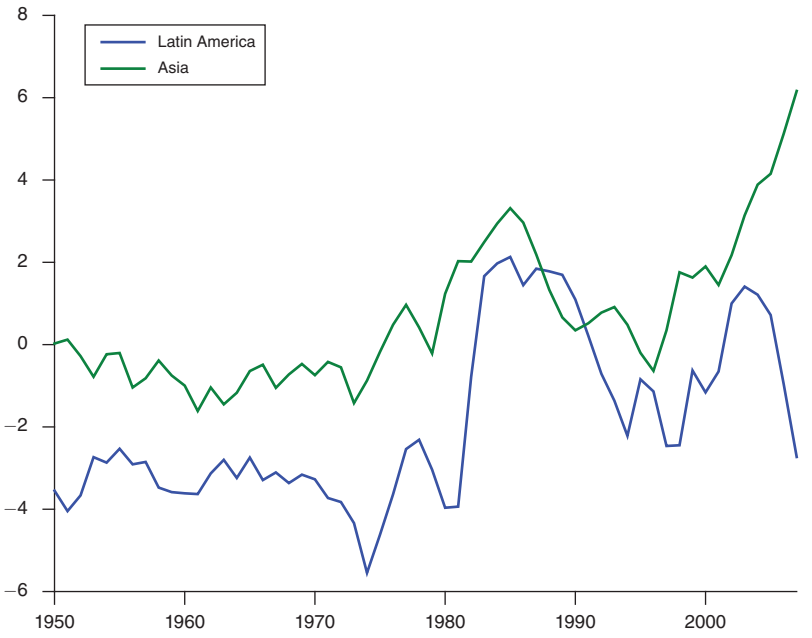

Figure 1. Capital Flows to Asia and Latin America (*Net Exports Percent GDP*)

the incentives to move capital out of slow-growing regions and into fast-growing regions. This is natural both because such distortions are the most direct channel for affecting capital flows and because there is significant documentation of capital market imperfections within the literature. In contrast, in this paper we argue that labor market distortions and their evolution simultaneously explain why capital flowed into Latin America and not into Asia, and also why the growth experiences of the two regions were so different.

Our argument is quite simple and is based on the fact that distortions in domestic labor markets caused by labor taxes, labor market regulations, and trade unions, among other factors, reduce the incentive to invest by reducing the equilibrium supply of labor. Lower labor supply depresses the marginal product of capital, which in turn reduces the return to capital and limits the incentive for investment. This is particularly stark in the case of Asia, where hours worked per capita were relatively low in 1950, grew rapidly in the succeeding decade, and then continued to rise more slowly until the beginning of the 1990s. This suggests that labor market distortions were very high in 1950 and declined rapidly initially, with less-rapid declines thereafter. High and declining labor market distortions thus help to explain both why Asia initially grew so fast as well as why growth leveled off after 1995, while the initially high level of these distortions explains why so little capital flowed into the region immediately after World War II.

To the best of our knowledge, labor market distortions have not previously been studied as determinants of the pattern of capital flows. Consequently, the relative importance of labor versus capital market distortions in understanding capital flows is an open question. Toward an answer to this question, this paper presents a capital flow accounting framework to quantitatively assess the relative impact of capital and labor market distortions on the pattern of capital flows between East Asia,

Latin America, and the rest of the world (primarily Europe and North America) from 1950 to 2007. Specifically, we construct a multi-country dynamic stochastic general equilibrium model of the world economy augmented with "wedges" that affect the incentives to invest, work, and trade capital internationally. This framework builds on the (closed economy) business cycle accounting framework of Cole and Ohanian (2002) and Chari, Kehoe, and McGrattan (2007) and extends it to an open economy setting through the introduction of an international wedge in which a country-specific tax is applied to the purchase of international contingent claims. In contrast to the business cycle accounting approach, we focus our analysis on lower frequency movements in the data that influence the incentives to consume and save, and hence play a major role in determining international capital flows.

With the wedges added, the model can exactly replicate the data on economic outcomes in the world economy, including world capital flows. We estimate the parameters of the model on a novel dataset of factor accumulation, employment, economic outcomes, and capital flows in Latin America, East Asia, and the rest of the world and use the estimated model to recover the wedges that account for world capital flows. We compare movements in the resulting wedges to a narrative history of significant policy changes in these regions and argue that a significant component of the movements in the wedges is associated with fluctuations in government policies, thus leading us to interpret the wedges structurally as policy distortions.

Our first finding is that the labor market distortions exhibit by far the most variation over time, changing by as much as 50 percent in all three regions. To assess the relative quantitative importance of labor market distortions in explaining capital flows over time, we then conduct counterfactual experiments that shut down movements in all of these distortions. We interpret these experiments as policy reforms. Our most striking finding from these experiments is that labor market distortions—rather than either international or domestic capital market distortions—have been the single most important factor driving the pattern of capital flows for much of the postwar period. Specifically, domestic labor market distortions explain roughly 30 percent of the variation in capital flows to Asia and Latin America during the 1950s and 1960s, while the general equilibrium effects of labor market distortions in other regions account for another 30 to 40 percent in total. All told, the direct and indirect impact of labor market distortions account for about 60–70 percent of capital flows to Asia and Latin America.

International capital market distortions also matter. The most surprising finding is that these fluctuations have had their most significant impact in more recent decades, after many countries liberalized international capital transactions, rather than in the 1950s and 1960s when these distortions were believed to be large. This finding primarily reflects the legacy of past distortions and their propagation through a country's stock of net foreign assets, rather than the contemporaneous effect of new distortions, with the exception of the Latin American debt crisis of the 1980s. We find that the international capital market distortions operated to discourage capital inflows into Asia in the 1950s. However, from the 1960s onward, and contrary to what is commonly believed, Asian capital outflows would have been far greater if not for international capital market distortions. Domestic capital market distortions are found to have a quantitatively far less important impact on capital flows throughout the postwar period.

The remainder of the paper is organized as follows. The next subsection discusses previous literature. Section I presents the benchmark model economy and describes how the closed economy wedge methodology used at business cycle frequencies is adapted to the open economy setting using lower frequency data. Section II discusses the measurement of the wedges, our data sources, and our procedures for calibrating and estimating parameters. Section III presents our results. Section IV discusses robustness and extensions, and Section V concludes. An online Appendix collects more details on the material presented in the text.

Previous Literature.—Our paper connects to four distinct but related literatures. First, the paper contributes to the very large literature that studies patterns in capital flows. This literature has largely been focused on how various *capital* market distortions affect flows. Indeed, much of the literature, following Feldstein and Horioka's (1980) examination of the correlation between domestic savings and investment rates, has interpreted their analyses as "tests" of international capital market efficiency (see also Bayoumi and Rose 1993, Taylor 1996, Tesar 1991, and many others). Responding to the failures of these tests, the literature has developed models of international financial frictions ranging from limited commitment (Wright 2001, Kehoe and Perri 2002, and Restrepo-Echavarria 2018) and default risk (Eaton and Gersovitz 1981, Arellano 2008, Aguiar and Gopinath 2006, Tomz and Wright 2013, and many others) to exogenous market incompleteness (Bai and Zhang 2010) and asymmetric information (Atkeson 1991). A problem with these "tests" of capital mobility is that they typically rely on strong assumptions about the existence and source of gains from trade, and hence these have low power against plausible alternatives as to the nature of the gains from trade. Our approach complements this literature on international financial market inefficiency by evaluating these frictions using a different framework that uses data on a wider set of macroeconomic variables to simultaneously identify the sources of gains from international trade in capital *and* to back out the potential role of distortions in limiting that trade.

Our emphasis on measuring the gains from trade and in exploring the role of frictions outside of capital markets is shared by a number of other recent studies of international capital flows. Caselli and Feyrer (2007) directly estimate the marginal product of capital for many countries and find that these estimates have converged over time, once the marginal products are adjusted for the share of nonreproducible capital, such as land and natural resources. They conclude on the basis of this convergence that the gains from international trade in capital have declined, implying that any international capital market distortions have become less important over time.[1]

We explore the connection of their results to our own in Section IIIC. Obstfeld and Rogoff (2001), Fitzgerald (2012), Reyes-Heroles (2016), Eaton, Kortum, and Neiman (2016), and others explore the role of trade costs in explaining a number of facts about international flows. We argue that our approach is complementary in that it provides evidence that can be used to test for the role of trade costs, although we

[1] Ohanian and Wright (2008) and Monge-Naranjo, Sánchez, and Santaeulalia-Llopis (2015) extend the Caselli and Feyrer (2007) approach and propose alternative methods for estimating the marginal product of physical capital.

argue in Section IV that our findings suggest a relatively minor role for these costs in explaining the relative allocation of capital flows between Asia and Latin America.

We follow in the footsteps of Alfaro, Kalemli-Ozcan, and Volosovych (2008), who study the role of institutions in driving the incentive to reallocate capital around the world. Unlike them, we focus on labor market institutions that depress labor supply and lower the return to capital as the key factor. Alfaro, Kalemli-Ozcan, and Volosovych (2014) study the difference between official and private capital flows since 1970 and find that private flows are more closely in accordance with standard models than are official flows. This relies on significant departures from Ricardian equivalence to explain why private flows do not offset official flows in order to produce aggregate capital flows in line with the theory. In Section IV, we argue that our approach yields evidence as to the kind of departure that might be relevant in the data. Aguiar and Amador (2016) provide a model of one such mechanism.

Second, our paper makes contact with the literature on East Asian growth and the debate as to the relative contribution of factor accumulation (see Young 1995) and productivity growth (see Hsieh 1999) in explaining East Asia's rapid growth. We argue that incorporating data on international capital flows, and understanding the causes of the observed rapid factor accumulation, help to shed light on this debate. Specifically, we find evidence for substantial distortions in East Asian labor markets in the 1950s that both depressed returns to investment, limiting the incentive for international capital inflows, and, as the distortions were unwound, drove rapid factor accumulation and economic growth thereafter.

Third, our paper builds on the literature on business cycle accounting in closed economies following Cole and Ohanian (2002) and Chari, Kehoe, and McGrattan (2007). Unlike these papers, we examine open economies and focus on medium- and longer-term movements in economic variables, which play a larger role in determining the level of consumption, and hence also savings and international capital flows, than do fluctuations at business cycle frequencies. Our paper is also related to the literature on business cycle accounting in small open economies (see Lama 2011 and Rahmati and Rothert 2014). In contrast to their partial equilibrium (small open economy) approach with incomplete markets, we show how to apply a general equilibrium complete markets model to data on the world economy constituted from multiple countries.

A related approach, and the paper perhaps most closely related to ours, is Gourinchas and Jeanne (2013), which studies capital flow data from 1980 to 2000 for individual countries using wedges in a deterministic open economy growth model without transitional dynamics. They also abstract from labor supply decisions and so are unable to address the importance of the labor wedge. We discuss the differences between our analysis and that of Gourinchas and Jeanne (2013) in greater detail in Section IIIC. For now, we simply note that in comparison we emphasize capital flows during the decades from 1950 to 1970, and that our dynamic out-of-steady-state analysis allows us to study the impact of movements in the labor wedge, which chiefly matter out of steady state.

Fourth and finally, our paper complements the large literature seeking to identify the presence of distortions to factor markets both at home and abroad. Much of this literature computes indices of distortions by examining legal restrictions on the operation of markets and then counting up the number of different types of restrictions.

As such they provide a *qualitative* measure of the presence of restrictions that are "on the books" (de jure). Examples of this approach in international capital markets include the large number of studies based on the International Monetary Fund's *Annual Report on Exchange Arrangements and Exchange Restrictions*, including Chinn and Ito (2006), Quinn (1997), and many others, while examples covering domestic labor markets and capital markets are cited below. As is openly acknowledged, these measures have two problems. First, some restrictions that are on the books may not be enforced in practice, while some restrictions that are in practice may not appear on the books (a de jure restriction may not be a de facto restriction and vice versa). Second, ultimately we are more interested in the quantitative significance of such controls than we are in a qualitative measure of their presence. By contrast, our paper uses data on equilibrium quantities to construct quantitative measures of the impact of de facto restrictions on international and domestic capital markets as well as domestic labor markets that we believe serve as a useful complement to these qualitative de jure measures.

I. Capital Flow Accounting

As noted in the introduction, the existing literature has focused on distortions in capital markets, both domestic and international, in explaining anomalous international capital flows. In contrast, we hypothesize that labor market distortions played an important role in determining capital flows. In situations like this with a clear substantive question, many possible theories, and no canonical answer, it is productive to adopt an approach capable of identifying possible explanatory channels and quantifying their significance. Hence, we develop a capital flow accounting framework. Our method is a direct descendant of the closed economy business cycle accounting approaches of Cole and Ohanian (2002) and Chari, Kehoe, and McGrattan (2007) extended to the general equilibrium of a world economy. Unlike this earlier literature, which focuses on business cycle fluctuations in macroeconomic variables, we are also interested in medium- and long-term frequencies that play a large role in determining capital flows and hence pay particular attention to long-run trends in variables.

Also unlike this literature, we start with a variant on the class of models typically used to analyze international capital flows (for example, Mendoza 1991 and Baxter and Crucini 1993, 1995). We refer to this as our benchmark model and augment it with wedges so that it is able to exactly replicate the data on macroeconomic outcomes including capital flows. These wedges are described as taxes that distort the marginal conditions determining optimal labor supply, domestic investment, and foreign investment but stand in for a wider range of departures from our benchmark accounting framework. We explore alternative interpretations of these wedges in Section IV.

A. *Households*

Consider a world economy composed of three "countries" indexed by j, where $j = L$ stands for "Latin America," $j = A$ stands for "(East) Asia," and $j = R$ stands for the "rest of the world." Time evolves discretely and is indexed by $t = 0, 1, \ldots,$

so that N_{jt} denotes the population of country j at time t. The decisions of each country are made by a representative agent with preferences over consumption C_{jt} and per capita hours worked h_{jt} ordered by

$$E_0\left[\sum_{t=0}^{\infty}\beta^t\left\{\ln\left(\frac{C_{jt}}{N_{jt}}\right)-\frac{\varphi}{1+\gamma}h_{jt}^{1+\gamma}\right\}N_{jt}\right].$$

The parameters governing preferences—the discount factor β, the preference for leisure φ, and the Frisch elasticity of labor supply $1/\gamma$—are assumed common across countries; therefore, any cross-country differences in core preferences will be attributed to the wedges that we introduce next. We discuss how this assumption affects our results in Section IVA.

The problem of the representative agent of country j is to choose a state-contingent stream of consumption levels C_{jt}, hours worked h_{jt}, purchases of capital to be rented out next period K_{jt+1}, and a portfolio of state-contingent international bond holdings B_{jt+1} subject to a sequence of flow budget constraints for each state and date:

$$\begin{aligned}C_{jt}+P_{jt}^{K}K_{jt+1}+E_t\left[q_{t+1}B_{jt+1}\right] \;\le\; &\left(1-\tau_{jt}^{h}\right)W_{jt}h_{jt}N_{jt}+\left(1-\tau_{jt}^{B}\right)B_{jt}+T_{jt}\\ &+\left(1-\tau_{jt}^{K}\right)\left(r_{jt}^{K}+P_{jt}^{*K}\right)K_{jt}+\Pi_{jt},\end{aligned}$$

with initial capital K_{j0} and bonds B_{j0} given. Here W_{jt} is the wage per hour worked, r_{jt}^{K} the rental rate of capital, P_{jt}^{K} the price of new capital goods, and P_{jt}^{*K} the price of old capital goods, which will differ from the price of new capital goods due to the presence of adjustment costs in capital. In this complete markets environment, the prices of state-contingent international bonds at time t that pay off in one state at $t+1$ are composed of a risk-adjusted world price q_{t+1} multiplied by the probability of the state occurring, which allows us to write the expected value of the risk-adjusted expenditures on bonds on the left-hand side of the flow budget constraint. Households also receive profits Π_{jt} from their ownership of domestic firms.

The τ represent taxes or "wedges" on factor payments and investment income. Specifically, τ^{h} is a tax on wage income (the labor wedge), τ^{B} is a tax on income derived from international assets or, equivalently, a subsidy on the cost of paying for international liabilities (the international wedge), while τ^{K} is a tax on income from domestic capital (the capital wedge). Any revenue from these taxes net of the level of government spending G_{jt} is assumed to be transferred in lump-sum fashion to or from households each period as T_{jt},

$$T_{jt} \;=\; \tau_{jt}^{h}W_{jt}h_{jt}N_{jt}+\tau_{jt}^{B}B_{jt}+\tau_{jt}^{K}\left(r_{jt}^{K}+P_{jt}^{*K}\right)K_{jt}-G_{jt}. \tag{1}$$

This implies that there is no government borrowing. As Ricardian equivalence holds in our model, this is without loss of generality. However, some authors (for example, Alfaro, Kalemli-Ozcan, and Volosovych 2014) have argued that an understanding of government borrowing is necessary to rationalize observed capital flows. We discuss these issues in more detail in Section IVC.

The first-order conditions for the household can be rearranged to find the optimal condition governing the labor supply,

$$(2) \qquad \left(1-\tau_{jt}^{h}\right) W_{jt}\frac{N_{jt}}{C_{jt}} \;=\; \phi h_{jt}^{\gamma},$$

the Euler equation for domestic capital,

$$(3) \qquad 1 \;=\; E_t\left[\beta\frac{C_{jt}/N_{jt}}{C_{jt+1}/N_{jt+1}}\left(1-\tau_{jt+1}^{K}\right)\frac{r_{jt+1}^{K}+P_{jt+1}^{*K}}{P_{jt}^{K}}\right],$$

and the Euler equation for state-contingent international assets,

$$(4) \qquad \frac{C_{jt+1}/N_{jt+1}}{C_{jt}/N_{jt}} \;=\; \frac{\beta}{q}\left(1-\tau_{jt+1}^{B}\right).$$

Although our focus is on capital flows, which are influenced by economic fluctuations at short-, medium-, and long-run frequencies, our framework shares a number of elements with the closed economy business cycle accounting literature (see Cole and Ohanian 2002 and Chari, Kehoe, and McGrattan 2007). However, while the labor and capital wedges are familiar, the international wedge is new and has been added to create an open economy accounting framework. This term drives a wedge between the growth rate of the domestic marginal utility of consumption and the return on international assets. It differs from the way international factors are subsumed into the closed economy framework of Chari, Kehoe, and McGrattan (2007), where net exports are treated as an additive output shock equivalent to government expenditure.

B. *Firms*

Each country is populated by two types of firms. The first type of firm hires labor and capital to produce the consumption good using a standard Cobb-Douglas technology of the form $A_{jt}K_{jt}^{\alpha}\left(h_{jt}N_{jt}\right)^{1-\alpha}$, where A_{jt} is the level of aggregate productivity in the economy and α is the output elasticity of capital. This yields expressions for the equilibrium wage rate per hour and the rental rate on capital:

$$(5) \qquad W_{jt} \;=\; \left(1-\alpha\right)\frac{Y_{jt}}{h_{jt}N_{jt}}, \quad \text{and} \quad r_{jt}^{K} \;=\; \alpha\frac{Y_{jt}}{K_{jt}}.$$

The second type of firm produces new capital goods K_{jt+1} using X_{jt} units of investment (deferred consumption) and K_{jt} units of the old capital good. Their objective is to maximize profits $P_{jt}^{K}K_{jt+1}-X_{jt}-P_{jt}^{*K}K_{jt}$ subject to the capital production function (or capital accumulation equation) with convex adjustment costs ϕ of the form,

$$K_{jt+1} \;=\; \left(1-\delta\right)K_{jt}+X_{jt}-\phi\left(\frac{X_{jt}}{K_{jt}}\right)K_{jt}.$$

Note that, although the capital good K_{jt+1} is to be used for production in period $t+1$, it is produced and sold in period t at price P_{jt}^K. This gives rise to first-order conditions:

$$P_{jt}^K = \frac{1}{1-\phi'\left(\frac{X_{jt}}{K_{jt}}\right)}, \tag{6}$$

$$P_{jt}^{*K} = P_{jt}^K\left(1-\delta-\phi\left(\frac{X_{jt}}{K_{jt}}\right)+\phi'\left(\frac{X_{jt}}{K_{jt}}\right)\frac{X_{jt}}{K_{jt}}\right). \tag{7}$$

We assume that adjustment costs are of the quadratic form,

$$\phi\left(\frac{X_{jt}}{K_{jt}}\right) = \frac{\nu}{2}\left(\frac{X_{jt}}{K_{jt}}-\kappa\right)^2.$$

All production parameters—the output elasticity of capital α, the depreciation rate δ, and those governing adjustment costs ν and κ—are assumed constant across countries; we return to this assumption in Section IVA.

C. *Growth and Uncertainty*

The world economy has grown substantially over the period under study. But this growth is not well represented by movements around a deterministic trend with a constant growth rate. Moreover, expectations of future growth in income drive a household's desire to save and invest and hence play a large role (in many cases, the dominant role) in determining capital flows. Hence, it is not appropriate to simply apply the Hodrick-Prescott filter to the data and proceed with a detrended model, as might be done for a business cycle accounting analysis. As a consequence, we adopt a specification for the growth of the population and productivity level in each country that allows the data to speak to us about these expectations of future trends.

We assume that there is a stochastic world trend for both population and productivity and associate this with growth in the rest of the world (for similar approaches, see Canova 1998, Fernández-Villaverde and Rubio-Ramírez 2007, and Cheremukhin and Restrepo-Echavarria 2014). Specifically, we assume that the rest of the world productivity and population evolve according to

$$\ln A_{Rt+1} = \ln A_{Rt} + \ln \pi_{ss} + \sigma_R^A \varepsilon_{Rt}^A,$$

$$\ln N_{Rt+1} = \ln N_{Rt} + \ln \eta_{ss} + \sigma_R^N \varepsilon_{Rt}^N,$$

where π_{ss} and η_{ss} are the growth rates in world productivity and population that would occur in the deterministic steady state of our model. The parameters σ_R^A and σ_R^N govern the volatility of these stochastic trends. In order to make our model of the world economy stationary, we scale by the level of effective labor in the rest of the world $Z_t = A_{Rt}^{1/(1-\alpha)} N_{Rt}$. Note that our specification nests a constant growth rate as a special case.

Population and productivity levels in Asia and Latin America are assumed to evolve relative to the world trend in such a way that a nondegenerate long-run distribution of economic activity across countries is preserved. Specifically, for Asia and Latin America we define relative productivity $a_{jt} = A_{jt}/A_{Rt}$ and relative population $n_{jt} = N_{jt}/N_{Rt}$ and assume that both a_{jt} and n_{jt} follow first-order autoregressive processes of the form,

$$\ln a_{jt+1} = \left(1-\rho_j^a\right)\ln a_{jss} + \rho_j^a \ln a_{jt} + \sigma_j^a \varepsilon_{jt+1}^a,$$

$$\ln n_{jt+1} = \left(1-\rho_j^n\right)\ln n_{jss} + \rho_j^n \ln n_{jt} + \sigma_j^n \varepsilon_{jt+1}^n.$$

This allows for long-lasting deviations from the world trend. We place no further restrictions on these processes, preferring to allow the data to speak by estimating their parameters directly.

The labor, capital, and international wedges (indexed by $m = h, K$, and B) for each country are also assumed to follow univariate first-order autoregressive processes of the form,

$$\ln\left(1-\tau_{jt+1}^m\right) = \left(1-\rho_j^m\right)\ln\left(1-\tau_{jss}^m\right) + \rho_j^m \ln\left(1-\tau_{jt}^m\right) + \sigma_j^m \varepsilon_{jt+1}^m, \tag{8}$$

where τ_{jss}^m is the level the wedge would take on in the deterministic steady state of our model and ρ_j^m governs the rate of mean reversion. The evolution of the level of government spending in each country G_{jt} is assumed to be such that the ratio of government spending to national income $g_{jt} = G_{jt}/Y_{jt}$ also follows a first-order autoregressive process:

$$\ln g_{jt+1} = \left(1-\rho_j^g\right)\ln g_{jss} + \rho_j^g \ln g_{jt} + \sigma_j^g \varepsilon_{jt+1}^g.$$

The parameters of all of these processes, with the exception of the steady-state international wedge to be discussed next, are estimated from, or calibrated to, match the data.

D. *Model Solution*

Our benchmark assumes that the world economy has complete markets. Complete markets are a natural benchmark, as there are many ways in which markets can be incomplete. It is also the natural approach to modeling a world economy with very rich and complex asset trades: certainly more assets than can be accommodated in a tractable incomplete markets model. However, given our continuous state space, this means that each country has an infinite dimensional portfolio decision to make each period. In a contribution that may be of independent interest, we establish that the solution to a particular pseudo social planner's problem corresponds to the equilibrium of our complete markets economy and work directly on the pseudo social planner's problem. Online Appendix A describes in detail the mapping between the competitive equilibrium problem and the pseudo social planner's problem. As noted earlier, to obtain stationarity, we scale by the stochastic world trend Z_{t-1} to obtain an intensive form version of the model.

The large number of state variables (23) leads us to use perturbation methods. To do so, we make additional assumptions to ensure that the model has a unique nondegenerate deterministic steady state (which serves as the point about which the approximation is taken). To see the need for these assumptions, note that for our reference country R and any other country j, we can take equation (4) and rearrange to obtain the first equality in

$$\frac{C_{jt+1}/N_{jt+1}}{C_{Rt+1}/N_{Rt+1}} = \frac{C_{jt}/N_{jt}}{C_{Rt}/N_{Rt}}\frac{1-\tau^B_{jt+1}}{1-\tau^B_{Rt+1}} = \frac{C_{jt}/N_{jt}}{C_{Rt}/N_{Rt}}\left(1-\tau^B_{jt+1}\right). \tag{9}$$

This means we cannot separately identify each country's international wedge τ^B_j, and so we normalize the rest of the world international wedge to 0, $\tau^B_{Rt+1} = 0$, yielding the second equality. It also means that, if the steady-state international wedge, τ^B_{jss}, is not equal to 0, there is a long-run trend in relative consumption levels so that the deterministic steady-state distribution of consumption is degenerate (one country's share of consumption must converge to 0). Moreover, simply assuming that $\tau^B_{jss} = 0$ for all j does not pin down a *unique* steady-state relative consumption level. Intuitively, the level of the international wedge out of steady state affects the accumulation of international assets, which in turn affects long-run consumption levels. In terms of equation (9), the *growth rate* of relative consumption is a first-order autoregressive process that converges to 0 in the deterministic steady state; the long-run *level* of relative consumption depends upon the entire sequence of realizations of the international wedge.

Analogous issues arise in multi-agent models with heterogeneous rates of time preference (see the conjecture of Ramsey 1928, the proof of Becker 1980, and the resolution of Uzawa 1968) and in small open economy incomplete markets models. In the latter context, a suite of alternative resolutions of this issue have been proposed (see Schmitt-Grohé and Uribe 2003 for a survey and discussion). We use a variant of the portfolio adjustment cost approach, adapted to our general equilibrium complete markets setting. Specifically, for Asia and Latin America, we assume that their international wedges can be decomposed into a pure tax on international investment income τ^{*B}_{jt} and another term Ψ_{jt}, both of which the country takes as given:

$$1-\tau^B_{jt} = 1-\tau^{*B}_{jt}+\Psi_{jt}.$$

We refer to τ^{*B} as the international wedge from now on (typically suppressing the asterisk) and assume that it follows a first-order autoregressive process with the steady state assumed to be 0:

$$\ln\left(1-\tau^{*B}_{jt+1}\right) = \rho^B_j \ln\left(1-\tau^{*B}_{jt}\right)+\sigma^B_j\varepsilon^B_{jt+1}. \tag{10}$$

The other term takes the form of a portfolio tax that is assumed, in equilibrium, to satisfy

$$\Psi_{jt} = \left(1-\tau^{*B}_{jt}\right)\left[\left(\frac{C_{jt}/N_{jt}}{C_{Rt}/N_{Rt}}\frac{1}{\psi_{j0}}\right)^{-\psi_{j1}}-1\right]. \tag{11}$$

This ensures that, in the deterministic steady state, relative consumption levels are pinned down by ψ_{j0}, with mean reversion in relative consumption levels controlled by ψ_{jt} as

$$\ln\frac{C_{jt+1}/N_{jt+1}}{C_{Rt+1}/N_{Rt+1}} = \frac{\psi_{j1}}{1+\psi_{j1}}\ln\psi_{j0} + \frac{1}{1+\psi_{j1}}\ln\frac{C_{jt}/N_{jt}}{C_{Rt}/N_{Rt}} + \frac{1}{1+\psi_{j1}}\ln\left(1-\tau^{*B}_{jt+1}\right). \tag{12}$$

We refer to this as a portfolio tax because in steady state, relative consumption levels map one-for-one into net foreign asset positions. Once again, these parameters are identified from the data, meaning that we allow the data to estimate the long-run net foreign asset position of each country.

Under these assumptions on the portfolio tax, there exists a unique nondegenerate deterministic steady state. We proceed by taking a first-order log-linear approximation of the pseudo social planner's problem around this point.

II. Implementation

The multi-country dynamic stochastic general equilibrium model of the world economy augmented with wedges described above has been designed to exactly replicate data on the national income and product account expenditure aggregates. In this sense, the model can be used as an accounting framework for observed data. In this section, we describe how the model uses these data to identify the wedges. We then briefly describe our data sources, with a more detailed discussion available in online Appendix B. To recover realizations of the capital wedge, we must compute the equilibrium of the model in order to determine expectations of future returns to capital, and so we also describe our solution method. A small number of structural parameters governing preferences and production are calibrated. Some wedges can be recovered, and the parameters governing their evolution estimated, without solving the model. The remaining parameters of the model are estimated using Bayesian methods.

A. *Using the Data to Measure the Wedges*

Realizations of the labor, capital, and international wedges can all be measured by feeding data on the national income and accounting expenditure aggregates through the optimality conditions of households and firms combined with the equilibrium conditions of the model. Realizations of the labor and international wedges can be computed directly from first-order conditions without knowing the solution of the model. The capital wedge, on the other hand, requires the computation of expectations about future capital returns and hence requires both estimating and solving the model.

To see this, note that under our assumption of complete markets, the composite international wedge and portfolio tax τ^{B}_{jt+1} can be recovered from data on the growth in relative consumption levels, as shown in equation (9). Estimation of equation (12) serves to both decompose the composite into the international wedge τ^{*B}_{jt+1} and

the portfolio tax Ψ_{jt+1} and estimate the parameters governing the evolution of the international wedge and the portfolio tax. Note that under the assumptions of our model, the residual in this equation, the international wedge, follows an autoregressive process; relative consumption does not follow a simple first-order autoregressive process. Nonetheless, all that is needed to estimate the process governing the international wedge and the parameters of the portfolio tax is data on the growth in relative consumption levels. This can be done without solving the entire model.

The labor wedge can also be recovered, and its evolution process estimated, outside of the model. Specifically, using the optimal labor supply condition for the household (2) and the optimal employment decision of the firm (5), we obtain

$$1 - \tau_{jt}^{h} = \frac{\phi}{1-\alpha} h_{jt}^{\gamma} \frac{h_{jt} N_{jt}}{Y_{jt}} \frac{C_{jt}}{N_{jt}}. \tag{13}$$

That is, using data on consumption, population, hours worked, and output, and given values for the production and preference parameters, we can recover realizations of the labor wedge without solving the model. This can then be used to estimate the process governing the evolution of the labor wedge. Note that it is not possible to separately identify the level of the labor wedge from the preference for leisure parameter φ, which in principle could also vary across countries. Hence, in what follows, we normalize the leisure parameter to 1 for all countries, and we focus on changes in the levels of these wedges over time, and not on cross-country differences in their levels.

Lastly, the capital wedge is determined from the Euler equation for the household (3), the optimal capital decision of the consumer good firm (5), and the optimality conditions of the capital good firm (6) and (7). Denoting by $x_{jt+1} = X_{jt+1} / K_{jt+1}$ the ratio of investment to the capital stock, we obtain the capital wedge from

$$1 = E_t \left[\beta \frac{C_{jt+1}/N_{jt+1}}{C_{jt}/N_{jt}} \left(1 - \tau_{jt+1}^{K}\right) \frac{\alpha \frac{Y_{jt+1}}{K_{jt+1}} + \frac{1 - \delta - \phi\left(x_{jt+1}\right) + \phi'\left(x_{jt+1}\right) x_{jt+1}}{1 - \phi'\left(x_{jt+1}\right)}}{\frac{1}{1 - \phi'\left(x_{jt}\right)}} \right]. \tag{14}$$

Note that it is impossible to separately identify the level of the capital wedge from the level of the discount factor, and hence we focus on changes in the levels of these wedges, and not the levels themselves, below. Unlike the labor and international wedges, this requires computing an expectation, which in turn requires the solution of the model and estimation of the processes governing the evolution of all exogenous variables. Moreover, it also requires a value for the initial capital stock from which data on investment can be used to derive the entire sequence of capital stocks, which we estimate along with all other parameters in the model. We describe the solution and estimation of the model after we describe our data sources.

B. *Data Sources and Methods*

As discussed in the previous subsection, to recover our wedges we need data on the main national accounts expenditure aggregates (output Y_{jt}, consumption C_{jt},

investment X_{jt}, and net exports NX_{jt}) along with data on population N_{jt} and hours worked h_{jt}, for each of our three "countries." In this subsection, we first describe our rationale for grouping countries into regions and then briefly describe data sources and methods. More detail is available in online Appendix B.

Our country aggregates for Asia and Latin America were chosen on the basis of the similarity of their economic development paths, as well as on the availability of data. Asia is defined to be the aggregate of Japan and the four "East Asian Tigers" of South Korea, Taiwan, Hong Kong, and Singapore, which were the center of a great deal of attention because of their similar economic performance (see, for example, Krugman 1994 and the debate between Young 1995 and Hsieh 1999 and online Appendix Figure 11). Other Asian economies were excluded on the grounds that their development proceeded differently: the "Tiger Cub Economies" of Malaysia, Thailand, Philippines, and Indonesia developed less rapidly and followed different development strategies (see online Appendix Figure 13); China's rapid economic development did not begin until at least the late 1970s; and India's liberalization did not occur until the 1990s (see online Appendix Figure 12).

Our Latin American aggregate was constrained by data availability to include only Argentina, Brazil, Chile, Colombia, Mexico, and Peru. These six countries accounted for 82 percent of the GDP from the entirety of Latin America and the Caribbean in 2000 US$ terms. The only Latin American country that we did not include but for which we had data was Venezuela, which stands apart as a major oil exporter that ran trade surpluses averaging 10 percent of GDP between 1950 and 1975 (see online Appendix Figure 14). The rest of the world aggregates data from 22 advanced economies in North America, Europe, and Oceania, which are described in more detail in online Appendix B. Online Appendix B also plots the resulting data series that are used in the estimation.

Data were obtained from a number of sources. Briefly, where available, data from the Organisation for Economic Co-operation and Development were used for its member countries. For other countries, data from the World Bank's *World Development Indicators* were our primary source. Data prior to 1960 were typically taken from the World Bank's *World Tables of Economic and Social Indicators*. The Groningen Growth and Development Center was a valuable source of hours worked data. Gaps in the resulting database were filled using a number of other sources as detailed in the online Appendix. A small number of missing observations are replaced using data extrapolated or interpolated from other countries in the relevant country aggregate. For the purpose of comparing our model-generated estimates of the level of productivity and capital stocks to the data, we use the estimate of capital stocks in 1950 from Nehru and Dhareshwar (1993) combined with the perpetual inventory method to construct a reference series for the capital stock and the implied level of productivity. Online Appendix B provides a detailed country-by-country description of data sources.

All national accounts data were transformed to constant 2000 US$ prices. Data were aggregated by summation for each region. Net exports for the rest of the world were constructed to ensure that the world's trade balance with itself was zero, and any statistical discrepancy for a region was added to government spending.

TABLE 1—COMMON PARAMETER VALUES

Parameter	Notation	Value
Preferences		
Discount factor	β	0.96
Frisch elasticity of labor supply	$1/\gamma$	2/3
Preference for leisure	φ	1
Production		
Output elasticity of capital	α	0.36
Depreciation rate	δ	0.07
Adjustment cost size	ν	5.5
Adjustment cost reference level	κ	0.09

C. *Calibration and Estimation*

As noted above, we solve the model numerically by taking a first-order log-linear approximation of the model around its deterministic steady state, which is well defined under our assumptions on the portfolio tax. After imposing symmetry in the preference and production parameters across countries, we must assign values to 68 parameters. In this subsection, we describe how some parameters are calibrated to standard values and others are estimated outside the model, while the remainder are estimated by Bayesian methods using the Kalman filter.

The parameters governing preferences and production are assumed constant across countries, so that any differences across countries are attributed to the wedges. Of these common parameters (collected in Table 1), six are calibrated to standard values, while a seventh is a normalization. Specifically, we set the output elasticity of capital in the Cobb-Douglas production function α to 0.36, the discount factor β to 0.96, and the depreciation rate δ to 7 percent per year. These are all standard values. The curvature for the disutility of labor γ is set to 1.5, which implies a Frisch elasticity of labor supply of two-thirds. This is within the range typically estimated using microdata on the labor supply intensive margin, a little higher than estimates using microdata on the extensive margin, but smaller than estimates typically found using macrodata (see the surveys by Pencavel 1987, Keane 2011, and Reichling and Whalen 2012). As is evident from equation (13), we cannot separately identify the household's preference for leisure φ from the long-run labor wedge τ^{h}_{jss}, so we normalize φ to 1; this means that we are cautious in interpreting the estimated level of the labor wedge and only conduct experiments in which this wedge is set to its sample mean.

In the investment adjustment cost function, the parameter κ is set such that adjustment costs are zero in steady state, or $\kappa = (\delta + z_{ss} - 1)$. The adjustment cost scale parameter ν is chosen to generate a particular value for the elasticity of the price of capital with respect to the investment-capital ratio, which is equal to $\nu\kappa$. Bernanke, Gertler, and Gilchrist (1999) use a value of 0.25 for this elasticity for the United States and argue the range of plausible values is from 0 to 0.5. We use 0.5 as our benchmark to allow for the possibility that adjustment costs are higher for the emerging markets of Asia and Latin America; results for an elasticity of 0.25 are presented in the online Appendix.

The remaining parameters govern the evolution of population, productivity, and government spending; the labor, capital, and international wedges; the portfolio tax; and the initial levels of capital in each country. As noted above, some can be estimated without knowing the solution of the model, which helps reduce the number of parameters that are estimated within the model. The processes for the evolution of population, government spending, and the international wedges, as well as the parameters for the portfolio tax, are estimated outside of the model. We impose the assumption that the world economy grows at 2 percent per year in the long run, or $z_{ss} = \pi_{ss}^{1/(1-\alpha)}\eta_{ss} = 1.02$.

As our model is nonstationary, it is estimated using the *growth rates* of our data. To ensure that our estimated model produces *levels* of hours worked, capital, and productivity that are consistent with the data, we set the steady-state labor wedge to match the sample average level of hours worked, set the steady-state capital wedge to match capital-to-output ratios from our benchmark capital series, and estimate the steady states and persistence of the productivity processes from our benchmark productivity series.

All other parameters are then estimated using Bayesian methods (see An and Schorfheide 2007). Our decision to use Bayesian methods is a pragmatic one; our use of standard prior distributions serves to focus the estimation on the "right" region of the parameter space. Our choices are collected in online Appendix C along with the plots of the prior and posterior distributions, which show that our chosen priors are not restrictive with the estimated parameters reflecting the information contained in the data.

The linearized equations of the model combined with the linearized measurement equations form a state-space representation of the model. We apply the Kalman filter to compute the likelihood of the data given the model and to obtain the paths of the wedges. We combine the likelihood function $L\left(Y^{Data}|p\right)$, where p is the parameter vector, with a set of priors $\pi_0(p)$ to obtain the posterior distribution of the parameters $\pi\left(p|Y^{Data}\right) = L\left(Y^{Data}|p\right)\pi_0(p)$. We use the random-walk Metropolis-Hastings implementation of the MCMC algorithm to compute the posterior distribution.

The point values for each of our parameters are collected in Table 2. The estimates imply that long-run population growth of the world is roughly 0.67 percent per year. In the long run, it is estimated that the population of Latin America will exceed that in the rest of the world aggregate by 13 percent, while in East Asia the population will settle down to 29 percent of the rest of the world level. Productivity, on the other hand, will converge to 37 percent of the rest of the world level in Latin America and to 77 percent of that level in Asia. Under our assumption of 2 percent long-run growth, the long-run growth of productivity settles down to 0.85 percent per year, or $\pi_{ss} = 1.0085$. Productivity and population are very persistent in all regions. Government expenditure stabilizes at between 12 percent (Asia) and 19 percent (rest of the world) of GDP and is estimated to be quite persistent.

The long-run level of the labor wedge cannot be separately identified from a country's preference for leisure parameter φ. After normalizing $\varphi = 1$ for all countries, the long-run labor wedge is found to be positive for Asia and the rest of the world and negative for Latin America, indicating that average hours worked in Latin America are larger than predicted from implied wages and consumption levels and

TABLE 2—COUNTRY-SPECIFIC PARAMETER VALUES

Process	Region	Steady state	Persistence	SD
Population	Asia	$n_{Ass} = 0.29$	$\rho_A^n = 0.97$	$\sigma_A^n = 0.004$
	Latin America	$n_{Lss} = 1.13$	$\rho_L^n = 0.90$	$\sigma_L^n = 0.003$
	Rest of world	$\eta_{ss} = 1.0067$	$\rho_R^n = 1^{**}$	$\sigma_R^N = 0.001$
Productivity	Asia	$a_{Ass} = 0.77$	$\rho_A^a = 0.89$	$\sigma_A^a = 0.03^{*}$
	Latin America	$a_{Lss} = 0.37$	$\rho_L^a = 0.99$	$\sigma_L^a = 0.03^{*}$
	Rest of world	$\pi_{ss} = 1.0085^{**}$	$\rho_R^a = 1^{**}$	$\sigma_\pi = 0.01^{*}$
Government wedge	Asia	$g_{Ass} = 0.12$	$\rho_A^g = 0.86$	$\sigma_A^g = 0.17$
	Latin America	$g_{Lss} = 0.18$	$\rho_L^g = 0.80$	$\sigma_L^g = 0.05$
	Rest of world	$g_{Rss} = 0.19$	$\rho_R^g = 0.73$	$\sigma_R^g = 0.03$
Labor wedge	Asia	$\tau_{Ass}^h = 0.14$	$\rho_A^h = 0.99^{*}$	$\sigma_A^h = 0.04^{*}$
	Latin America	$\tau_{Lss}^h = -0.25$	$\rho_L^h = 0.99^{*}$	$\sigma_L^h = 0.04^{*}$
	Rest of world	$\tau_{Rss}^h = 0.47$	$\rho_R^h = 0.99^{*}$	$\sigma_R^h = 0.02^{*}$
Capital wedge	Asia	$\tau_{Ass}^k = 0.002$	$\rho_A^K = 0.76^{*}$	$\sigma_A^K = 0.01^{*}$
	Latin America	$\tau_{Lss}^k = 0.05$	$\rho_A^h = 0.83^{*}$	$\sigma_A^K = 0.01^{*}$
	Rest of world	$\tau_{Rss}^k = 0.04$	$\rho_A^h = 0.98^{*}$	$\sigma_A^K = 0^{*}$
International wedge	Asia	$\tau_{Ass}^B = 0^{**}$	$\rho_A^B = 0.36$	$\sigma_A^B = 0.02$
	Latin America	$\tau_{Lss}^B = 0^{**}$	$\rho_L^B = 0.24$	$\sigma_L^B = 0.03$
Portfolio tax	Asia	$\psi_{A0} = 0.95$	$1 - \psi_{A1} = 0.94$	n/a
	Latin America	$\psi_{L0} = 0.13$	$1 - \psi_{L1} = 0.94$	n/a

Notes: * denotes parameter is estimated inside the model; ** denotes the parameter is set by assumption; all other parameters are estimated or calibrated to match some feature of the data, outside the model. Online Appendix C contains more details on the estimation procedures.

hence must require a subsidy. Of course, this could simply reflect differences in preferences: perhaps people in Latin America have a lower preference for leisure? In order to avoid being drawn into debates on this question, we focus our attention on changes in these measured wedges over time rather than cross-country differences in their levels. Likewise, the steady-state levels of the capital wedge cannot be separately identified from the discount factor. Given our normalization for β, all long-run capital wedges are small and are approximately zero in Asia.

We have also normalized the international wedge in the rest of the world to 1, and by assumption the international wedge is 0 in steady state in both regions in order to ensure a nondegenerate steady-state level of relative consumption. The international wedge in either region is not estimated to be particularly persistent. Long-run relative consumption per capita levels are pinned down by the portfolio tax parameters and imply that consumption per capita in Asia will tend to 95 percent, and in Latin America will tend to only 13 percent, of the rest of the world levels. The curvature parameters of the portfolio tax are quite small, roughly 0.06, ensuring that the tax is also quite small and that convergence to this long-run portfolio is slow, implying in turn that the addition of this portfolio tax has little impact on the short- and medium-run dynamics of the model.

III. Results

In this section, we report the recovered values of productivity and of the labor, capital, and international wedges. We first examine productivity in order to ascertain where capital should have flowed in the absence of wedges. We then examine each wedge in turn with a view to accounting for actual capital flows.

As noted above, although we introduced the wedges as though they are tax distortions, they may in fact stand in for nontax distortions, other equilibrium frictions (that are efficient and hence nondistortionary), other forms of model misspecification, or some combination of the above. In other words, the recovered wedges may be reduced-form representations of diverse structural phenomena, rather than true primitives of the model. Moreover, a structural distortion in one factor market may be recovered as a reduced-form wedge affecting another factor market or even the level of productivity. We view this as a virtue of the approach, as it pinpoints the precise margins—the allocation of time between market and nonmarket activities, or the allocation of resources between consumption and investment at home and abroad—that drive observed capital flows in a way that can be informative about large classes of structural models.

Nonetheless, toward a structural interpretation of these wedges, we present our findings on the behavior of the recovered wedges in parallel with a narrative history of factor market distortions in Latin America and Asia. We show that movements in our recovered wedges are often associated with changes in both quantitative and qualitative changes in measures of both tax and nontax regulatory distortions. This leads us to a structural interpretation of the wedges as reflecting policy distortions affecting factor markets. With this structural interpretation in hand, we carry out counterfactual exercises to assess the relative importance of labor market, domestic capital market, and international capital market distortions. Our interest is in the answer to the following question: given the evolution of productivity growth across countries, why didn't more capital flow into Asia and out of Latin America? As a result, we take the evolution of productivity as given in our counterfactual experiments.

A. *The Evolution of Productivity and the Wedges*

Productivity.—Our estimates of total factor productivity across the three regions (A_{jt}) are depicted in Figure 2. The solid lines represent the realizations of the wedges, while the dashed segments represent the forecast implied by the stochastic process of each of the wedges, which is important in evaluating incentives to save and consume, and hence also for capital flows. All levels are scaled relative to the rest of the world in 1950, which is normalized to 100.

The figure shows that Asia's productivity starts at about three-quarters of the rest of the world level in 1950 and catches up by 1970 before beginning to fall behind again thereafter. This is made more explicit in Table 3, which collects by decade the growth rates of output and hours worked from the data, and capital and productivity growth implied by the estimated model.[2] Latin American productivity growth is lower than that in Asia for the first two decades of our sample and especially so in the 1960s. This further emphasizes the puzzle: everything else equal, capital should have flowed into Asia in greater quantities than into Latin America in the first few decades after World War II.

[2] Note that we do not use capital data for the estimation. We use the capital accumulation equation together with investment data and allow the Kalman filter to estimate the initial level of capital.

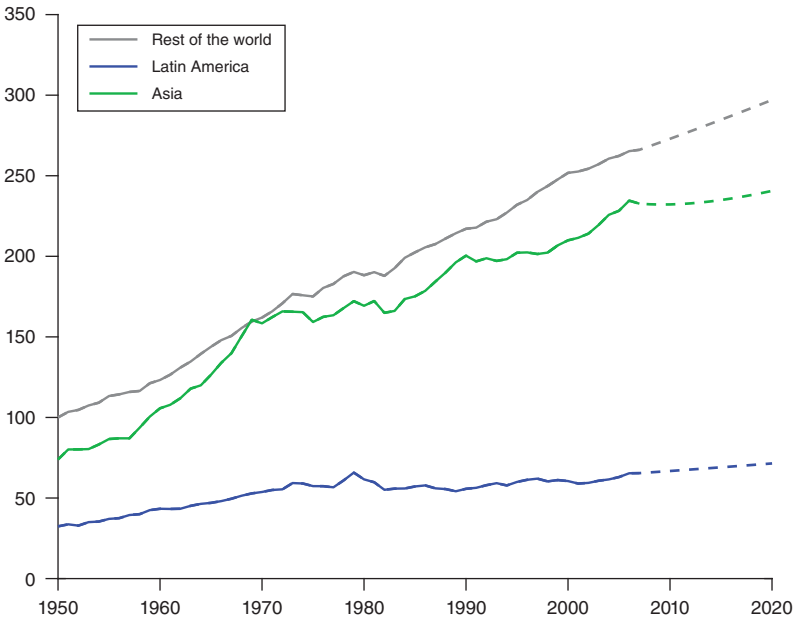

FIGURE 2. PRODUCTIVITY

Our productivity estimates for the rest of the world and for Latin America are within the ranges found by other authors. The productivity growth slowdown of the 1970s appears clearly for the rest of the world, while the Latin American lost decade of the 1980s shows up as negative productivity growth.

Our findings for East Asia contribute to the debate on the East Asian miracle associated with Young (1995), Hsieh (2002), and Krugman (1994). As our method takes data on the quantity of hours worked and investment as inputs into computing productivity, our approach to calculating productivity growth is most similar to the commonly used primal approach, used in the context of this debate by Young (1995). Although similar in spirit, the implementation differs in the details: whereas Young reports estimates using a rich dataset of labor input controlling for educational differences starting in 1966, our cross-country comparison begins in 1950, which forces us to use data on raw hours worked, and whereas Young identifies the output elasticities of factors off their observed labor shares, we calibrate these elasticities to a standard value as a result of the fact that the taxes and other distortions that are central to our framework can drive a wedge between factor shares and these elasticities. Despite these differences, our conclusions are largely in accord. Whereas Young finds average productivity growth from 1966 to 1990 ranged from 0.2 (Singapore) to 2.3 percent (Hong Kong), our aggregate productivity growth rate (which includes Japan) averages 1.8 percent from 1966 to 1990. This is also in the neighborhood of the primal estimates reported by Hsieh (2002).

Our results differ from the dual estimates computed by Hsieh, which rely on data on factor prices instead of quantities, who finds significantly higher growth rates of productivity for Singapore and Taiwan. One possible explanation is that data on asset returns used by Hsieh deviate from the true return to capital as a result of

distortions like the ones we emphasize in this paper. Young (1992, 1998) and Hsieh (2002) debate this possibility in the context of Singapore, where changes in corporate taxes, forced savings, banking regulations, and a monopolistic banking system may have all produced a capital wedge. Our findings can therefore be construed as supportive of the arguments of Young. Having said that, our results also indicate that by excluding the period 1950 to 1965, Young's analysis omitted some of the most impressive periods of East Asian productivity growth.

In summary, our findings for productivity growth, particularly between 1950 and 1970, suggest that, all else equal, capital should have flowed into Asia rather than into Latin America. In order to account for this discrepancy, there must exist offsetting incentives in either domestic or international capital markets, or in domestic labor markets. We next turn to our estimates of these incentives (the wedges) and their interpretation as policy distortions.

The International Wedge.—The evolution of the international wedge τ^B is depicted in Figure 3. Since all wedges are relative to the rest of the world, the figure depicts only Latin America and Asia. A key contribution to the accounting literature is that the international wedge is identified off of *relative* consumption *growth* rates from the Euler equation for international asset purchases (4). As a consequence, the wedge is quite volatile, and so, in addition to the recovered wedge (the dotted lines), we also plot the Hodrick-Prescott trend of the wedge (solid line) in order to highlight the medium-term movements of the wedge.[3]

To interpret Figure 3, note that a positive wedge reduces payments on net foreign assets and hence acts as a tax on foreign savings and a subsidy on foreign borrowing; a negative wedge is a subsidy on foreign savings and a tax on foreign borrowing. That is, a value of -0.05 is equivalent to a 5 percent tax on borrowing. Viewed in this light, the figure shows that from 1950 until the end of the 1970s (roughly corresponding to the Bretton Woods era), both Latin America and Asia faced taxes on international borrowing. This is consistent with the idea that capital controls under Bretton Woods discouraged foreign borrowing. However, the implied tax in Asia was roughly four times larger than the one faced by Latin America during this period. By the 1990s, these wedges had largely converged, consistent with the pattern identified in Figure 1, which shows that capital flows to the two regions become more synchronized toward the end of the sample. The boom in borrowing by Latin America at the end of the 1970s shows up as a significant increase in the subsidy on borrowing that is sharply reversed in the mid-1980s when the Latin American debt crisis reached its peak. The subsidy on borrowing in both Latin America and Asia quickly became a tax on borrowing at the end of the 1990s, which coincides with a series of financial crises that directly or indirectly affected countries in both regions.

In summary, the levels and medium-term movements in the international wedge are qualitatively consistent with well-known events in the history of the international financial system: capital controls under Bretton Woods discouraged borrowing, while financial crises in the 1980s and late 1990s are associated with declines in borrowing subsidies or increases in taxes on borrowing. This leads us to conclude

[3] We set the smoothing parameter $\lambda = 6.25$ given our annual data.

TABLE 3—MODEL-ESTIMATED GROWTH RATES OF OUTPUT, FACTOR INPUTS, AND TFP

	1950s	1960s	1970s	1980s	1990s	2000s
Rest of the world						
Y	3.8	4.4	3.4	2.6	2.7	2.4
K	3.2	4.1	3.9	2.7	2.2	2.7
H	0.9	0.3	0.3	0.7	0.6	0.9
A	2.1	2.7	1.8	1.2	1.5	0.9
Latin America						
Y	5.4	5.5	5.8	1.9	2.9	3.3
K	2.7	5.4	4.0	6.2	2.1	2.7
H	2.2	2.2	3.4	2.5	1.5	2.3
A	3.0	2.2	2.2	−1.9	1.2	0.8
Asia						
Y	8.3	10.1	5.4	4.0	2.1	2.4
K	7.3	10.9	10.2	5.2	4.7	2.1
H	3.5	2.3	1.6	1.4	−0.1	0.2
A	3.4	4.7	0.7	1.3	0.5	1.5

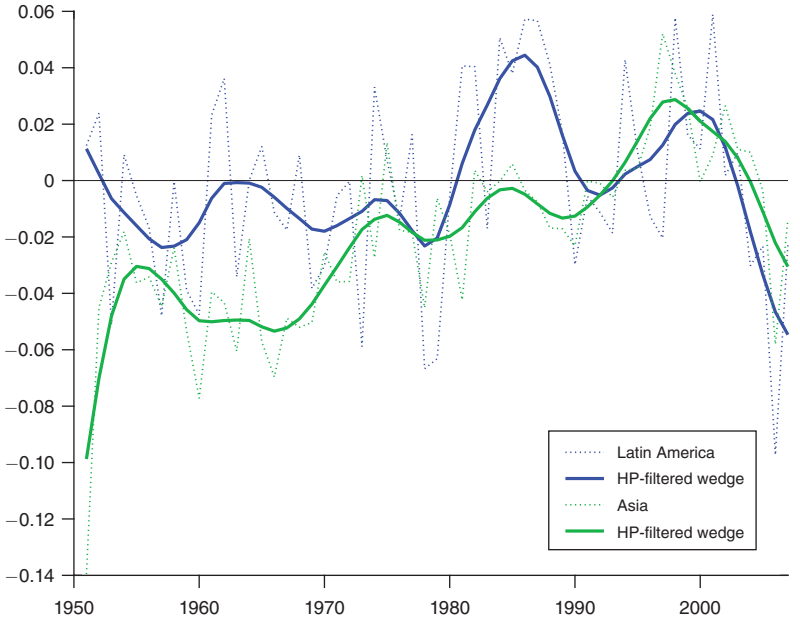

FIGURE 3. THE INTERNATIONAL WEDGE

that movements in our international wedge are associated with structural shocks to international financial markets; below we will conduct experiments to assess the importance of the international wedge in which these structural shocks are assumed not to occur.

Perhaps more surprisingly, our method reveals that capital controls in Asia were much more significant than those in Latin America in the first three decades of our sample. This highlights one of the advantages of our approach over studies that construct qualitative indicators of capital controls based on descriptions of capital controls in the IMF's *Exchange Arrangements and Exchange Restrictions* publication (for example, Chinn and Ito 2006; Quinn 1997, and many others). Whereas the

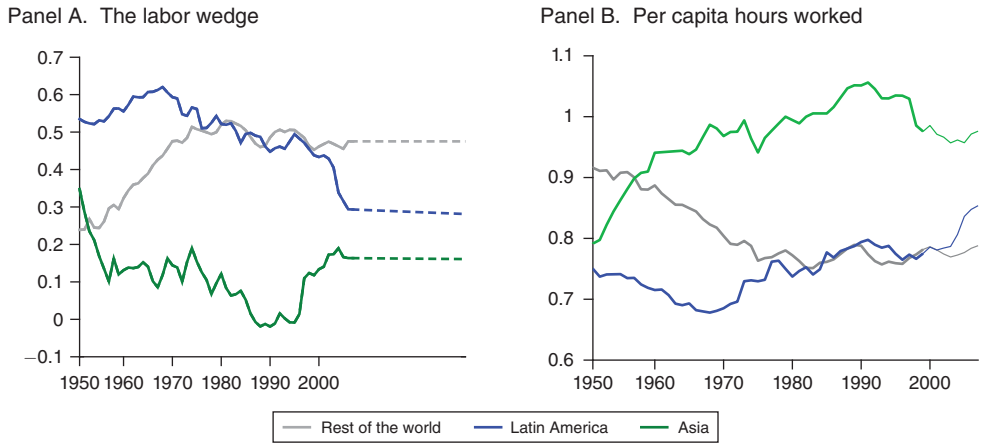

FIGURE 4. THE LABOR WEDGE

de jure system of capital controls in a country can be very complicated and may not always be enforced in practice,[4] our approach collapses a potentially complicated system into a straightforward measure of the quantitative significance of de facto capital controls. In online Appendix D we compare our international wedge to the qualitative measures constructed by Chinn and Ito (2006).

The Labor Wedge.—Figure 4 reports our estimate of the labor wedge τ^h (panel A) and per capita hours worked (panel B). Recall that this wedge is identified off of the relationship among consumption, wages, and hours worked in equation (2). Bearing in mind the caveat that the level of the recovered labor wedge cannot separately be identified from preference parameters that could vary across countries, under our normalization a wedge that is greater than zero is interpreted as a tax on labor income and reflects employment levels lower than predicted by the model with a labor wedge that is equal to zero; a number less than zero identifies relatively high employment, which is interpreted as a subsidy to labor. A value of 0.4 denotes a 40 percent tax on wage income. The figure shows that Latin America faced a larger labor wedge than all other regions in the early decades of this period, although it declined after 1970. Asia started with a significant labor wedge that fell quickly, while the labor wedge for the rest of the world rose during the first 30 years and then

[4] As one example of the difficulties involved, consider the case of Japan. In the 1950s and 1960s, Japan put in place a range of regulations and restrictions on capital flows, with the stated goal of limiting debt accumulation (Pyle 1996). These controls were particularly strict on foreign direct investment, although Japan also encouraged international licensing arrangements to access new technologies. By the late 1960s, Japan's entrance into the OECD required some capital market liberalization. By 1980, broad controls were apparently eliminated, though many international financial transactions were still subject to a variety of specific controls and regulations. In the mid-1980s, the dollar-yen accord created additional liberalization by establishing markets that previously had not existed for some financial instruments.

In contrast to qualitative measures, which typically construct categorical variables for the presence of certain types of restrictions and average them to create an aggregate measure, our method looks directly at allocations to divide the quantitative importance of these restrictions.

remained constant. As can be seen from the figure, movements in the labor wedge closely mimic inverse movements in hours worked per capita.

To interpret the labor wedge, note that it reflects various factors that affect the relationship between the household's marginal rate of substitution between consumption and leisure and the marginal product of labor. These may include forces that can be affected by policy, such as labor and consumption taxes (Chari, Kehoe, and McGrattan 2007 and Ohanian, Raffo, and Rogerson 2008), employment protection laws and other restrictions on hiring or firing workers (Cole and Ohanian 2015), unemployment benefits (Cole and Ohanian 2002), and limitations on product market competition that increase firm monopoly power (Chari, Kehoe, and McGrattan 2007), as well as search and matching frictions (Cheremukhin and Restrepo-Echavarria 2014) that form part of the "technology" of the economy. As with the international wedge, we show that the labor wedges estimated here often move with changes in taxes and changes in labor market rigidities, leading us to conclude that our estimated labor wedge is capturing structural policy changes that affect the labor market.

Studies of taxes on labor income and consumption in OECD countries coincide closely with the rest of the world labor wedge. Prescott (2002) and Ohanian, Raffo, and Rogerson (2008) report that in most European countries consumption and labor taxes rose substantially between 1950 and the mid-1980s and then were roughly stable on average after that (see online Appendix Figure 22). This closely mimics the pattern of our labor wedge for the rest of the world that shows an increase until the mid-1970s and little movement thereafter.

In terms of labor market distortions, a number of studies construct measures of these distortions across countries. In the most comprehensive study that we know of, Campos and Nugent (2012) construct an index of de jure employment law rigidities for 145 countries between 1950 and 2004. Their approach is similar to that of Botero et al. (2004), who identify labor market rigidities based on employment, collective bargaining, and social security laws. However, unlike the Botero et al. analysis, the Campos and Nugent data span the full period we analyze.

Our measure of the labor wedge has some patterns that are qualitatively similar to those reported by Campos and Nugent (2012). Specifically, Campos and Nugent's measure of aggregated Latin American labor market rigidity shows an increase in rigidity between 1960 and the beginning of the 1970s, then a decline until 1985, followed by an increase until 1994, and a larger improvement from then on (see plot of the labor market rigidity index in online Appendix Figure 11). Our labor wedge follows this pattern. The Campos and Nugent measure of aggregated European labor market rigidity shows increased rigidity from the 1950s up until the mid-1980s, the same time the rest of the world labor wedge is increasing.

For Asia, Campos and Nugent report a relatively modest increase in rigidity throughout the period (see online Appendix Figure 11). Our Asian labor wedge increases after the mid-1990s, which is qualitatively similar to Campos and Nugent. However, our Asian labor wedge declines considerably before then. This likely reflects factors that are not considered by Campos and Nugent, such as the migration of labor from rural areas, in which labor markets may not be as efficient, to more urban areas. It may also reflect the changes in education emphasized by Kim (1990), Mason et al. (1980), McGinn (1980), and Ohkawa and Rosovsky (1973)

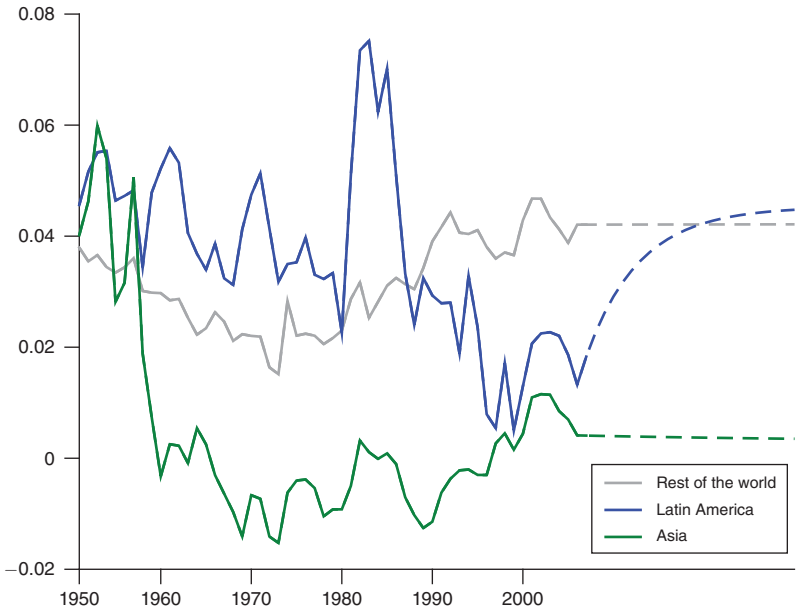

Figure 5. The Capital Wedge

among others. Likewise, the labor market reforms in Latin America emphasized by Heckman and Pagés (2004), Murillo (2001), and Duryea and Székely (2000) coincide with a decline in the Latin American labor wedge.

In summary, our method recovered quantitatively large movements in labor wedges that coincide with important policy changes affecting labor taxes and labor market regulations.

The Capital Wedge.—Figure 5 presents our estimates of the capital wedge τ^K. This wedge is identified off of the Euler equation (3) and thus reflects the difference between returns to investment estimated from the marginal product of capital and the return to savings estimated from the growth rate of consumption. Bearing in mind our caveat about the recovered levels of this wedge, under our normalization a value of 0.05 is equivalent to a 5 percent tax on capital income. As shown in the figure, the rest of the world and Latin America have a capital tax (a wedge that is greater than zero), while Asia's capital wedge deteriorates in the 1950s before falling dramatically between 1960 and 1980. Latin America is estimated as having larger domestic capital market distortions through the mid-1980s during the debt crisis, with the wedge falling thereafter to levels in between those of Asia and the rest of the world.

To assess whether these patterns in the capital wedge are consistent with an interpretation of domestic capital market policy distortions, it is useful to compare these results with the IMF's index of capital market liberalization (Abiad, Detragiache, and Tressel 2008). This index was constructed from surveyed changes in capital market regulations and restrictions for a number of countries between 1973 and 2005, including credit controls, interest controls, privatization of banks, entry barriers to

banking, the details of banking supervision regimes, and bank reserve requirements. We remove the subindex of changes in international capital market regulations. The resulting indicator ranges from a value of 0, meaning "fully repressed," to 4, meaning "fully liberalized." We find that movements in our estimated capital wedges line up with movements in the IMF's index.

According to the IMF index, the four largest Latin American countries (Argentina, Brazil, Chile, and Mexico) liberalized their domestic financial markets between 1973 and 2005, with some re-regulation occurring in the early to mid-1980s coinciding with the Latin American debt crisis. Specifically, whereas in 1973 the financial markets of Argentina, Brazil, and Chile were ranked as "fully repressed" and Mexico was ranked as "partially repressed," these countries implemented reforms in the 1970s that included less reliance on interest rate controls, more market-based securities market policies, increased privatization of banks, and increased banking supervision. The debt crises of the 1980s saw a temporary reversal of these policy shifts, particularly on interest rate controls and credit controls. Following the 1980s, however, Latin America made further progress in the operation of its capital markets, including the reduction of entry barriers, further privatization of commercial banks, less reliance on interest rate and credit controls, and more market-based securities market policies. By 2005, these countries all had composite rankings of financial markets between fully liberalized and partially liberalized. This general pattern of trend improvement in capital market regulations and restrictions, with a temporary reversal in the 1980s, is consistent with the estimated capital wedge of Latin America, which trends downward in the 1970s, increases significantly during the 1980s, and reverts to its declining trend thereafter.

For Asia, whereas in 1973 the IMF ranked the financial markets of Taiwan as fully repressed, those of Japan as partially repressed, and those of Hong Kong and Singapore as partially liberalized, the 1970s and 1980s saw all of these countries liberalize securities markets and impose fewer controls on interest rates and credit levels, so that by 2005 all of these countries were ranked as fully liberalized or close to fully liberalized. These patterns dovetail with our estimated capital wedge for Asia, which shows a trend narrowing over this same period. Online Appendix Figures 23, 24, and 25 show the plots of the indices for the different regions.

In summary, as with the labor and international wedges, we conclude that movements in our estimated wedges are often closely associated with reforms in economic policy. Obviously, it is beyond the scope of a single paper to provide a full and complete account of the history of labor and capital market policies around the world over half a century of time. However, the summary presented here documents a close coincidence between movements in labor, domestic capital, and international capital wedges and substantive historical policy changes. This leads us to a structural interpretation of our wedges as measures of the impact of economic policy distortions. We next turn to a quantitative assessment of the importance of these distortions in driving capital flows.

B. *Counterfactuals and Decomposition*

In the previous section we argued that movements in our estimated wedges are often closely associated with reforms in economic policy, leading us to give them

a structural interpretation as policy distortions. We also found that these policy distortions fluctuated significantly through time. However, comparisons of the levels and movements of different wedges do not tell us which were the most important determinants of international capital flows. In this section, we assess the quantitative importance of changes in policy distortions in the determination of capital flows, and in particular whether they can explain why capital flowed into slow-growing Latin America in greater quantities than into fast-growing Asia.

To evaluate the effect of movements in the labor and capital wedges, we treat them parametrically and simulate their effect on the economy. Specifically, we fix the labor and capital wedges at their sample mean. We choose the sample mean because, as noted above, the levels of the labor and capital wedges cannot be recovered independently of households' taste for leisure and rate of time preference. As the *level* of our wedges is a normalization, we focus on shutting down the *movements* in these wedges around this level. To quantify the impact of changes in international capital market imperfections, we also treat the international wedge parametrically but fix it to its steady-state value of zero to ensure nondegenerate long-run relative consumption levels.

Note that every time we shut down movements in a wedge by fixing it parametrically, we resolve the model so that agent expectations reflect the assumptions of the counterfactual experiment. This also implies that the effect of shutting down movements in a wedge will vary according to whether movements in other wedges have been shut down or are still operative. As a result, we present two types of results. First, we shut down movements in each individual wedge (one at a time) and for each evaluate its effect on capital flows keeping all other wedges operative. We interpret the results as the effect of removing the corresponding policy distortion while keeping other policy distortions unchanged and refer to these experiments as our *counterfactuals*. Second, we calculate the relative contribution of each wedge to observed patterns in capital flows as part of an experiment in which all wedges are shut down. We refer to this series of counterfactuals as our *decomposition*.

Counterfactuals.—We begin by shutting down each wedge in isolation. Figure 6 depicts the results of these counterfactual experiments for Latin American and Asian capital flows, as measured by the ratio of net exports to output, respectively, while Figure 7 shows the results for the rest of the world. The figures show the effect of removing each region's own wedges. This means that, for example, the line labeled "No Labor Wedge" in the panel for Latin America corresponds to the trajectory followed by net exports in Latin America when the Latin American labor wedge is set parametrically to its mean value. In the same manner, "No Capital Wedge" and "No International Wedge" correspond to the path followed by net exports when the own-region's capital wedge is set to its mean value and its international wedge is set to zero, respectively.

Consider first the effect of shutting down the international wedges. In both Latin America and, especially, Asia, the international wedge was negative at the start of the sample, indicating a tax on borrowing that led both regions to accumulate relatively more foreign assets, or borrow less, than they would have otherwise chosen to do. In the case of Latin America, removing the wedge lowers wealth growth over time and implies correspondingly lower consumption relative to the rest of the world

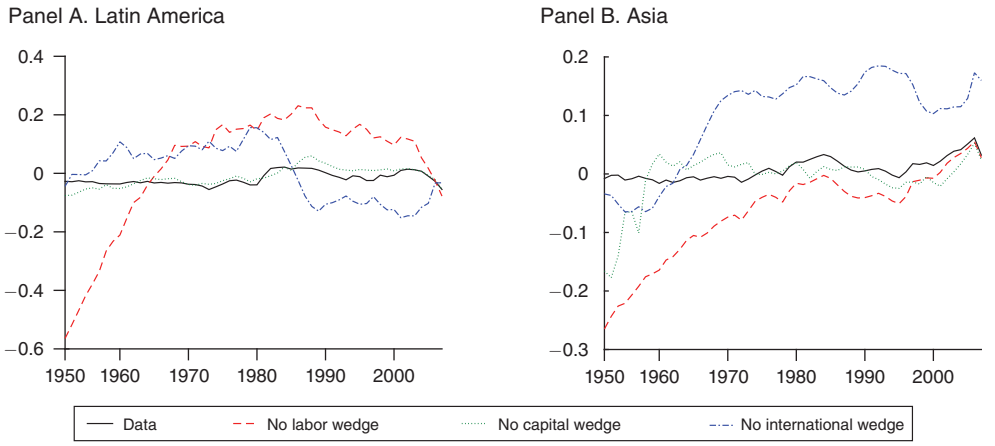

FIGURE 6. THE EFFECT OF OWN DOMESTIC WEDGES ON CAPITAL FLOWS FOR LATIN AMERICA AND ASIA (NET EXPORTS PERCENT GDP)

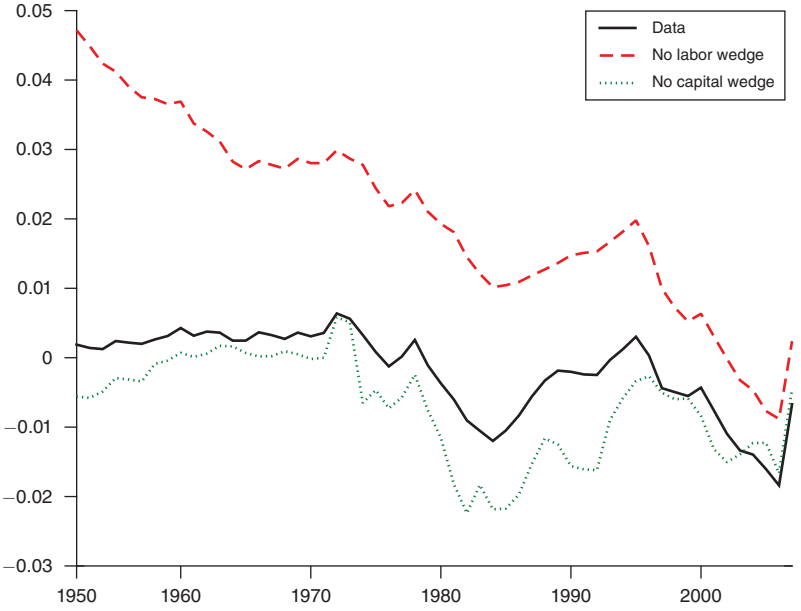

FIGURE 7. THE EFFECT OF OWN DOMESTIC WEDGES ON CAPITAL FLOWS FOR THE REST OF THE WORLD

during the first three decades, as well as higher hours worked (see Figure 8, which plots the absolute level of hours, and the level of consumption relative to the data, under each counterfactual) and an outflow of capital (compare the black line for the data with the dash-dotted lines). Under this counterfactual, the pattern is reversed in the 1980s as Latin America avoids a debt crisis and relative wealth rises.

In the case of Asia, where the tax on foreign borrowing was larger, removal of the tax leads to an initial increase in consumption and a decline in hours worked, which generates inflows of capital into Asia on the order of 5 percent of GDP during the 1950s. However, with wealth no longer rising quickly thereafter, counterfactual

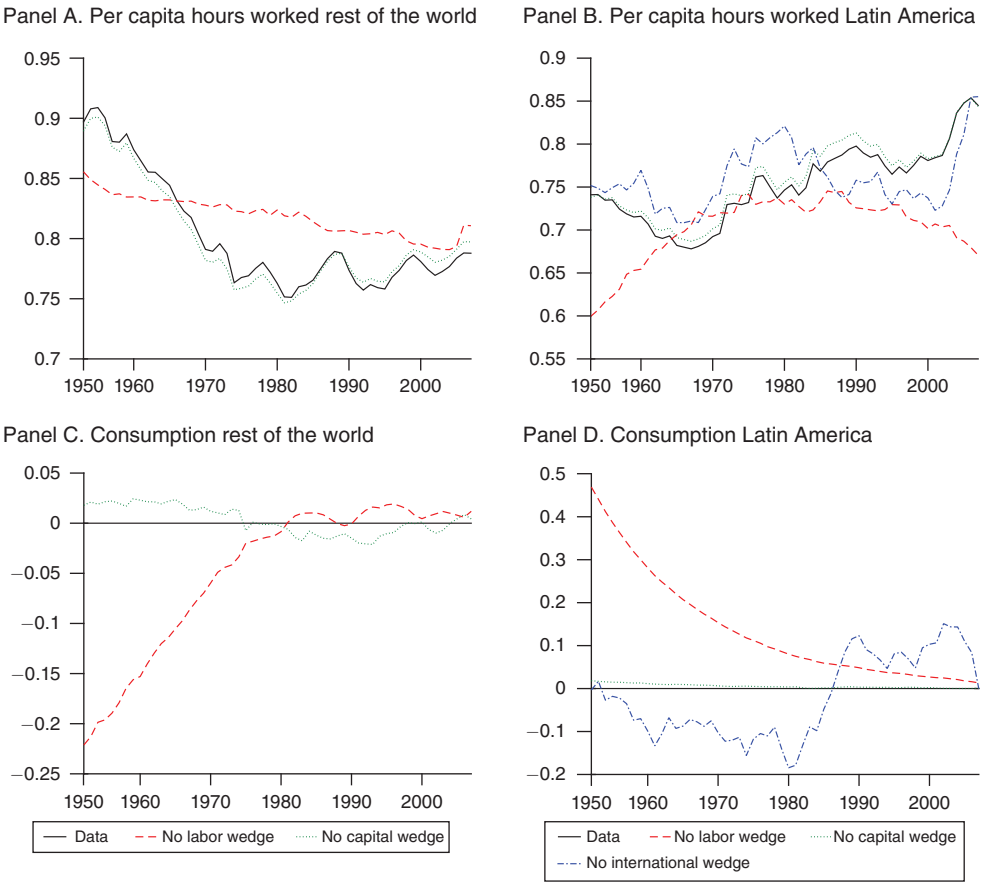

FIGURE 8. THE EFFECT OF OWN DOMESTIC WEDGES ON HOURS AND CONSUMPTION FOR LATIN AMERICA AND THE REST OF THE WORLD

consumption soon drops below the level in the data, while hours worked rise, and for the rest of the sample Asia experiences a large capital outflow. In fact, for the bulk of the sample, capital outflows from Asia would have been even greater were it not for the cumulative effect of past international capital market distortions. Note that the mechanism by which this occurs is the accumulation of net foreign assets, which in turn is driven by the entire history of the international wedge; the period-by-period impact of the international wedge on capital flows is much smaller.

These results suggest that international capital market distortions played a role in generating the perverse pattern of capital flows in the 1950s; absent these distortions, more capital would have flowed into Asia, while capital flows into Latin America would have been muted and eventually reversed. International capital market distortions also play a large role in driving capital flows in the latter decades of the sample. However, these distortions only deepen the puzzle surrounding the direction of capital flows in the 1960s and 1970s: surprisingly, eliminating these distortions leads to a much *larger* outflow of capital from Asia.

Moreover, the effect of international distortions is small compared to the effect of distortions in domestic labor markets. As shown in Figures 6, 8, and 9, shutting down movements in domestic labor market distortions produces a large increase in

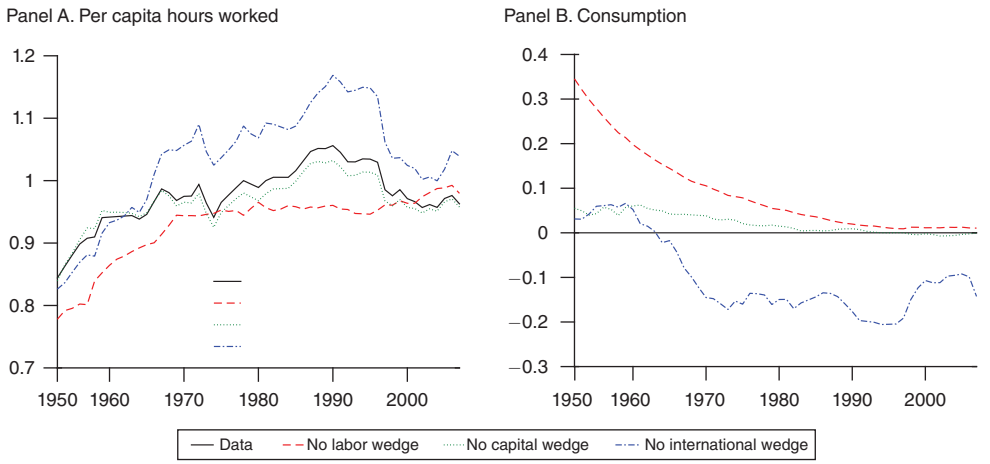

FIGURE 9. THE EFFECT OF OWN DOMESTIC WEDGES ON HOURS AND OUTPUT FOR ASIA

wealth with higher consumption and lower hours worked leading to much larger capital inflows in both Asia *and* Latin America. In the case of Asia, these capital inflows remain significant until the 2000s. In Latin America, capital begins to flow out starting in the mid-1960s and the apparently perverse pattern in capital flows is gone. In that sense, the labor wedge plays a quantitatively more significant role in explaining capital flows to Asia and Latin America in the decades after World War II. Removing domestic capital market distortions also increases capital inflows into both regions in the 1950s, although the effects are quantitatively far less significant and shorter lived.

In summary, our results indicate that while international capital market distortions can help to explain qualitatively why capital flowed into slow-growing Latin America and not fast-growing Asia in the 1950s, the quantitative magnitude is quite modest. Moreover, international distortions only seem to deepen the puzzle for the 1960s and 1970s, as their removal implies very large capital outflows despite continuing strong growth in Asia. Labor market distortions, on the other hand, especially in Asia have a much larger quantitative impact and, beginning in the 1960s, explain why capital flowed into Latin America and not into Asia.

Decomposition.—The results above are derived from counterfactual experiments in which only one type of distortion is removed at a time. This leaves open the possibility that the relative marginal contributions of the international and labor wedge to determining capital flows might depend on the order in which various distortions are removed. To assess this possibility, in our second experiment we remove all factor market distortions and quantify the contribution of each wedge to the overall change in capital flows. Given that the marginal contribution of each wedge will in general depend upon the order of its removal,[5] we remove the wedges in random

[5] For example, the marginal contribution of the labor wedge is different if the capital wedge has been previously removed than if the international wedge has been previously removed.

Table 4—Contribution of the Different Wedges to Latin American Capital Flows

Wedge Contributions	1950s	1960s	1970s	1980s	1990s	2000s
τ_R^h	0.32	0.28	0.20	0.17	0.16	0.15
τ_L^h	0.27	0.20	0.26	0.31	0.24	0.17
τ_A^h	0.10	0.09	0.06	0.03	0.03	0.02
τ_R^k	0.05	0.05	0.06	0.09	0.08	0.04
τ_L^k	0.06	0.05	0.04	0.06	0.06	0.06
τ_A^k	0.07	0.09	0.05	0.03	0.02	0.03
τ_L^B	0.08	0.18	0.26	0.22	0.27	0.39
τ_A^B	0.04	0.07	0.09	0.10	0.14	0.14

order 10,000 times[6] and then average over all of these combinations to compute the absolute relative contribution of the labor, capital, and international wedges for capital flows in each decade of our sample. These results are collected in Tables 4 and 5. Each number in each table is then the decade average of the absolute marginal contribution of each wedge over the sum of the marginal contributions of all labor, capital, and international wedges.

Table 4 shows the results for Latin America. As we can see during the 1950s and 1960s, Latin American labor market distortions explain between 20 and 30 percent of capital flows into Latin America. Labor market distortions in Asia and, particularly, in the rest of the world explain roughly another 40 percent of capital flows into Latin America. In sum, labor market distortions in all three countries explain roughly two-thirds of the movements in Latin American capital flows, while international capital market distortions around the world explain between one-tenth and one-quarter. These numbers also point to the importance of general equilibrium effects of changes in distortions in one country on capital flows into another. Starting in the 1970s, the contribution of the international wedge to Latin American capital flows rises as the accumulated effect of this wedge on net foreign asset accumulation grows. A large jump in the international wedge associated with the Latin American debt crisis also plays a role.

Table 5 presents analogous results for Asia and shows that during the decade of the 1950s, labor market distortions were five times more important than international capital market distortions in explaining capital flows. During the 1960s, labor market distortions explained two-thirds of capital flows, while international capital market distortions explained roughly one-fifth. International capital imperfections matter, with the accumulated effect of past distortions explaining one-half of Asian capital flows from the 1980s onward, although it primarily acted to decrease capital outflows. Importantly, the role of contemporaneous international capital market distortions is small; rather, it is the accumulated effect of past international distortions on net foreign asset accumulation that leads the contribution of the international wedge to increase over time.

In summary, while these results show that the accumulation of international capital market distortions over time can play a very large role in determining capital flows, the effect of contemporaneous movements in these distortions on capital

[6] There are more than 40,000 ways (orderings) in which we can remove them, but given the computational constraints, we approximate all of the possible combinations by a random sample of 10,000.

TABLE 5—CONTRIBUTION OF THE DIFFERENT WEDGES TO ASIAN CAPITAL FLOWS

Wedge contributions	1950s	1960s	1970s	1980s	1990s	2000s
τ_R^h	0.30	0.27	0.21	0.18	0.13	0.14
τ_L^h	0.09	0.07	0.03	0.02	0.02	0.03
τ_A^h	0.29	0.30	0.18	0.15	0.14	0.07
τ_R^k	0.04	0.04	0.04	0.08	0.05	0.04
τ_L^k	0.03	0.03	0.02	0.01	0.01	0.01
τ_A^k	0.13	0.08	0.04	0.05	0.09	0.15
τ_L^B	0.03	0.05	0.05	0.03	0.03	0.05
τ_A^B	0.09	0.17	0.43	0.47	0.53	0.53

flows is modest. Hence, we view them as playing a quantitatively subsidiary role in explaining why capital flowed into Latin America, and not into Asia, after World War II. Labor market distortions played the dominant role in explaining capital flows after the war; they are quantitatively more significant in general, their removal would have led to greater capital flows into Asia throughout the entire postwar period, and, at least after the 1960s, their removal would have caused capital to flow out of Latin America.

C. *Relation to the Literature*

With our results in hand, we now compare our findings to those from two recent and influential papers, Caselli and Feyrer (2007) and Gourinchas and Jeanne (2013).

Caselli and Feyrer (2007).—Our finding that distortions to both domestic and international capital markets play a subsidiary role in explaining why capital did not flow into Asia after World War II might, at first glance, seem to be consistent with Caselli and Feyrer's (2007)—henceforth, CF—finding that marginal products of capital are surprisingly similar across countries, at least toward the end of our sample. However, this is misleading. We do find significant differences in returns across countries, especially in the 1950s and 1960s, that existed due to the presence of international distortions. Rather, these differences are smaller than differences in marginal products of capital alone, and would have been even larger if not for the presence of distortions in labor markets.

To understand why this is the case, it is useful to abstract from uncertainty and rearrange equations (3) and (4) to obtain

$$1 + r_{t+1} = \frac{1 - \tau_{jt+1}^K}{1 - \tau_{jt+1}^B} \frac{\alpha Y_{jt+1}/K_{jt+1} + P_{jt+1}^{*K}}{P_{jt}^K}, \tag{15}$$

where $r_{t+1} = 1/q_{t+1} - 1$ is the world interest rate between periods t and $t+1$. This equation states that, in the absence of distortions to domestic and international capital markets ($\tau_{jt+1}^K = \tau_{jt+1}^B = 0$, for all t and j), the return to capital should be equalized in every country at the world interest rate. CF abstract from the contribution of capital gains P_{jt+1}^{*K}/P_{jt}^K to the return to capital and focus on how appropriately measuring the relative price of capital goods P_{jt}^K and the output elasticity of capital α, which in their frictionless economy equals the share of capital in national

income, leads to the equalization of the marginal product of capital across countries. We defer a discussion of differences in capital shares until Section IV and discuss first how our findings on marginal products and returns to capital compare to CF under the assumption of a common output elasticity of capital $\alpha = 0.36$.

The four panels of Figure 10 plot the components of the return to capital for each of our three regions. In panel A, we plot the expected marginal product of capital $\alpha Y_{jt+1}/K_{jt+1}$ (what CF call the naïve marginal product, or MPKN); in panel B we adjust for the model-implied relative price of capital (CF's PMPKN); in panel C, we add in the contribution of capital gains to the return to capital (which is absent from CF); and in panel D, we adjust for the role of the domestic capital wedge. Adjusting for the international wedge ensures by construction that the returns to capital in Asia and Latin America equal the line for the rest of the world in panel D.

Our estimates for the naïve marginal product in Latin America and the rest of the world rise in the first two decades of the postwar period to between 18 and 21 percent, before falling thereafter to between 17 and 18 percent. Marginal products in Asia, on the other hand, start at roughly 28 percent and decline to roughly 13 percent by the end of our sample, remaining higher than those in Latin America until the 1970s. This further emphasizes the puzzling behavior of capital flowing into Latin America instead of Asia immediately after the war. These naïve marginal products for Asia and the rest of the world are higher at the end of the sample than those from CF (Japan and the United States are at 9 and 12 percent, respectively) but are similar for Latin America (Mexico's is 22 percent and Colombia's is 28 percent, for example). After adjusting for the relative price of capital, returns in Latin America and the rest of the world converge dramatically, even more so than in CF's estimates, albeit to somewhat higher levels. Asian returns remain higher than those in Latin America for only the first decade.

Including capital gains (which includes the effect of depreciation and is shown in panel C) lowers returns in Latin America and the rest of the world to around 8 percent and in Asia to around 4 percent by the end of the sample. Accounting for the capital wedge (panel D) lowers returns at the start of the sample and compresses them toward the end, with all three countries between 3 and 4 percent. The international wedge, by construction and given our normalization, causes all returns to converge to that of the rest of the world in panel D.

Panel D shows that, if there were no international wedge, during the 1950s, an investor in the rest of the world would have made an additional 4 percent return investing in Asia and a negative return of roughly 1 percent investing in Latin America. In that sense, there were bad investments in Latin America and missed opportunities in Asia. Returns in Asia remain higher than those in Latin America until the 1980s, although both returns are lower than in the rest of the world after the 1970s. In this sense, the international wedge helps to explain the puzzling absence of capital inflows into Asia in the 1950s and 1960s, and the puzzling inflows of capital into Latin America up until the mid-1980s. Interestingly, absent both the international and capital wedges, the investor would have made 1 percent (Latin America) to 3 percent (Asia) higher returns from investing abroad in either region in the 1950s.

This is the main difference between our results and those of CF: we find significant differences in returns to capital across countries, especially in the 1950s and

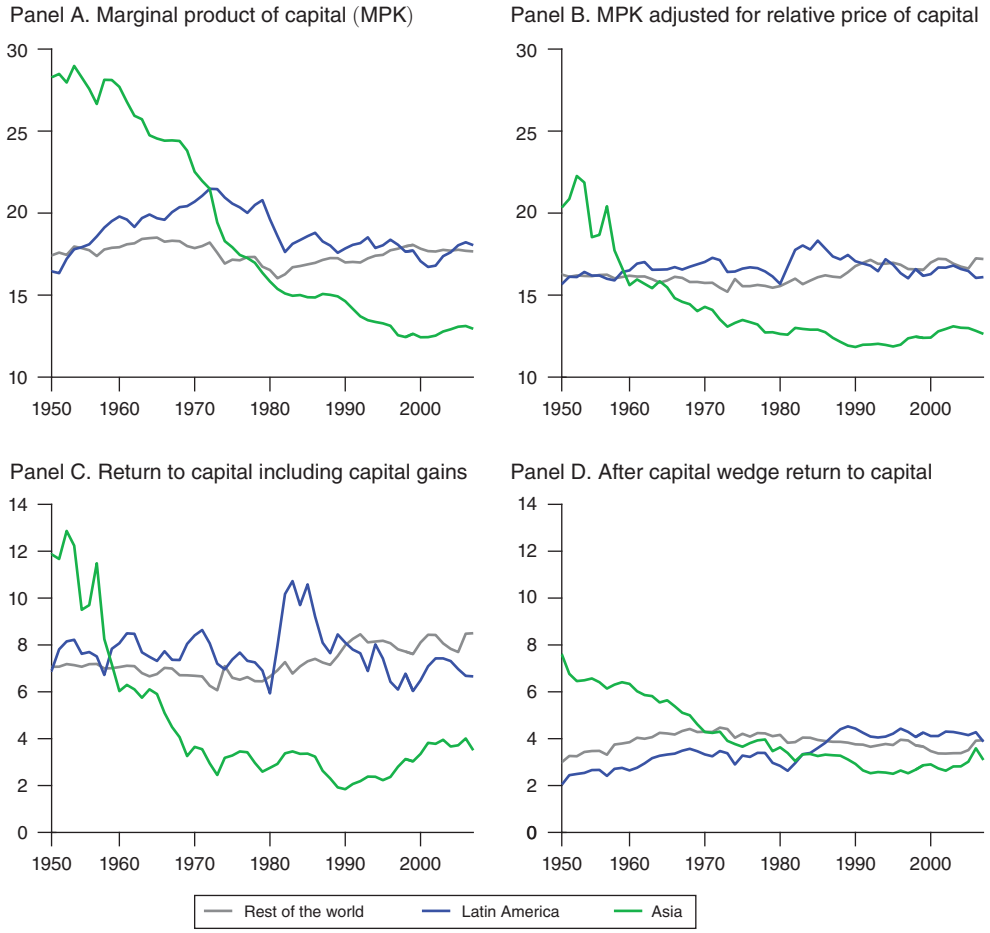

Figure 10. Different Measures of the Marginal Product of Capital

1960s, that persist only due to international capital market distortions. However, our results are closer in spirit to CF in that we find that differences in returns would have been even larger still had it not been for distortions in labor markets. To see this most clearly, consider Asia, which, according to our results for 1950, had a marginal product of capital (panel A) that is 11 percentage points higher, and a return to capital after capital gains and domestic capital market distortions (panel D) that is 4.5 percentage points higher, than in the rest of the world. These differences are large but were entirely erased by 1980. However, the differences in 1950 and the declines thereafter would have been much larger still were it not for high and declining labor market distortions in Asia. To see this, note that hours worked per person in Asia were roughly one-third lower in 1950 than they were in 1980. Had hours worked per person in 1950 been closer to their 1980 levels, the marginal product in Asia would have been almost 17 percentage points higher than in the rest of the world. Similarly, had labor market distortions not been unwound over the decades after 1950, the marginal product of capital would have fallen to roughly 3 percentage points below that in the rest of the world by 1980, instead of being within a percentage point. We

therefore conclude that labor market distortions played a more significant role in driving differences in returns and the incentives to reallocate capital.

So far, we have not considered CF's argument that capital shares as typically constructed in the data may overestimate the true share of reproducible capital due to the inclusion of returns to nonreproducible factors such as land and natural resources. We have three reasons for this. First, measured capital shares will not correctly identify the output elasticity of capital if capital market distortions are not recorded as payments to capital, even in the absence of nonreproducible capital returns. Thus, we prefer to calibrate the output elasticity of capital to a common value. Second, measured capital shares need not accurately reflect after-tax and subsidy payments to capital. Third, CF's adjustments to capital shares often result in returns to capital that seem implausibly low (see also Ohanian and Wright 2008). Specifically, under CF's assumption of a 6 percent depreciation rate, their implied return to capital is nonpositive in 17 out of 52 countries. Allowing for an additional decline in capital prices of between 3 and 4 percent due to technological progress (Greenwood and Yorukoglu 1997 find that equipment prices fell 3.3 percent per year prior to 1974 and 4 percent thereafter) results in negative returns to capital for all but 8 (if we use 3 percent) or 7 (if we use 4 percent) countries in their sample. Note that these returns are negative; they are certainly less than the return on a real government bond. Nonetheless, in the robustness section below, we report results from experiments in which we calibrate capital shares to the levels estimated for reproducible capital by CF and show that, when the model is reestimated under these assumptions, our results are largely unchanged.

Gourinchas and Jeanne (2013).—Our finding that the international wedge plays only a small role in determining capital flows stands in stark contrast to the finding of Gourinchas and Jeanne (2013)—henceforth, GJ—that this wedge (GJ call it a savings wedge) plays the dominant role in accounting for observed capital flows. There are several complementary reasons for this. One of the most significant reasons results from GJ's different definition of the capital wedge. Specifically, whereas we define our capital wedge as the difference between a household's marginal rate of substitution and domestic capital returns, GJ define their capital wedge as the difference between domestic capital returns and the world interest rate. That is, their capital wedge is equivalent to the ratio of our capital wedge to our international wedge. More importantly, their experiments varying their savings wedge while keeping their capital wedge constant are equivalent to varying both our international and capital wedges simultaneously, which produces a compounded effect. Combined with an absence of transitional dynamics in their model, this results in much larger effects of the savings wedge on capital flows.

The other major difference comes from their treatment of the labor supply. This has two dimensions. First, empirically, GJ measure labor input as the working-age population. This means that in their measurement of productivity growth, GJ attribute any variation in hours per person to changes in productivity. This also leaves no role for the labor wedge in their analysis. Second, in their theory, the labor supply is held constant, which is strongly at variance with the very large changes in hours per worker documented here. This matters because, when they vary their savings wedge, their measure of productivity (which includes any implicit effect from a

variable labor supply) is held constant. When labor supply is endogenous, changes in the savings wedge would imply changes in wealth that lead to changes in labor supply that would change their measure of productivity. Specifically, the positive savings wedges (which act as taxes on borrowing) necessary to explain why capital did not flow into Asia in their analysis, *taking as given their measure of productivity growth* for Asia, would in fact lead to declines in hours worked per person and an endogenous decline in their measure of productivity growth. This amplifies the effect of changes in the savings wedge in their framework, relative to ours.

IV. Robustness and Extensions

In this section, we briefly discuss the robustness of our findings. We consider robustness with respect to changes in the specification of our benchmark model and the robustness of our structural interpretation of the wedges as reflecting factor market distortions. We also consider how our results relate to some other studies of international capital flows that have emphasized different and complementary moments of the data. A more detailed discussion of these issues is available in online Appendix E.

A. *Parameter Values*

Above we wrote down a benchmark model against which the data could be compared, with a view toward identifying wedges between what the model predicts and what the data show. As is conventional, and for concreteness, we interpreted these wedges as taxes and subsidies that affect the marginal optimality conditions of firms and households. In discussing our results, we compared our estimated wedges with both qualitative and quantitative indicators of taxes and factor market distortions and argued that the results were similar. That is, the interpretation of these wedges as a combination of taxes and subsidies and nontax distortions was reasonable. Nonetheless, any differences between our benchmark model and the "true model" of the data-generating process will also show up as wedges. One possible cause of misspecification arises from specific functional forms and parameter choices. In this subsection, we illustrate how alternative assumptions about parameter values affect the identified wedges and the resulting analysis.

A number of parameter choices have precisely no effect on our results, as they serve only to scale up or down the estimates of the wedges, and our experiments set wedges to their mean levels. These include the discount factor β, which, as long as it is constant across countries, only affects the steady-state level of the capital wedge in each country. It also includes the preference for leisure parameter φ, which is indistinguishable from the steady-state labor wedge and could be allowed to vary across countries. Other parameters appear to have small effects: for example, allowing the intertemporal elasticity of substitution to depart from 1 changes the levels of the wedges: the lower the elasticity, the more wedges must vary to explain changes in behavior. But this departure seems to have only small effects on our experiments: a low elasticity also dampens the response to setting these wedges constant. Likewise, increasing the Frisch elasticity of labor supply dampens movements in the recovered wedges, but correspondingly increases the response from shutting down these same movements.

Of the remaining parameters, one that might have a significant effect on the model is the level of the capital adjustment cost ν, which is known to be a very important determinant of capital flows in open economy macroeconomic models (see, for example, Baxter and Crucini 1993 for a discussion). In our benchmark, we set this to generate an elasticity of the price of capital to the ratio of investment to capital of $1/2$, which is the upper bound of what Bernanke, Gertler, and Gilchrist (1999) consider plausible, but arguably better describes emerging market countries. In the online Appendix, we also present results using Bernanke, Gertler, and Gilchrist's preferred value of $1/4$ for the United States and show that it leads to very similar results.

Another parameter that has been a focal point of the literature is the output elasticity of capital, which in an undistorted economy equals the capital share. As noted above, CF argue that the true capital share should exclude payments to nonreproducible factors of production, such as land, and provide an adjustment that shows significant differences in these shares across countries. Changing the output elasticity of capital α not only will directly affect the labor and capital wedges, as can be seen in equations (13) and (14), but also will affect the entire equilibrium of the model. To assess whether this makes a significant difference to our results, we calculated our wedges after reestimating the model with output elasticities of capital calibrated to be different across regions and equal to the income-weighted share of the estimates of CF. Whereas in the baseline we imposed $\alpha = 0.36$ for all countries, this results in output elasticities of capital of $\alpha_{ASIA} = 0.23$, $\alpha_{LATAM} = 0.26$, and $\alpha_{ROW} = 0.18$. The resulting estimates of the capital and labor wedges using heterogeneous capital shares look like scaled versions of those computed in our benchmark. This is perhaps not surprising: ignoring the effect of the equilibrium of the model, increasing/decreasing α serves mostly to decrease/increase the estimated capital wedge each period. Given that our experiments set the capital wedge equal to its sample mean, the resulting outcomes of our experiments also turn out to be both qualitatively and quantitatively similar to those for our benchmark.

A recent literature has pointed to movements in the capital share in the United States and some other countries over time and has argued that this is evidence that the aggregate production function is not well approximated by a Cobb-Douglas production function. While this is one possible interpretation of varying factor shares, another possibility consistent with the mechanism of our paper is that changes in factor market distortions are responsible for the changing levels of the factor share. This would be the case if these factor market distortions are not priced or otherwise measured as compensation for the relevant factor of production and would imply that measured factor shares do not identify the relevant parameter of the Cobb-Douglas production function nor indicate any departure from Cobb-Douglas. Differences in the levels of factor market frictions across countries could also explain recorded differences in the levels of capital shares across countries, and not just time-series variation in factor shares. Given these possibilities, we do not further explore them.

Lastly, we imposed the assumption that our wedges were uncorrelated across countries. This was for simplicity, as it drastically reduced the number of parameters to be estimated on less than 60 years of annual data; instead of 34 parameters, a vector autoregressive structure for our 17 wedges would require the estimation of $17^2 = 289$ autoregressive coefficients and a further 153 parameters in the covariance

matrix. Nonetheless, correlation among the labor, capital, and international wedges could matter for the interpretation of our experiments, in which movement in a given wedge is shut down. To examine the potential for this issue, we looked at the empirical relationship among our recovered wedges. Economically, the correlations between the wedges are typically small, with 66 percent of the parameters in the correlation matrix being less than 0.5 in absolute value. The largest correlations tend to be associated with the cross-country relationships between population and productivity.

As our experiments concerned shutting down the international, capital, and labor wedges, with a focus on those wedges specific to Latin America and Asia, we are mostly concerned with interactions among these wedges and all other wedges. One way to assess this is to compute the principal components of the covariance matrix of the wedges.

The first two principal components explain almost 92 percent of the variation in the data. Of these, the first principal component, which explains roughly 73 percent of the variation in the data, loads primarily on the population and productivity wedges of Asia and Latin America as well as on Asian government spending. The second principal component, which explains 19 percent of the variation in the data, loads primarily on the productivity of Asia and the capital wedge for the rest of the world and Asia. While one might tell an economic story in which these are related, we think it more likely reflects a spurious relationship in the short sample. As a consequence, we conclude that the correlation among the wedges that we focus on is small and not an important factor driving our results.

B. *Alternative Structural Interpretations of Wedges*

In this subsection, we briefly discuss some examples of alternative models of, and explanations for, observed patterns in international capital flows. In each case, we briefly sketch how the alternative explanation would manifest as patterns in the wedges recovered from our analysis. Further details are provided in online Appendix E.

Multiple Goods and Transport Costs.—Our benchmark model featured one tradable consumption good for the world and one nontradable investment good in each country. This means that the terms of trade are constant and that any movements in the terms of trade in the data will be attributed to our wedges. To see how this affects our wedges, consider the two-country model of Backus, Kehoe, and Kydland (1994) in which a domestically produced tradable good is combined with a foreign-produced tradable good to produce a nontraded domestic good that is both consumed and invested. The assumption of two countries simplifies the analysis by making relative price calculations obvious.

It is straightforward to show (see online Appendix E) that if data generated by this model were confronted with the capital flow accounting procedure above, the resulting wedges in our benchmark model would be correlated with the level and change in a country's terms of trade. Specifically, when the price of a country's export good falls relative to the price of the good it imports, so that its terms of trade deteriorate, both the labor and capital wedges get larger. This is intuitive: for a given nominal wage, an increase in import prices reduces the real returns to suppliers of labor and

capital while leaving the real costs to the firm unchanged. The international wedge, on the other hand, will in general respond to the growth rate of the terms of trade as relative inflation across countries, and hence also relative real returns, move in opposite directions. Inspection of the wedges recovered from the data shows at best modest evidence for these patterns, suggesting that this explanation does not play a major role in explaining observed capital flows.

Relatedly, Obstfeld and Rogoff (2001), Fitzgerald (2012), and others have argued that transport costs in international trade can drive movements in relative prices that provide a qualitative, and possibly also a quantitative, explanation of some observed patterns in capital flows. Regarding the level of capital flows, intuitively, in a finite horizon economy, a country that is a borrower (net importer) today will be a net exporter at some point in the future when these debts are repaid. If this causes a country to shift from importing a given set of goods (at a high price due to payment of transport costs) to exporting them (at a lower price due to foreigners paying these same costs), there will be domestic deflation and a high real cost of borrowing from abroad. Likewise, a country that saves will tend to receive lower real returns. Thus, the level of capital flows may be reduced. Reyes-Heroles (2016), Alessandria and Choi (2015), and Eaton, Kortum, and Neiman (2016) all find that trade costs play significant (but quantitatively varying) roles in explaining the *level* of capital flows in the context of their own models. However, it is not clear that this mechanism plays a quantitatively significant role in explaining *relative levels* of capital flows to Latin America and Asia in practice. Further discussion is provided in online Appendix E.

Financial Frictions.—Our finding of a dominant role for labor market distortions may be viewed as surprising when set against the large literature that has examined the role of various financial frictions in determining capital flows. In the case of Latin America in particular, which experienced a sovereign debt crisis in the middle of our sample, one might expect frictions resulting from the enforcement of contracts to play a significant role. In this subsection, we briefly review the implications of the class of limited commitment models for our results.

Consider a limited commitment model of international financial frictions along the lines of Kehoe and Perri (2002); see also Wright (2001). In online Appendix E, we show that the shadow cost of binding enforcement constraints shows up directly in our international wedge. In a limited commitment model, regardless of whether capital flows are motivated by consumption smoothing, capital scarcity, or a desire to shift consumption through time (that is, tilt the consumption profile), the model predicts that the participation constraint should never bind when net exports are negative. Intuitively, this is because a country is never tempted to refuse a positive inflow of resources from the rest of the world. As we can see in Figure 3, the upward movement in the international wedges in Asia and Latin America in the 1980s coincides with the switch from negative to positive net exports for both regions, providing support for this model in the 1980s (see also Restrepo-Echavarria 2018). However, this mechanism appears to play no role in explaining capital flows in the 1950s and 1960s, which is the focus of our analysis. Moreover, limited commitment models imply an international wedge that is highly correlated with the capital wedge, and these models generate no labor wedge at all. We find no support for these predictions in the data.

C. *Public Capital Flows and Ricardian Equivalence*

Some authors, such as Aguiar and Amador (2016) and Alfaro, Kalemli-Ozcan, and Volosovych (2014), have argued that public capital flows—borrowing and saving by emerging market country governments—are the key component in explaining capital flows beginning in the 1970s. It is also possible that similar forces were also relevant in the early decades that are our focus, although data limitations prevent an extension of their analysis back to 1950. Implicitly, of course, this requires that there must be a significant departure from Ricardian equivalence that prevents private capital flows (that is, flows to the private sector of these economies) from offsetting these public flows. We are quite open to this possibility and note that plausible reasons for the departure from Ricardian equivalence have testable implications that our wedges approach is well designed to examine.

Specifically, one leading hypothesis must be that the capital controls that were introduced under the Bretton Woods system prevented the private sector from accessing international capital markets to offset the effect of public capital flows. But this implies that private consumption should depart from the levels implied by the Euler equation for bonds, which would show up as an international wedge in our framework. The fact that we find that the international wedge has a relatively small impact on capital flows is evidence against this departure from Ricardian equivalence being important in explaining capital flows. Other possibilities, such as myopia on the behalf of consumers, would also show up as both an international and a capital wedge.

These possibilities should not necessarily be taken as evidence against the claim that public capital flows drive national capital flows during this period. Instead, it might simply imply a different departure from Ricardian equivalence. We view our approach as complementary to this argument in that it provides evidence of what these departures from Ricardian equivalence might be and believe it will be a fruitful avenue for future research.

V. Conclusion

Between 1950 and 1990, Asia grew much faster than Latin America but received fewer capital inflows from abroad. This is surprising because, all else equal, rapidly growing countries should generate higher capital returns and thus should receive more capital than slow-growing countries. Some studies implicitly adopt the "all else equal" aspect of this argument and analyze capital flow patterns by focusing on imperfections and inefficiencies of international capital markets that either depress the incentives, or limit the opportunities, to move capital to fast-growing regions. In this paper, we removed the "all else equal" assumption and explored the role of domestic *labor* market distortions in influencing the return to capital and the incentives for capital flows.

Specifically, we developed a capital flow accounting framework that can be thought of as a form of open economy business cycle accounting. We then applied this to a novel dataset of output, consumption, investment, hours worked, and international capital flows for Asia, Latin America, and the rest of the world from 1950 to 2007. We used this framework and data to measure implied labor market and both

domestic and international capital market distortions and to quantify the impact of these factors on international capital flows.

We found that labor market distortions, and their removal over time, play the dominant role in explaining both why Asia grew relatively fast as well as why it received little in the way of capital inflows. Perhaps surprisingly, in light of the preceding literature, the impact of international and domestic capital market distortions was not quantitatively important in deterring capital flows into Asia after the 1950s, and in fact acted to decrease capital outflows from Asia. Latin American capital flows were also primarily driven by the Latin American labor wedge. International capital market distortions had much larger effects on Latin American capital flows during and after the Latin American debt crisis of the 1980s.

These findings have both positive and normative implications. On the positive side, the results indicate that there is no presumption that rapidly growing countries should receive disproportionately high capital flows, as domestic labor and capital market distortions can sufficiently depress the incentives to move capital to these countries. On the normative side, our findings also suggest that the welfare effects of reforming domestic institutions can be much larger than often assumed, as changes in domestic distortions can have large direct and indirect effects on world allocations.

REFERENCES

Abiad, Abdul, Enrica Detragiache, and Thierry Tressel. 2008. "A New Database of Financial Reforms." IMF Working Paper WP/08/266.

Aguiar, Mark, and Manuel Amador. 2016. "Fiscal Policy in Debt Constrained Economies." *Journal of Economic Theory* 161: 37–75.

Aguiar, Mark, and Gita Gopinath. 2006. "Defaultable Debt, Interest Rates and the Current Account." *Journal of International Economics* 69 (1): 64–83.

Alessandria, George, and Horag Choi. 2015. "The Dynamics of the Trade Balance and the Real Exchange Rate: The J Curve and Trade Costs?" Unpublished.

Alfaro, Laura, Sebnem Kalemli-Ozcan, and Vadym Volosovych. 2008. "Why Doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation." *Review of Economics and Statistics* 90 (2): 347–68.

Alfaro, Laura, Sebnem Kalemli-Ozcan, and Vadym Volosovych. 2014. "Sovereigns, Upstream Capital Flows, and Global Imbalances." *Journal of the European Economic Association* 12 (5): 1240–84.

An, Sungbae, and Frank Schorfheide. 2007. "Bayesian Analysis of DSGE Models." *Econometric Reviews* 26 (2–4): 113–72.

Arellano, Cristina. 2008. "Default Risk and Income Fluctuations in Emerging Economies." *American Economic Review* 98 (3): 690–712.

Atkeson, Andrew. 1991. "International Lending with Moral Hazard and Risk of Repudiation." *Econometrica* 59 (4): 1069–89.

Backus, David K., Patrick J. Kehoe, and Finn E. Kydland. 1994. "Dynamics of the Trade Balance and the Terms of Trade: The J-Curve?" *American Economic Review* 84 (1): 84–103.

Bai, Yan, and Jing Zhang. 2010. "Solving the Feldstein-Horioka Puzzle with Financial Frictions." *Econometrica* 78 (2): 603–32.

Baxter, Marianne, and Mario J. Crucini. 1993. "Explaining Saving-Investment Correlations." *American Economic Review* 83 (3): 416–36.

Baxter, Marianne, and Mario J. Crucini. 1995. "Business Cycles and the Asset Structure of Foreign Trade." *International Economic Review* 36 (4): 821–54.

Bayoumi, Tamim A., and Andrew K. Rose. 1993. "Domestic Savings and Intra-National Capital Flows." *European Economic Review* 37 (6): 1197–202.

Becker, Robert A. 1980. "On the Long-Run Steady State in a Simple Dynamic Model of Equilibrium with Heterogeneous Households." *Quarterly Journal of Economics* 95 (2): 375–82.

Bernanke, Ben S., Mark Gertler, and Simon Gilchrist. 1999. "The Financial Accelerator in a Quantitative Business Cycle Framework." In *Handbook of Macroeconomics,* Vol. 1C, edited by John B. Taylor and Michael Woodford, 1341–93. Amsterdam: Elsevier.

Botero, Juan C., Simeon Djankov, Rafael LaPorta, Florencio Lopez-de-Silanes, and Andrei Shleifer. 2004. "The Regulation of Labor." *Quarterly Journal of Economics* 119 (4): 1339–82.

Campos, Nauro F., and Jeffrey B. Nugent. 2012. "The Dynamics of the Regulation of Labor in Developing and Developed Countries since 1960." IZA Discussion Paper 6881.

Canova, Fabio. 1998. "Detrending and Business Cycle Facts: A User's Guide." *Journal of Monetary Economics* 41 (3): 533–40.

Caselli, Francesco, and James Feyrer. 2007. "The Marginal Product of Capital." *Quarterly Journal of Economics* 122 (2): 535–68.

Chari, V. V., Patrick J. Kehoe, and Ellen R. McGrattan. 2007. "Business Cycle Accounting." *Econometrica* 75 (3): 781–836.

Cheremukhin, Anton A., and Paulina Restrepo-Echavarria. 2014. "The Labor Wedge as a Matching Friction." *European Economic Review* 68: 71–92.

Chinn, Menzie D., and Hiro Ito. 2006. "What Matters for Financial Development? Capital Controls, Institutions, and Interactions." *Journal of Development Economics* 81 (1): 163–92.

Cole, Harold L., and Lee E. Ohanian. 2002. "The Great U.K. Depression: A Puzzle and Possible Resolution." *Review of Economic Dynamics* 5 (1): 19–44.

Cole, Harold L., and Lee E. Ohanian. 2015. "The Impact of Cartel, Monetary, and Productivity Shocks on the International Great Depression." Unpublished.

Duryea, Suzanne, and Miguel Székely. 2000. "Labor Markets in Latin America: A Look at the Supply-Side." *Emerging Markets Review* 1 (3): 199–228.

Eaton, Jonathan, and Mark Gersovitz. 1981. "Debt with Potential Repudiation: Theoretical and Empirical Analysis." *Review of Economic Studies* 48 (2): 289–309.

Eaton, Jonathan, Samuel Kortum, and Brent Neiman. 2016. "Obstfeld and Rogoff's International Macro Puzzles: A Quantitative Assessment." *Journal of Economic Dynamics and Control* 72: 5–23.

Feldstein, Martin, and Charles Yuji Horioka. 1980. "Domestic Saving and International Capital Flows." *Economic Journal* 90 (358): 314–29.

Fernández-Villaverde, Jesús, and Juan F. Rubio-Ramírez. 2007. "Estimating Macroeconomic Models: A Likelihood Approach." *Review of Economic Studies* 74 (4): 1059–87.

Fitzgerald, Doireann. 2012. "Trade Costs, Asset Market Frictions, and Risk Sharing." *American Economic Review* 102 (6): 2700–33.

Gourinchas, Pierre-Olivier, and Olivier Jeanne. 2013. "Capital Flows to Developing Countries: The Allocation Puzzle." *Review of Economic Studies* 80 (4): 1484–1515.

Greenwood, Jeremy, and Mehmet Yorukoglu. 1997. "1974." *Carnegie-Rochester Conference Series on Public Policy* 46: 49–95.

Heckman, James J., and Carmen Pagés, eds. 2004. *Law and Employment: Lessons from Latin America and the Caribbean.* Chicago: University of Chicago Press.

Hsieh, Chang-Tai. 1999. "Productivity Growth and Factor Prices in East Asia." *American Economic Review* 89 (2): 133–38.

Hsieh, Chang-Tai. 2002. "What Explains the Industrial Revolution in East Asia? Evidence from the Factor Markets." *American Economic Review* 92 (3): 502–26.

Keane, Michael P. 2011. "Labor Supply and Taxes: A Survey." *Journal of Economic Literature* 49 (4): 961–1075.

Kehoe Patrick J., and Fabrizio Perri. 2002. "International Business Cycles with Endogenous Incomplete Markets." *Econometrica* 70 (3): 907–28.

Kim, Chongsoo. 1990. "Labor Market Developments in Macroeconomic Perspective." In *Korean Economic Development*, edited by Jene K. Kwon. Westport, CT: Greenwood Press.

Krugman, Paul. 1994. "The Myth of Asia's Miracle." *Foreign Affairs* 73 (6): 62–78.

Lama, Ruy. 2011. "Accounting for Output Drops in Latin America." *Review of Economic Dynamics* 14 (2): 295–316.

Mason, Edward S., Mahn Je Kim, Dwight H. Perkins, Kwang Suk Kim, and David C. Cole. 1980. *The Economic and Social Modernization of the Republic of Korea.* Cambridge, MA: Harvard University Press.

McGinn, Noel F. 1980. *Education and Development in Korea.* Cambridge, MA: Harvard University Press.

Mendoza, Enrique G. 1991. "Real Business Cycles in a Small Open Economy." *American Economic Review* 81 (4): 797–818.

Monge-Naranjo, Alexander, Juan M. Sánchez, and Ral Santaeulalia-Llopis. 2015. "Natural Resources and Global Misallocation." Federal Reserve Bank of St. Louis Working Paper 2015-13A.

Murillo, Maria Victoria. 2001. *Labor Unions, Partisan Coalitions, and Market Reforms in Latin America.* Cambridge: Cambridge University Press.

Nehru, Vikram, and Ashok Dhareshwar. 1993. "A New Database on Physical Capital Stock: Sources, Methodology and Results." *Revista de Análisis Económico* (*Economic Analysis Review*) 8 (1): 37–59.

Obstfeld, Maurice, and Kenneth Rogoff. 2001. "The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?" In *NBER Macroeconomics Annual 2000,* edited by Ben S. Bernanke and Kenneth Rogoff, 339–412. Cambridge, MA: MIT Press.

Ohanian, Lee, Andrea Raffo, and Richard Rogerson. 2008. "Long-Term Changes in Labor Supply and Taxes: Evidence from OECD Countries, 1956–2004." *Journal of Monetary Economics* 55 (8): 1353–62.

Ohanian, Lee E., Paulina Restrepo-Echavarria, and Mark L. J. Wright. 2018. "Bad Investments and Missed Opportunities? Postwar Capital Flows to Asia and Latin America: Dataset." *American Economic Review.* https://doi.org/10.1257/aer.20151510.

Ohanian, Lee E., and Mark L. J. Wright. 2008. "Where Did Capital Flow? Fifty Years of International Rate of Return Differentials and Capital Flows." Unpublished.

Ohkawa Kazushi, and Henry Rosovsky. 1973. *Japanese Economic Growth: Trend Acceleration in the Twentieth Century.* Stanford, CA: Stanford University Press.

Pencavel, John. 1987. "Labor Supply of Men: A Survey." In *Handbook of Labor Economics*, Vol. 1, edited by Orley C. Ashenfelter and Richard Layard, 3–102. Amsterdam: Elsevier.

Prescott, Edward C. 2002. "Prosperity and Depression." *American Economic Review* 92 (2): 1–15.

Pyle, Kenneth B. 1996. *The Making of Modern Japan*. 2nd ed. Lexington, MA: DC Health.

Quinn, Dennis. 1997. "The Correlates of Change in International Financial Regulation." *American Political Science Review* 91 (3): 531–51.

Rahmati, Mohammad, and Jacek Rothert. 2014. "Business Cycle Accounting in a Small Open Economy." United States Naval Academy Department of Economics Departmental Working Paper 46.

Ramsey, F. P. 1928. "A Mathematical Theory of Saving." *Economic Journal* 38 (152): 543–59.

Reichling, Felix, and Charles Whalen. 2012. "Review of Estimates of the Frisch Elasticity of Labor Supply." Congressional Budget Office Working Paper 2012–13.

Restrepo-Echavarria, Paulina. 2018. "Endogenous Borrowing Constraints and Stagnation in Latin America." Federal Reserve Bank of St. Louis Working Paper 2014-037A.

Reyes-Heroles, Ricardo. 2016. "The Role of Trade Costs in the Surge of Trade Imbalances." Unpublished.

Schmitt-Grohé, Stephanie, and Martín Uribe. 2003. "Closing Small Open Economy Models." *Journal of International Economics* 61 (1): 163–85.

Taylor, Alan M. 1996. "International Capital Mobility in History: The Saving-Investment Relationship." NBER Working Paper 5743.

Tesar, Linda L. 1991. "Savings, Investment and International Capital Flows." *Journal of International Economics* 31 (1–2): 55–78.

Tomz, Michael, and Mark L. J. Wright. 2013. "Empirical Research on Sovereign Debt and Default." *Annual Review of Economics* 5: 247–72.

Uzawa, H. 1968. "Market Allocation and Optimum Growth." *Australian Economic Papers* 7 (10): 17–27.

Wright, Mark L. J. 2001. "Investment and Growth with Limited Commitment." Unpublished.

Young, Alwyn. 1992. "A Tale of Two Cities: Factor Accumulation and Technical Change in Hong Kong and Singapore." In *NBER Macroeconomics Annual 1992*, Vol. 7, edited by Olivier Jean Blanchard and Stanley Fischer, 13–64. Cambridge, MA: MIT Press.

Young, Alwyn. 1995. "The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience." *Quarterly Journal of Economics* 110 (3): 641–80.

Young, Alwyn. 1998. "Growth without Scale Effects." *Journal of Political Economy* 106 (1): 41–63.

This article has been cited by:

1. Paulina Restrepo-Echavarria. 2019. Endogenous borrowing constraints and stagnation in Latin America. *Journal of Economic Dynamics and Control* **109**, 103774. [Crossref]
2. Josef Schroth. 2018. Capital Flows Across Developing Countries: Is There an Allocation Puzzle?. *SSRN Electronic Journal* . [Crossref]