Financial Globalization: Winners and Losers

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Abstract

Using wedge accounting in an international investment gravity model, we quantify the effects of the last five decades of financial globalization on world output, cross-country inequality, and the cross-section of wages and capital rents. We find that uneven financial globalization has led to a worsening of the allocation of capital, resulting in a lower world output by 4%. In addition, inequality across countries has widened: output per capita has declined by 23% in the poorest economies on average. While financial globalization has increased wages and lowered capital returns in high-income countries, it has led to the opposite result in low-income countries. Despite the diversification of their portfolio towards capital-scarce high-returns economies, capital-owners in high-income economies have seen the average returns on their portfolio decline by 18% because returns on the domestic asset have declined by 29%.

1 Introduction

The last five decades have seen a tremendous rise in cross-border capital flows. The sum of external assets and liabilities totaled 300% of GDP on average in recent years while it was only 50% in 1970. Through the worldwide reallocation of capital, financial globalization can have profound implications for the world distribution of output and income across individuals–both across and within countries. In this paper we analyze the aggregate and distributional implications of financial globalization: who loses and who wins from financial globalization?

Starting from the international investment gravity model of Pellegrino et al. (2021) (PSW hereafter), the paper first develops a wedge accounting framework, in the style of Chari, Kehoe, and McGrattan (2007). Using national accounting and external asset and liabilities positions and domestic portfolio shares for 70 countries spanning five decades (1970-2015), we back out *financial globalization wedges* (FGW), which represent frictions to the international flow of capital among countries. We then show that these FGW correlate with several drivers of financial globalization identified in the literature. In our counterfactual analyses, we feed alternative trajectories of the wedges to the model to study the effects of financial globalization on world output, cross-country inequality, and the cross-section of wages and capital rents.

In the model, young individuals supply labor and invest and retirees consume their savings. Production of the final good uses labor, capital and natural resources. Young individuals choose to allocate capital among different destinations with varying returns. The model yields a gravity equation for foreign assets demand. Cross-border investments are affected by informational frictions, which we parametrize in terms of measures of physical and cultural distances between societies. They are also affected by capital controls, investment risk and taxation, which are captured by the FGW. These wedges can be interpreted as the implicit taxes an investor has to pay on the returns of its investment in each country. They skew portfolios and thus distort the world allocation of capital, affecting national income, wages and capital rents.

Our methodological contribution and the key novelty relative to PSW is to show how to invert the model to back out the FGW using the following country-level statistics: 1) the external assets and liabilities and 2) the domestic portfolio shares. We show that the first two identify for each country the frictions impeding incoming foreign investments. Intuitively, we infer that a country is characterized by high barriers to incoming foreign investments if its external liability is lower than what the model predicts given the observed external assets of all other countries and the model-

implied share of their portfolio invested into this country. The domestic portfolio shares identify the frictions impeding the outgoing foreign investment. Intuitively, a domestic portfolio share higher than what the model would predict given the observed returns and distances would imply strong barriers to outgoing foreign investment.

We find that the average implicit tax faced by investors has decreased from 89% in 1970 to 58% in 2010 before going up to almost 64% in the most recent period. The 1970s and the second half of the 1990s until the Great Financial Crisis are two periods of very fast financial globalization. The 1980s and the 2010s are two periods of retrenchment of globalization. We also find that financial globalization is a deeply uneven process: the dispersion of implicit taxes has increased over time. In our validation exercise, we show that the estimated FGW are significantly related to drivers of financial globalization identified in the literature such as capital controls, corporate tax and "investment safety."

Our key empirical contribution is to study the effects of financial globalization on world output, cross-country inequality and the within-country inequality between wage-earners and capital-owners. Our main counterfactual compares the world equilibrium with the actual FGW to an equilibrium in which the FGW are held constant at their value in 1970. From this analysis, we highlight four main results. First uneven financial globalization has worsened the global allocation of capital by inducing a reallocation of capital from capital-scarce to capital-rich countries, resulting in a 4% lower world output. This surprising result is consistent with the Lucas puzzle (Lucas, 1990) and with the fact that emerging and developing economies have higher returns on capital documented in Monge-Naranjo et al. (2019) and David et al. (2014) and analyzed in PSW. Second, it has increased inequality across countries: output per capita has decreased by 23% in the poorest countries but increased by 30% in the richest countries. Relative to output per capita, inequality in income per capita increases by less, as low-income countries accumulate a net foreign asset position.

While one would expect financial globalization to improve the allocation of capital by allowing capital to flow to the countries with highest returns, two mechanisms have contributed to the worsening of the allocation of capital. First, the pace of financial globalization has been uneven: barriers to capital investment in high-income countries have declined more quickly than those of low-income countries. If high-income countries liberalize their capital account faster than low-income countries, the perceived rates of returns on their capital stock increase relative to those in low-income countries, thereby attracting investment from the rest of the world. In a counterfactual that assumes that the decrease in barriers to investment is even across

all countries, we indeed find that financial globalization increases the world output by 2%. Second, consistent with empirical evidence, our model generates portfolio shares that increase in the size of the destination economy; as a result the decrease in barriers to international investment benefit relatively more large countries *ceteris paribus*. Since large economies have on average higher income per capita and lower returns, capital is being channeled towards high-income low-returns countries. In a counterfactual that assumes that the portfolio shares are not related to the size of the destination countries but are only a function of returns, we indeed find that financial globalization causes a decline in output by only 2%.

The third and fourth results highlight that inequality between wage-earners and capital-owners has increased within low-income countries and decreased within high-income countries. In the poorest countries, wages have decreased by 23% while the average returns on portfolios have increased by 14%. On the contrary, in the richest countries, wages have increased by 30% and the average returns on portfolio have decreased by 18%. The latter is the combination of two opposite forces. With the decrease of barriers, capital-owners reshuffle their portfolio and invest abroad in higher-return assets which increases the average returns by 8%. But they also face a decline in the returns on the local assets—which remains a large share of their portfolio—by 29%. This general equilibrium effect is strong enough to offset the partial equilibrium gains from the reshuffling of portfolios.

Related literature. This paper contributes to the literature on Open-Economy Macro-Finance. A key contribution is methodological. One major obstacle preventing historical analysis using the investment gravity model is the lack of long panel data on bilateral investment positions. Our new method to account for financial globalization relies on insights from two streams of the literature: Lane and Milesi-Ferretti (2007) and Lane and Milesi-Ferretti (2018) document the patterns of financial globalization using their panel of external assets and liabilities in the past five decades; French and Poterba (1991) documents and provides rationales for a strong home bias of portfolios (see Coeurdacier and Rey (2013) for a review and Gârleanu et al. (2019) for a recent contribution). The FGW are identified using the panel of external assets and liabilities and the panel of domestic investment shares. The measurement of the FGW relates to the wedge analysis done by Chari et al. (2007) in the context of the business cycle, Restuccia and Rogerson (2017) in the context of the allocation of inputs across firms and Ohanian et al. (2018) in an international and historical context.

Regarding the analysis of the drivers of financial globalization, Alfaro et al. (2007)

find, in a cross-section of 47 countries, an important role for geographic distances and "institutional quality" in attracting inflows of capital, but no significant role for capital controls or corporate taxes. Lane and Milesi-Ferretti (2008) also find that capital controls play very little role in their cross-sectional analysis. Closely related to this paper and the basis of the structural model, PSW show that a gravity equation of bilateral positions on geographic and cultural distances matches well the network of cross-border asset trade. While these papers rely mostly on cross-country analysis, we are to the best of our knowledge the first to analyze the drivers across time, from the 1970s onward. In contrast with this literature, we find an important role for capital controls, especially those on outflows, and for capital taxation.

Our paper contributes to a large empirical literature on the effects of financial globalization on the aggregate economy and the distribution of output across countries. Evidence of the core mechanism at play in the model, Henry (2007) and Chari et al. (2012) show that when emerging economies open up their stock market to capital inflows, growth and wages increase temporarily. At a microeconomic level, Forbes (2007) and Alfaro et al. (2017) conclude that financial opening in emerging countries is associated with a decline in the cost of capital. Extensive reviews and discussions of the literature are provided by Ghosh et al. (2010), Magud et al. (2018) and Erten et al. (2021). The range of estimates and conclusions is wide and there is little consensus in the literature, which reflects different definitions of capital flows and different sample of countries used by different papers (Forbes (2007)) as well as the endogeneity of financial liberalization episodes and the multiplicity of channels through which they affect the economy. Relative to these empirical studies, our paper focuses on a specific channel, the worldwide reallocation of capital, and adopts a structural approach.

We also contribute to the literature that investigate the drivers of changes in the income distribution within countries. The rise in income inequality has been documented and discussed for example in Piketty and Goldhammer (2014). Several factors have been analyzed: a skill-biased technological change (Autor et al. (2008)), the trade in goods (Goldberg and Pavcnik (2007), Caliendo et al. (2019)), changes in labor market institutions and tax regimes (Piketty and Goldhammer (2014)). In this paper, we focus on the role of financial globalization. We are not the first one to investigate this issue. Furceri and Loungani (2018) and Furceri et al. (2019) find that episodes of financial liberalization are associated with an increase in the Gini coefficient. Eichengreen et al. (2021) review the literature and find that the effect of globalization on inequality depends on the context and the composition of flows.

The remainder of the paper is organized as follows. Section 2 introduces the model

of the world economy with cross-border investments and explains the methodology and the data used to back out the financial globalization wedges. Section 3 introduces the data used for the estimation of the model. Section 4 documents the time series of these wedges and analyzes their drivers. Feeding these FGW into the model, section 5 analyzes who wins and who loses from financial globalization. Section 6 conducts robustness checks. Section 7 concludes.

2 A Gravity Model of International Investment

In this section, we outline the model of cross-border investment with overlapping generations of workers-investors in each country which we use to back out the financial globalization wedges in section 4 and to quantify the aggregate and distributional implications of financial globalization in section 5.

2.1 Production

Time is discrete. The time index is t and there is a world economy with I countries indexed by i. In each country, there is a representative firm that produces a homogeneous good that is freely tradeable, using the following Cobb-Douglas production function:

$$y_{it} \;=\; z_i \, n_{it}^{\nu_i} \, h_{it}^{\eta_i} \, k_{it}^{1-\nu_i-\eta_i} \tag{1}$$

where n_i is the natural (non-reproducible) capital of country i, h_i is human capital input, k_{it} is the reproducible capital. We shall assume (consistent with the previous literature on international capital allocation) that labor and natural capital are fixed and immobile, while reproducible capital can be accumulated and investment can occur from one country to another – i.e. capital is mobile.

We include natural resources as a separate variable from reproducible capital in our model because accounting for rents accruing from non-reproducible capital can significantly affect the measurement of the rate of return on reproducible capital and biasing the corresponding elasticity (Caselli et al., 2007; Monge-Naranjo et al., 2019)).

The homogeneous final good can be either consumed or saved as capital to be used in next-period production, leading to the following aggregate resource constraint:

$$\sum_{i=1}^{I} y_{it} \;=\; \sum_{i=1}^{I} \left(k_{it+1} + c_{it}\right) \tag{2}$$

where c_{it} is the aggregate consumption of the agents residing in country i at time t.

2.2 Saving and Asset Allocation

The economy is populated by overlapping generations of agents indexed by $u \in [0,1]$ that are born every period and live for two periods. An agent u that is born at time t consumes $c_t(u)$ of the homogeneous good when they are young and $c_{t+1}(u)$ units when they are old. Their intertemporal preferences are described by the following utility function:

$$V_t(u) \;=\; (1-\gamma_j)\log c_t(u) + \gamma_j \log c_{t+1}(u) \tag{3}$$

These workers-investors are endowed with ℓ_j units of labor in the first of the two periods, and they inherit natural capital from the previous generation. The agents' income in the first period comes from labor compensation ($w_j \ell_j$) as well as natural resource rents ($m_{jt} n_j$). They save part of their earnings and invest them in capital (s_t) from which they get a return $R_{t+1}(u)$ at the next period:

$$w_{jt}\ell_j + m_{jt}n_j \;=\; c_t(u) + s_t(u) \tag{4}$$

$$c_{t+1}(u) \;=\; R_{t+1}(u)\cdot s_t(u) \tag{5}$$

The utility specification above implies that investors save a constant share $\gamma_j(\nu_j + \eta_j)$ of their income

$$s_j \;=\; \gamma_j(\nu_j+\eta_j)\, y_j \tag{6}$$

Next, we consider the determination of the bilateral investment positions. We assume that capital investment at the agent level is lumpy: investors choose a single plant to invest (it can be located abroad) and face frictions. Following PSW, the share that country's investors invest in country i, π_{ij} take the following form, which corresponds to a logit demand system:

$$\pi_{ij} \;=\; \frac{(\tau_{ij} r_i)^{\varepsilon} k_i \cdot \exp\left(\mathbf{d}'_{ij}\beta\right)}{\sum_{\iota=1}^{I} (\tau_{\iota j} r_\iota)^{\varepsilon} k_\iota \cdot \exp\left(\mathbf{d}'_{\iota j}\beta\right)} \tag{7}$$

where $\mathbf{d}_{ij}$ is a D-dimensional vector of distances between country i and j, and $\beta < 0$ is a D-dimensional vector of negative semi-elasticities. ε is the elasticity of substitution between different destination country assets.

These portfolio shares can be micro-founded either with an intermediary that collects an investment fee, or with preference shocks of investors for destination countries,

or through a rational inattention model with flexible information acquisitions following the rational inattention model of Matějka and McKay, 2015.[1] In any case, the portfolio shares depend negatively on the distances because j-investors have an informational advantage or a preference for domestic assets and, more generally, for assets issued by countries that are geographically and culturally close to j (Van Nieuwerburgh and Veldkamp, 2009; Dziuda and Mondria, 2012).

In the rest of the paper, we follow PSW and calibrate $\varepsilon = 1$. This calibrated value is justified both by some empirical features of international investment funds, as well as by estimates from the asset demand estimation literature. Given this parametrization, the portfolio share π_{ij} can be re-written as:

$$\pi_{ij} \;=\; \frac{\tau_{ij}\, r_i\, k_i \cdot \exp\left(\mathbf{d}'_{ij}\beta\right)}{\sum_{\iota=1}^{I} \tau_{\iota j}\, r_\iota\, k_\iota \cdot \exp\left(\mathbf{d}'_{\iota j}\beta\right)}. \tag{8}$$

2.3 Asset Markets Clearing

Let $a_{ij} = \pi_{ij} s_j$ be the asset position of country j in country i. Naturally we have that $s_j \;=\; \sum_{i=1}^{I} a_{ij}$. Asset market clearing implies that the sum of investments from all countries in the world into country i should be equal to the capital stock in country i:

$$k_i \;=\; \sum_{j=1}^{I} a_{ij} \tag{9}$$

which can be rewritten in matrix form as

$$\mathbf{k} \;=\; \mathbf{\Pi}\,\mathbf{s} \quad : \quad \begin{bmatrix} k_1 \\ k_2 \\ \vdots \\ k_n \end{bmatrix} = \begin{bmatrix} \pi_{11} & \pi_{12} & \cdots & \pi_{n1} \\ \pi_{21} & \pi_{22} & \cdots & \pi_{n2} \\ \vdots & \vdots & \ddots & \vdots \\ \pi_{n1} & \pi_{n2} & \cdots & \pi_{nn} \end{bmatrix} \begin{bmatrix} s_1 \\ s_2 \\ \vdots \\ s_n \end{bmatrix} \tag{10}$$

2.4 Wedge Accounting and Financial Globalization

To quantify the effect of falling barriers to international investment, we perform a wedge accounting exercise in the style of Chari, Kehoe, and McGrattan (2007). Our objective in this section is to show how the wedge τ_{ij} can be identified from moments of the data.

[1] We refer the reader to PSW for more details on the microfoundation.

If we observed bilateral investment positions, we could directly back out the wedges (τ_{ij}) by using equation 8. But bilateral data exist for a large set of countries only for the most recent period. For example, the panel of bilateral positions constructed by Coppola et al. (2020), starts in 2007. We do not have bilateral investment positions for the full period under analysis.

We do have, however, the panel of the aggregate external asset and liability positions for each country as well as the panel of domestic portfolio shares. Let us call k_i^{e} the external liability position of country i, s_j^{e} the external asset position of country j and π_{jj} the domestic portfolio share of country j:

$$k_i^{\mathrm{e}} \stackrel{\text{def}}{=} \sum_{j \neq i} a_{ij} \quad , \qquad s_j^{\mathrm{e}} \stackrel{\text{def}}{=} \sum_{i \neq j} a_{ij} \qquad \text{and} \qquad \pi_{jj} \stackrel{\text{def}}{=} \frac{a_{jj}}{s_j} \tag{11}$$

Given this available data, we now proceed to show that, by imposing some structure on the wedges themselves, we can still retrieve τ_{ij} for the entire 50-year period. Specifically, we assume that the wedge τ_{ij} is composed of an in-wedge τ_i^{in}, which captures the barriers to the incoming capital investment into country i, times an out-wedge τ_j^{out}, which captures the barriers to the outgoing capital investment from country j:

$$\tau_{ij} \;=\; \begin{cases} \tau_i^{\mathrm{in}} \cdot \tau_j^{\mathrm{out}} & \text{if} \quad i = j \\ 1 & \text{if} \quad i \neq j \end{cases} \tag{12}$$

We explain why this separability assumption is natural later, in section 2.5. Next, define the external portfolio share

$$\pi_{ij}^{\mathrm{e}} \stackrel{\text{def}}{=} \begin{cases} 0 & \text{if} \quad i = j \\ a_{ij}/s_j^{\mathrm{e}} & \text{if} \quad i \neq j \end{cases} \tag{13}$$

as well as the following short-hand x_{ij}:

$$x_{ij} \stackrel{\text{def}}{=} \kappa_i y_i \cdot \exp\left(\mathbf{d}_{ij}' \beta\right). \tag{14}$$

Then we can write the external portfolio share as:

$$\pi_{ij}^{\mathrm{e}} \;=\; \frac{\tau_i^{\mathrm{in}}\, x_{ij}}{\sum_{\iota \neq i} \tau_\iota^{\mathrm{in}}\, x_{\iota j}} \tag{15}$$

We can stack all the x_{ij} in a square matrix $\mathbf{X}$, which provides the non-wedge "fundamental" drivers of international investment positions. The external portfolio

shares can also be stacked in a square matrix $\mathbf{\Pi}^{\mathrm{e}}$, which is a function of the vector of in-wedges τ^{in} and the matrix of fundamentals $\mathbf{X}$. Then $\mathbf{\Pi}^{\mathrm{e}}\left(\tau^{\mathrm{in}}, \mathbf{X}\right)$, the vector of external liabilities $\mathbf{k}^{\mathrm{e}}$, the external assets $\mathbf{s}^{\mathrm{e}}$ must respect the following variant of equation (10):

$$\mathbf{k}^{\mathrm{e}} \;=\; \mathbf{\Pi}^{\mathrm{e}}\left(\tau^{\mathrm{in}}, \mathbf{X}\right)\mathbf{s}^{\mathrm{e}} \tag{16}$$

This set of the world capital market clearing conditions is a system of I identifying equations. Because all its elements, except for the vector of in-wedges τ^{in} are observable, we identify the vector τ^{in} as the solution of the above system of non-linear equations.

The reason why the market clearing conditions identify the barriers impeding incoming flows of capital, τ^{in}, is intuitive: we infer that a country is characterized by high barriers to income capital investment if its external liability is lower than what the model predicts given the observed external assets of all other countries and the model-implied share of their portfolio invested into this country.

The second step is to identify the out-wedges τ^{out}. From the definition of domestic portfolio shares π_{ii}, we obtain another system of I equations:

$$\pi_{jj} \;=\; \frac{x_{jj}}{x_{jj} + \tau_j^{\mathrm{out}} \cdot \sum_{c \neq j} \tau_c^{\mathrm{in}} x_{cj}}. \tag{17}$$

By inverting this system, we are able to identify the out-wedges:

$$\tau_j^{\mathrm{out}} \;=\; \frac{1 - \pi_{jj}}{\pi_{jj}} \cdot \frac{x_{jj}}{\sum_{c \neq j} \tau_c^{\mathrm{in}} x_{cj}}. \tag{18}$$

The reason why the domestic portfolio shares identifies the barriers impeding the outgoing flow of capital is also intuitive: a domestic portfolio share higher than what the model would predict given the observed returns and distances implies high barriers to outgoing capital investment. Conversely, a higher propensity to invest abroad than the model suggests implies low barriers to outgoing investment.

2.5 Discussion of Assumptions

Our method to identify the FGW, τ_{ij}, assumes that they can be written as the product of an origin-specific j term and a destination-specific i term. In addition, the portfolio shares include a third-term that is pair-specific (i, j), constant over time and that we

parametrize as a log-linear function of geographic and cultural distances ($\mathbf{d}_{ij}$).

As shown by Portes and Rey (2005) the third term captures, *in the cross-section*, most of the bilateral barriers that are specific to the pair. The consensus in the literature is that geographic and cultural distances are proxies for information asymmetries, and PSW provides a micro-foundation in this sense. These two variables are very slow-moving which is consistent with the assumption that this term is fixed over the sample period, 1970-2015. It also rationalizes persistent capital misallocation across countries as documented by Monge-Naranjo et al. (2019) and analyzed in PSW.

In contrast, we argue that the factors that change over time and that drive financial globalization are to a large extent specific to the origin country and to the destination country, but not to the pair. This captures implicit and explicit taxes on investment returns, such as capital controls and dividends tax that are imposed by the origin and the destination country separately, institutions and risks such as the risk of expropriation, which are specific to the destination country.

There are arguably some lesser factors that are pair-specific *and* changing over time, which are therefore not well-captured by our method, such as capital controls on outflows that are destination-specific (Prasad (2016) documents that restrictions on outflows from China to France are stronger than to Germany, for example) or tax treaties that make the tax on investment returns in the destination country specific to the origin country. We believe they are negligible compared to the origin-specific and destination-specific factors.

2.6 Interpretation

The FGW, τ_{ij}, can be interpreted as the implicit net of tax rate-$(1-\tau_{ij})$ is the tax rate-an investor located in j has to pay on the returns on an investment located in country i. Relative to a *de jure* measure of restrictions on capital flows such as for example Chinn and Ito (2008), it captures all possible drivers of financial globalization, such as changes in institutions, taxation and country risk. In section 4 we show that the FGW indeed correlate with capital controls, taxation and country risk. Relative to a *de facto* measure of openness-the most common one being the ratio of external assets and liabilities over GDP-the FGW have the advantage of having a structural interpretation in terms of implicit taxes on investment returns.

3 Data

In this section we describe the data we use to estimate our model.

National Accounts. The Penn World Tables (version 10) are our data sources for the following variables: labor supply[2] (ℓ_{it}), labor compensation share (η_i) and the savings rate (γ_j), which we estimate by taking investment as a percentage of the sum of consumption and investment.

Natural Resources Share. We calibrate the natural resources rent share (ν_i) using data from the World Bank database "The Changing Wealth of Nations 2018". Following the methodology of Monge-Naranjo et al. (2019), we avoid on purpose measuring the natural resources share using data on stocks of natural capital, opting instead to use natural resources rent payments as a percentage of GDP. The World Bank estimates these using the annual production of several natural commodities, evaluated at current prices.

External Assets and Liabilities. The panel of total external assets, s_j^e, and liabilities, k_i^e, is provided by the Wealth of Nations dataset constructed by Lane and Milesi-Ferretti (2018).

Domestic Portfolio Shares. To construct the panel of domestic portfolio shares, we collect series on foreign and domestic assets on the consolidated balance-sheet of depository corporations from the International Financial Statistics dataset provided by the IMF. Depository corporations include the central bank and other banks. Including the central bank is important as it is a major foreign investor in many countries with large foreign reserves.

Using the share of domestic asset in the consolidated balance-sheet of depository corporations as a measure for the share of domestic assets of all agents relies on the assumption that the other agents in the economy have the same share of domestic assets in their portfolios on aggregate or that most investments are intermediated by depository corporations.

[2]For our model, it does not matter whether we use human capital-adjusted employment or simple employed persons. This choice only shifts that measured total factor productivity (z) but it does not affect the results of the counterfactual.

To test whether this assumption is reasonable, we compare our measure of domestic share based on balance-sheet data from the IMF-IFS to another measure that includes cross-border investments by all agents, the IMF-CPIS.[3] We use the dataset constructed by Coppola et al. (2020) to account for global firms financing themselves through foreign subsidiaries often in tax havens and which restate bilateral investment positions to better reflect the location of the ultimate investors. This data is available for the years 2007-2017. Figure A.2 in appendix compares the two measures. Overall, the graph suggests that our measure aligns well with the measure based on the CPIS. We find that the correlation is high for bonds (.65) and reasonably high for equity (.37).

Distances. Following PSW, we proxy the investors' information advantage over certain assets using measures of geographic and cultural distances. Geographic distance, measured as the geodesic distance between the most populous cities, is obtained from CEPII. To measure cultural distance, we use the metric developed by Spolaore and Wacziarg (2015), which is based on responses to the World Value Survey. We calibrate the semi-elasticity of investment with respect to these two variables (β) using the empirical estimates of the gravity equation by PSW.

Coverage. The coverage over periods and countries is fairly complete. Figure A.3 in appendix A reports the percentage of the world GDP of 2015 covered by each variable in each year. The coverage is above 95% for all variables in the past three decades. In 1970, when the coverage is smallest, total assets, GDP and the labor share cover again more than 95% of the world GDP. Total liabilities covers close to 80% and the domestic portfolio share covers 70% of the world GDP of 2015. In section 6.2, we explain how we extrapolate missing values backward and we show that our results are robust to the extrapolation methods.

4 Patterns and Correlates of Financial Globalization Wedges

In this section, we document the time series of the wedges (τ_{ij}) backed out using the method described in the previous section. Using a panel regression, we show that they are related to structural drivers of financial globalization discussed in the

[3]We are not the first to use the CPIS to construct measures of domestic share of investment, see for example Rey and Coeurdacier (2013).

literature. This analysis thus validates that the FGW are a meaningful measure of financial globalization. As a by-product, it also sheds new light on the drivers of financial globalization.

4.1 The Financial Globalization Wedges Over Time

The implicit tax rate a typical international investor faces has decreased tremendously in the past five decades. Figure 1 shows the evolution of GDP-weighted implicit tax rates, $1-\tau_{ijt}$, from 1970 to 2015: it decreases from 89% in 1970 to 58% in 2010 before going up to almost 64% in the most recent period.

We distinguish four sub-periods: 1) the 1970s are a period of fast financial globalization which involves mainly the liberalization of financial markets in advanced economies and Latin American countries; 2) the 1980s is a period of moderate retrenchment in the wake of the debt crisis in Latin America; 3) the second half of the 1990s until the GFC is a period of very fast financial globalization; 4) the last decade is a period of retrenchment of globalization, with many low-income countries reinstating capital controls (see figure A.1).

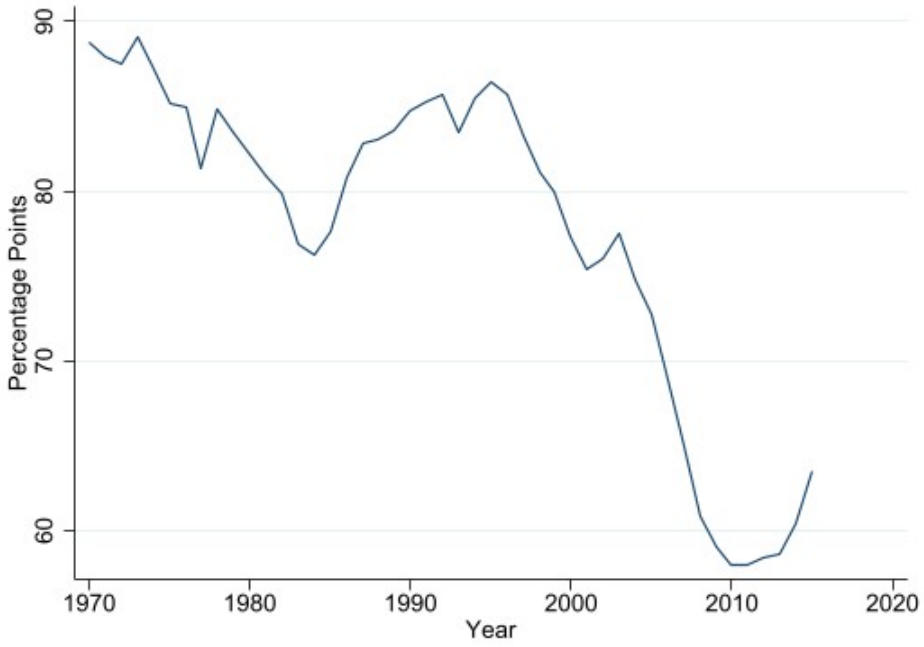
We also find that financial globalization is a deeply uneven process: the dispersion of implicit taxes have increased over time. In appendix, figure A.6, A.7 and A.8 report the first, second and third quartile of the distribution of implicit taxes. The first quartile—the one with low implicit taxes—has decreased from 90% to 58% over the entire sample period while the third quartile has decreased from 100% to only 95%. There is thus a large degree of heterogeneity across country pairs which has grown over time. This uneven pace of financial globalization plays an important role in explaining our findings in the counterfactual analysis of section 4.

4.2 Correlates of Financial Globalization

We now validate that the FGW (τ_{ij}) are indeed related to structural drivers of financial globalization discussed in the literature: (1) capital account restrictions in the origin country and (2) in the destination country; (3) taxation of returns on investment; (4) investment and political risk. Although we do not see our analysis as providing a causal identification of the drivers, it sheds new light on the sources of financial globalization.

Data Sources. We use three widely-used measures of de-jure capital account openness – all derived from the IMF's Annual Report on Exchange Arrangements and

Figure 1: Implicit Tax Rate on Investment Returns $(1 - \tau_{ijt})$



Legend: The weights for a pair (i, j) is the product of the nominal GDPs of country i and j in 2015 and in dollars.

Exchange Restrictions (AREAR) database, which documents country-level policy measures that affect international capital flows. The first is from Chinn and Ito (2008)(CI); the second is from Jahan and Wang (2016)(JW); and the third is from Fernández et al. (2015)(FKRSU). In the regression we include a measure of capital controls in the origin country and in the destination country. While CI provides only a single index at the country level capturing both restrictions on inflows and outflows, the last two datasets have a separate measure for inward and outward restrictions. When we use these last two datasets, we therefore use the index on outward restrictions for our measure of capital control in the origin country and the index on inward restrictions in the destination country.

We also use the corporate tax in the destination country as our measure of tax on investment returns. While the exact tax rate that a foreign investor may face on its investment might differ from the corporate tax, in particular because of the existence of additional taxes and bilateral tax treaties, this variable has the advantage of being available for 197 countries and as far back as 1980.

We also use the measure of investment safety from the International Country Risk Guide (ICRG) which combines information on risk of expropriation, of payment delays and risk regarding profits repatriation. In the ICRG, the variable's name is "investment profile." The ICRG dataset covers 137 countries since 1984.

Regression specification. Accordingly, our main specification is given by

$$\begin{aligned}\log(\tau_{ijt}) &= \beta_1 \text{Capital Controls-Outward}_{jt} + \beta_2 \text{Capital Controls-Inward}_{it} \\ &\quad + \beta_3 \text{Corporate Tax Rate}_{ijt} + \beta_4 \text{Investment Safety}_{ijt} + FE_{ijt}\end{aligned}$$

where FE_{ijt} denotes the set of fixed effects. We consider three different specifications for the fixed effects. In the first one, we include only year fixed effects; in the second, we include only origin and destination country fixed effects; in the third, we include year, origin and destination country fixed effects. In this last specification, the coefficients are identified out of within-country variation only.

In all regressions, the standard errors are clustered both at the level of the year times origin and at the level of the year times destination country. Two-way clustering computes standard-errors in a way that allows for correlations that arise naturally in our setting. Indeed, recall that $\tau_{ij} = \tau_i^{\text{in}} \cdot \tau_j^{\text{out}}$, which implies that $\log(\tau_{ij})$ are correlated within a year and origin country across destinations and within a year and destination country across origins.

An appealing feature of this setting is that the marginal effect of each variable is interpretable as an implicit tax change. Indeed, recall that the implicit tax rate is $1-\tau_{ijt}$, hence the change over time of the implicit tax rate is simply the negative of the change over time in τ_{ijt} which we denote $\Delta_{1970-2015}\tau_{ij} = \tau_{ij2015} - \tau_{ij1970}$. From the regression specification, the latter has the following expression as a function of the change in the right-hand-side variable X,$\Delta_{1970-2015,X}\tau_{ij} = \tau_{ij1970}\left(\exp(\beta_X \Delta_{1970-2015} X) - 1\right)$, where $\beta_X$is the coefficient associated with the variable X.

Results. Table 1 reports the results of the regressions for each of the three measures of capital controls and for each set of fixed effects. We find that all measures are significantly associated with τ_{ij} with the expected sign. In addition, the results are consistent across the three measures of capital controls. To get a sense of the magnitudes we now compute the implicit tax change implied by the change of the GDP-weighted average of each correlate over time. Because the time coverage of each right-hand-side variable is different, we use 2017 as the most recent year and the first

available year for each variable.

Going from an average value of capital controls (in the sense of CI) in the origin country in 1970 (.6) to its value in 2017 (1.2) is equivalent to a decrease in the implicit taxes by 6.1p.p.. The same decline for the destination country gives a decline in the implicit tax rate by .5p.p.. The decline in the average corporate tax from 1980 (49%) to 2017 (30%) is equivalent to a decline in the implicit tax rate of 3.8p.p.. Finally, the increase in investment stability from 1984 (8.75) to 2017 (9.76) is equivalent to a decline in the implicit tax by 1.2p.p..[4]

Although we do not interpret these results as causal, they suggest that the capital controls in the origin countries (6.1p.p.) play an important role followed by the corporate tax (3.8p.p.), the investment stability (1.2p.p.) and the capital controls in the destination countries (.5p.p.). Contrary to a conventional view that emphasizes the role of policies that lift restrictions on inflows from abroad as a key driver of globalization, we find that this factor is dwarfed by policies that lift capital controls in origin countries, the decline in capital taxation and the increasing investment safety.

Overall, these results show that the financial globalization wedges captures important dimensions of financial globalization. This validates our wedge accounting approach. We now use these FGW to answer the main question of the paper: who wins and who loses from financial globalization?

[4]We obtain this number by doing the following calculation:

$$.11\left(\exp(.737*(1.2-.6))-1\right)=.061, \qquad .11\left(\exp(.07*(1.2-.6))-1\right)=.005,$$
$$.11\left(\exp(-1.578*(.49-.30))-1\right)=.038 \quad \text{and} \quad .11\left(\exp(-.115*(9.76-8.75))-1\right)=-.012.$$

Table 1: Wedge Regressions

VARIABLES	(1) $\log(\tau_{ij})$	(2) $\log(\tau_{ij})$	(3) $\log(\tau_{ij})$	(4) $\log(\tau_{ij})$	(5) $\log(\tau_{ij})$	(6) $\log(\tau_{ij})$	(7) $\log(\tau_{ij})$	(8) $\log(\tau_{ij})$	(9) $\log(\tau_{ij})$
Capital Controls - i (JW)	-0.386***			-0.278***			-0.277***		
	(0.108)			(0.081)			(0.079)		
Capital Controls - j (JW)	-1.528***			-0.335***			-0.349***		
	(0.147)			(0.049)			(0.049)		
Capital Controls - i (CI)		-0.070***			-0.010			-0.012	
		(0.018)			(0.013)			(0.012)	
Capital Controls - j (CI)		-0.737***			-0.110***			-0.109***	
		(0.027)			(0.013)			(0.013)	
Capital Controls - i (FKRSU)			-0.437***			-0.166*			-0.176**
			(0.108)			(0.089)			(0.086)
Capital Controls - j (FKRSU)			-0.549***			-0.042			-0.055
			(0.154)			(0.101)			(0.098)
Corporate Tax - i	-1.671***	-1.578***	-1.170***	-0.631***	-0.547***	-1.301***	-0.373*	-0.405**	-0.567***
	(0.418)	(0.280)	(0.409)	(0.218)	(0.185)	(0.219)	(0.209)	(0.190)	(0.202)
Investment Safety - i	0.156***	0.115***	0.142***	0.012	0.014**	0.020**	0.007	0.009	0.010
	(0.022)	(0.016)	(0.019)	(0.009)	(0.007)	(0.009)	(0.009)	(0.008)	(0.009)
Observations	221,337	483,065	174,154	221,337	483,065	174,154	221,337	483,065	174,154
R-squared	0.056	0.116	0.021	0.965	0.934	0.953	0.966	0.934	0.954
Origin and Destination FE	-	-	-	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	-	-	-	Y	Y	Y
Sample	All	All	All	All	All	All	All	All	All
Cluster	-	-	-	Y	Y	Y	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5 Winners and Losers: Counterfactuals

In this section, we use the calibrated model and the estimated FGW to assess the implications of financial globalization for the world output, cross-country inequality and the distribution of income between wage-eaners and capital-owners within countries.

5.1 Description of Counterfactuals

What would have been the world allocation of output, wage income and capital rent in every country and in every year until now had financial globalization not happened, *i.e.* had the FGW remained constant at their 1970 level? To answer this question, we compare two equilibrium paths. The first equilibrium path is the solution of the model with the actual path of FGW. The second equilibrium path is the solution of the model with the cross-section of FGW held constant at their value in 1970.

Our counterfactual holds equal the paths of labor supply (ℓ_{it}), the labor compensation shares (η_{it}), the natural resources rent shares (ν_{it}), total factor productivity (z_{it}) and the the savings rates (γ_{jt}). The difference in the paths of FGW endogeneously generates two different paths of capital allocation across countries, which in turn generates two different paths of the distribution of output, wages, capital returns and portfolios.

5.2 Results 1: Misallocation and A Lower World Output

Our first result is that the world output is lower in 2015 than it would have been, had financial globalization not occurred. Figure 2 shows the time path of the output gains in the counterfactual relative to the actual allocation. Quantitatively, the effects are large: the world output would be 4% higher today had financial globalization not happened. As can be seen from the same figure, the output losses have been especially high in the past two decades.

This is driven by an upstream flow of capital: instead of flowing from capital-rich to capital-scarce countries, capital is flowing from capital-scarce to capital-rich countries. Figure 3 shows, for every country, the percentage change in the equilibrium capital stock as we move from the counterfactual equilibrium to the actual one. The x-axis is the output per capita in 2015: low-income countries are on the left hand side of the chart and high-income countries are on the right hand side. Looking at the extremes of the fitted line, financial globalization is predicted to decrease the stock of

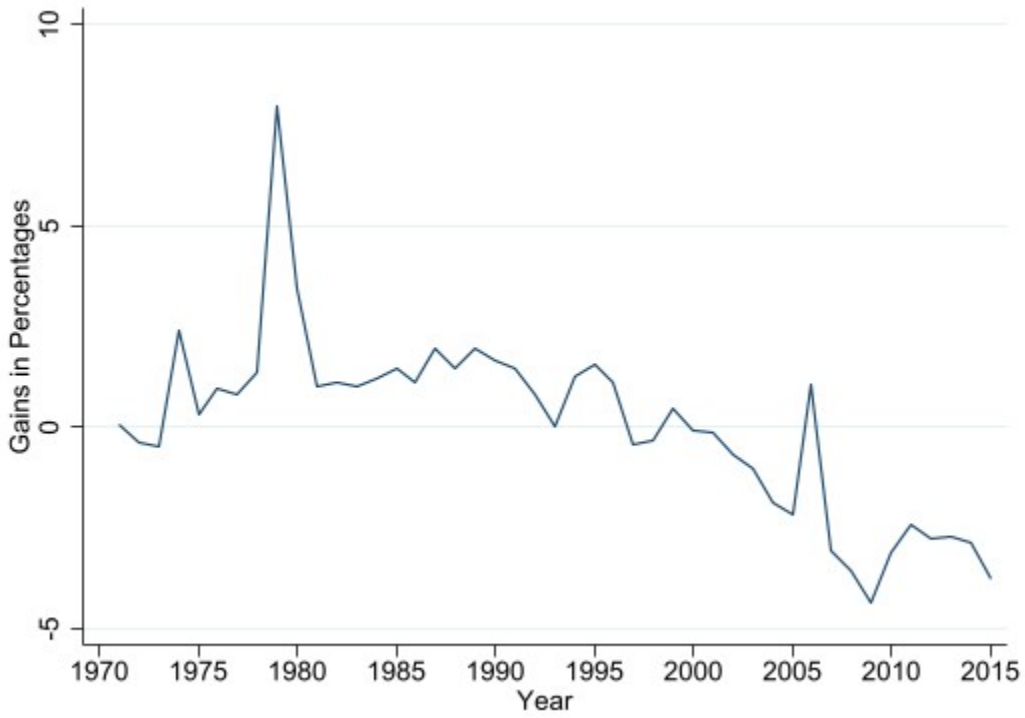


Figure 2: Output Gains due to Financial Globalization

capital by up to 47% in the poorest countries while the richest countries benefit from an increase by up to 59% of their stock of capital.

This first finding may seem counter-intuitive: as barriers to foreign investment decrease, investors should invest in capital-scarce countries where returns are high, and the global allocation of capital should improve, not worsen. This corresponds to the traditional argument in favor of the free-mobility of capital: capital flows to countries with the highest returns. But this intuition captures only one mechanism at play. Two other channels are at play.

First, different countries open to foreign investment at different paces. When a country decreases the barriers to investment into their economy, it entails a change in the perceived relative returns across destination countries by foreign investors. For example, when a country with a low return of its capital stock decreases the barriers to foreign investment into its economy, it increases the perceived relative returns of its local assets for international investors. In general, whether the allocation of capital improves or worsens depends on the pace at which countries with lower returns change

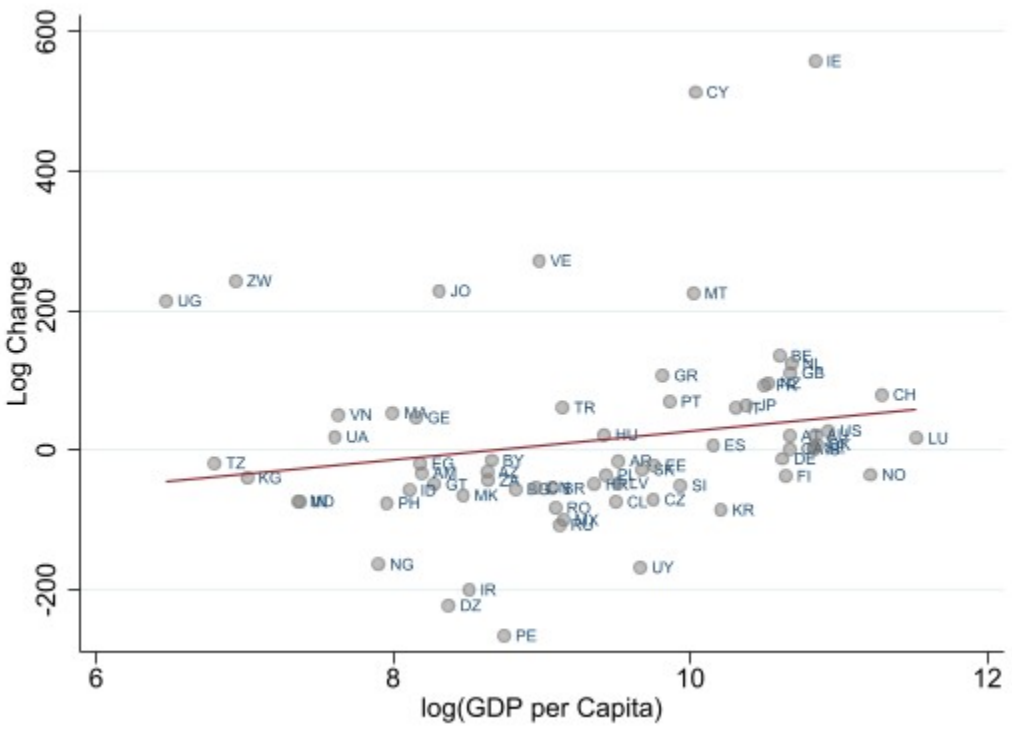


Figure 3: (Log) change in the capital stock due to financial globalization

their barriers against incoming capital investment (and hence the perceived relative returns) relative to countries with higher returns.

On average, high-income countries have liberalized their capital account faster than low-income countries (see figure A.1), leading to an increase in the perceived relative rates of returns in high-income countries, thereby attracting investment from the rest of the world and resulting in a worsening of the allocation of capital. To get a sense of the magnitude of this channel, we run an alternative counterfactual in which financial globalization is even. We assume that the change in the implicit tax rate $1 - \tau_{ij}$ is the same across all pairs of countries: if $\bar{\tau}_t$ is the average FGW at time t,[5] then we define the counterfactual wedge as $\tau_{ij,1970} + (\bar{\tau}_t - \bar{\tau}_{1970})$. We find that if financial globalization had been even, the output gains in 2015 would have been positive and around 2%. In appendix A, figure A.4 reports the full time series of the output gains.

The second channel driving the increase in misallocation is a size effect: the elimi-

[5]We use the weighted average of FGW given in figure 1.

nation of investment barriers leads to capital flowing towards larger countries, *ceteris paribus*. Recall that portfolio shares are increasing in the size of an economy as is clear from equation 8.[6] If large countries have lower returns, the decrease in barriers to international investment worsens the allocation of capital. More generally, it depends on the cross-sectional correlation between the size of countries and the returns on capital.

On average, large economies are also high-income countries with lower returns on their capital stock. The decrease in barriers is thus likely to benefit more high-income countries and to worsen the allocation of capital. To investigate this hypothesis, we run an alternative counterfactual in which portfolio shares are independent of size. Formally, we change the expression of portfolio shares given by equation 8 to $\pi_{ij} = \frac{\tau_{ij} r_i \cdot \exp\left(\mathbf{d}'_{ij}\beta\right)}{\sum_{\iota=1}^{I} \tau_{\iota j} r_\iota \cdot \exp\left(\mathbf{d}'_{\iota j}\beta\right)}$. We find that if capital wasn't attracted to large economies, output would still be lower in 2015 because of financial globalization but by only 2%. This negative impact of financial globalization is very recent: until 2012, financial globalization would have increased the world output by about 2% (see figure A.5 for the full time series of the output gains).

5.3 Result 2: Increase in Inequality across Countries

A corollary of the first result is that financial globalization leads to an increase in inequality of output per capita across countries. Financial globalization affects output per capita only through the stock of capital in each country. The relative increase in the stock of capital in capital-rich country together with the fact that capital-rich countries tend to also be the countries with higher output per capita imply an increase in output per capita in high-income countries relative to low-income countries.

Figure 4 shows, for every country, the percentage change in equilibrium output per capita as we move from the counterfactual equilibrium to the actual one. As before the x-axis corresponds to the output per capita in the final year of the sample. Looking at the extremes of the fitted line, we find that financial globalization leads to an increase in output per capita in the richest countries by 30% and a decrease in the poorest countries by 23%.

Looking at country-level outputs only draws a partial picture of the implications of financial globalization for the distribution of individual income. First, aggregate income differs from output. Gross National Income (GNI), unlike GDP, includes

[6]The micro-foundation for the expression is explained in details in PSW and is motivated by empirical evidence that portfolio shares are increasing in the size of the destination country.

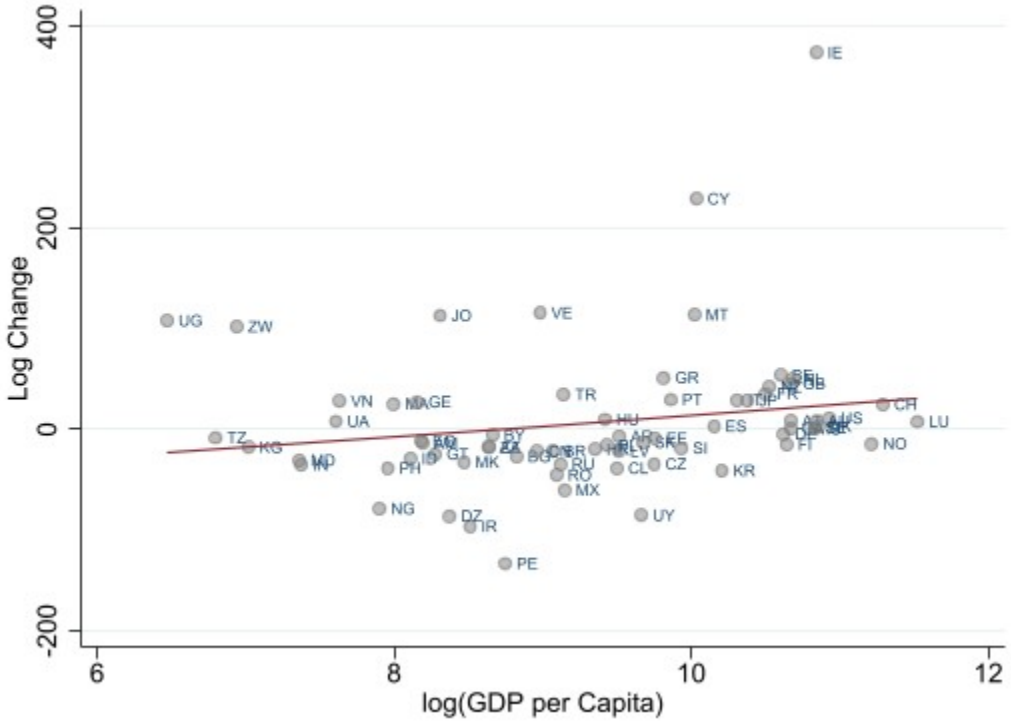


Figure 4: (Log) change in output per capita due to financial globalization

payments received from abroad by national investors and excludes payments made to foreign investors who invested locally. In our model, we abstract from international mobility of labor so payments to capital-owners are the only international flows of income. Using the notations introduced in the model section, the NFP of a country is given by

$$NFP_{it} = R^e_{it} s^e_{it-1} - r_{it} k^e_{it} \tag{19}$$

where $R^e_{it}, s^e_{it-1}, r_{it}$ and k^e_{it} are the average returns on the external portfolio, the external asset, the returns on the local capital and the external liability, respectively. Income is therefore affected by changes in the external assets of national investors, in its external liabilities as well as changes in the cross-section of returns.

Figure 5 shows the percentage change in equilibrium income per capita in each country as we move from the counterfactual equilibrium to the actual one. The

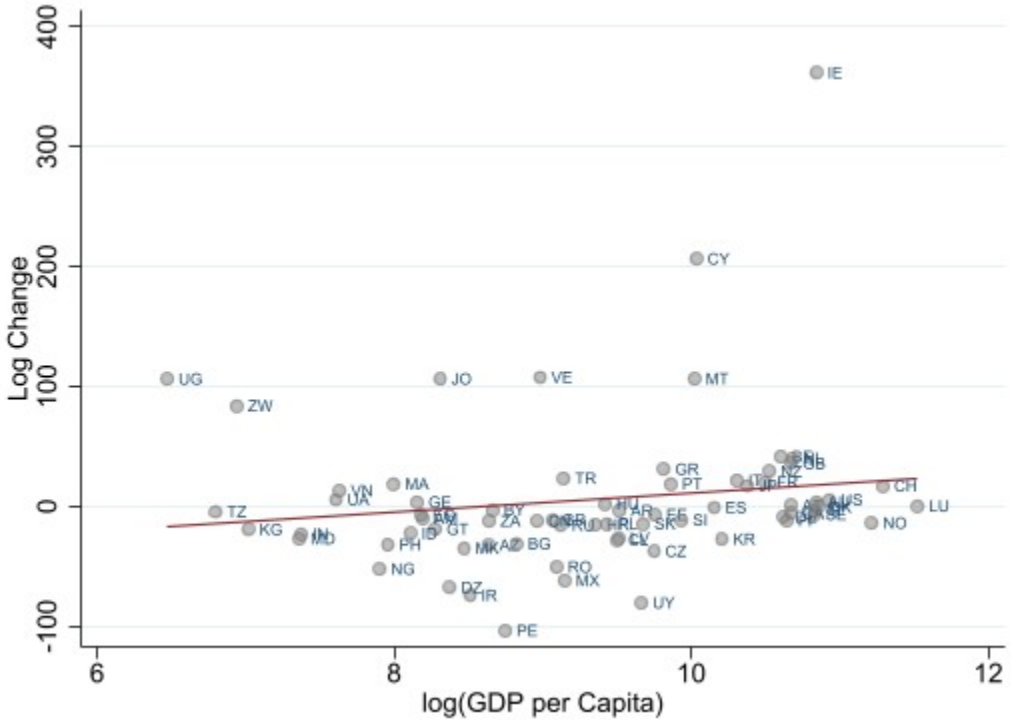


Figure 5: (Log) change in income per capita due to financial globalization

picture is similar to the one for output per capita but the magnitude are slightly smaller: financial globalization leads to an increase in income per capita in the richest countries by 23% and a decrease in the poorest countries by 18%.

Income per capita decrease less in poorer countries than output per capita because financial globalization leads to an increase in their net foreign asset position, thereby increasing the net foreign income they receive from richer countries. This increase in net foreign asset is partially mitigated by the decline in the returns of the local capital in richer countries and the increase in returns in poorer countries, a point we analyze in details in the next section.

5.4 Result 3: Factor Remuneration in Low-income countries

Looking at country-level income per capita hides the uneven effects that financial globalization has across workers and capital-owners within a country. The income received by national, also domestic, workers is the wage, w_{it}. The total gross income

received by national capital-owners on their investment abroad and domestically is given by $R_{it}s_{it-1}$. This measure however confounds the change in the average gross returns on the portfolio of national investors, R_{it}, with the change in total saving, s_{it}. For this reason and because the change in the gross returns is interesting on its own, we will be looking at both the change in the average returns, R, as well as at the change in total capital income.

The model's prediction that savings are proportional to output, $s = \gamma(\nu + \eta)y$, has two implications. First it is sufficient to look at output per capita and average gross returns to know the change in total capital income: at a first order the percentage change in total capital income is the sum of the percentage change in output per capita and in the average gross returns. Second the ratio of total capital income received by capital-owners over the wage—a natural measure of inequality—is proportional to the average returns, R:

$$\frac{Rs}{w\ell} = R \times \gamma \left(\frac{\nu}{\eta} + 1 \right) \tag{20}$$

We find that wages go down in poorer countries and average gross returns go up, thus increasing inequality between capital-owners and wage-earners. The decrease in wages is a direct corollary of the decline in output per capita in these countries. Figure 6 displays the change in the wage. The decline in wages mirrors the decline in output per capita: workers in the poorest countries have experienced a decline in wages by 23% due to financial globalization.

Figure 7 shows the percentage change in the average returns on the portfolio as we move from the counterfactual equilibrium to the actual one. In the poorest countries, the average returns on portfolios have increased by 14%. The increase in average returns is driven by the fact that investors keep a large share of their portfolio in domestic assets whose returns go up. Figure 8 confirms that the returns on the stock of capital have increased in low-income countries in the counterfactual (by 24%). Following equation 20, the increase in the ratio of capital income over wages has increased by 14% in the poorest countries.

5.5 Result 4: Factor Remuneration in High-income countries

In high-income countries, the opposite is true: wages go up, returns on local capital go down, returns on portfolio decrease and inequality decreases due to financial globalization. The increase in wages is an implication of the very first finding that

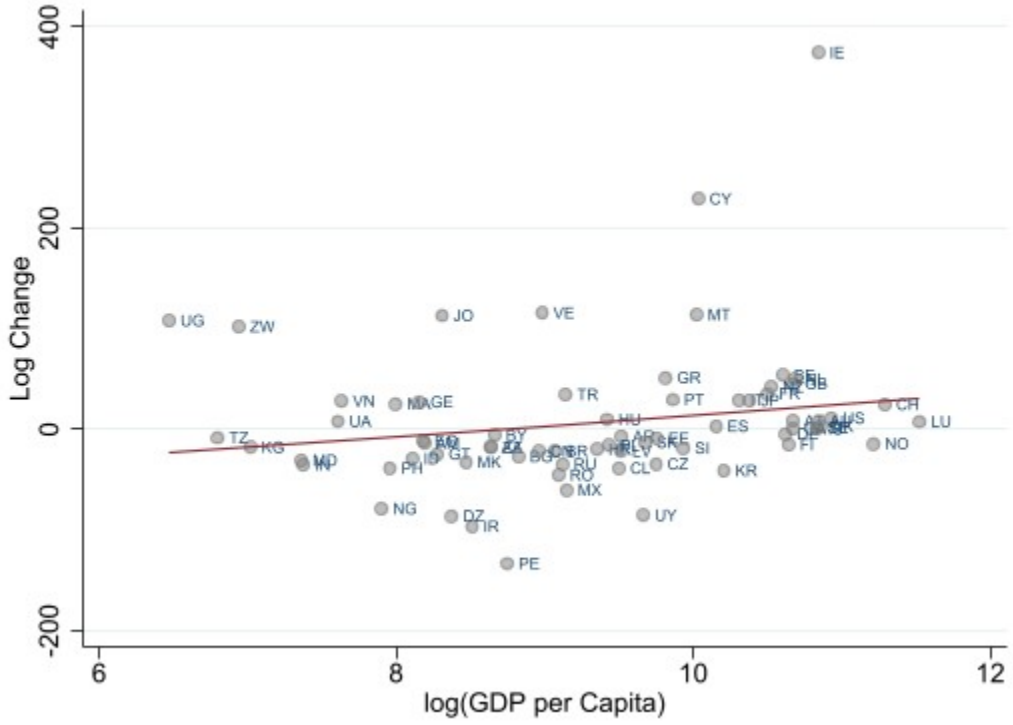


Figure 6: (Log) change in wages due to financial globalization

capital flows from low to high-income countries, thereby raising the marginal product of labor in high-income countries. Since the share of output going to labor is unchanged between the actual and the counterfactual, the increase in wages is proportional to the change in output capita: we find that wages go up by 30% in the richest countries—the exact same number we found for output per capita—because of financial globalization.

The decrease in the average gross returns on portfolio by 18% (see figure 7) is the result of two opposite forces. With the decrease of barriers to international investments, capital-owners reshuffle their portfolio and invest abroad in assets with higher returns. To isolate the reshuffling of portfolio, we compute the returns of a portfolio that uses the returns in the counterfactual equilibrium without financial globalization but the portfolio shares prevailing in the actual equilibrium. We find that the reshuffling of portfolio is associated with an increase in the returns by 8% in the richest countries. But there is also a general equilibrium effect: the influx of capital into richer countries implies a decline in the returns on the local assets by 29% (see

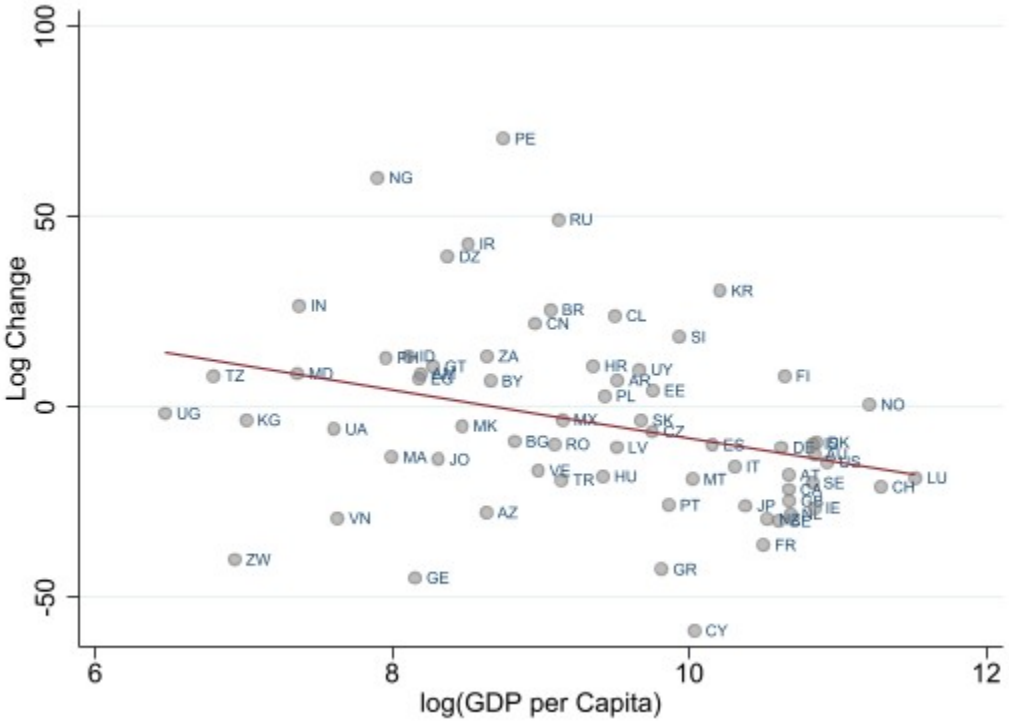


Figure 7: (Log) change in returns on portfolio due to financial globalization

figure 8). Combined with the home bias of portfolios of investors, it explains why the returns on the portfolio of investors from high-income countries has declined despite the decrease in barriers to capital flows and the possibility to obtain higher returns in capital-scarce countries.

This result goes against the notion that financial globalization has worsened the conditions of workers and benefited capital-owners in high-income countries (*e.g.* Stiglitz (2012)). This notion stems from one of three assumptions. First, it may rely on the assumption that capital flows from capital-rich to capital-scarce countries, in which case the general equilibrium effect underlined in the previous paragraph decreases wages and increases the returns on the portfolios of investors from high-income countries. Second, it may rely on mechanisms from which we abstract in this paper, such as the endogenous decline in the labor shares. Finally, it may rely on the idea that financial globalization enable capital-owners to reshuffle their portfolios towards high-return assets. But the latter ignores the general equilibrium implications of financial globalization which has led to a decline in returns in assets in high-income

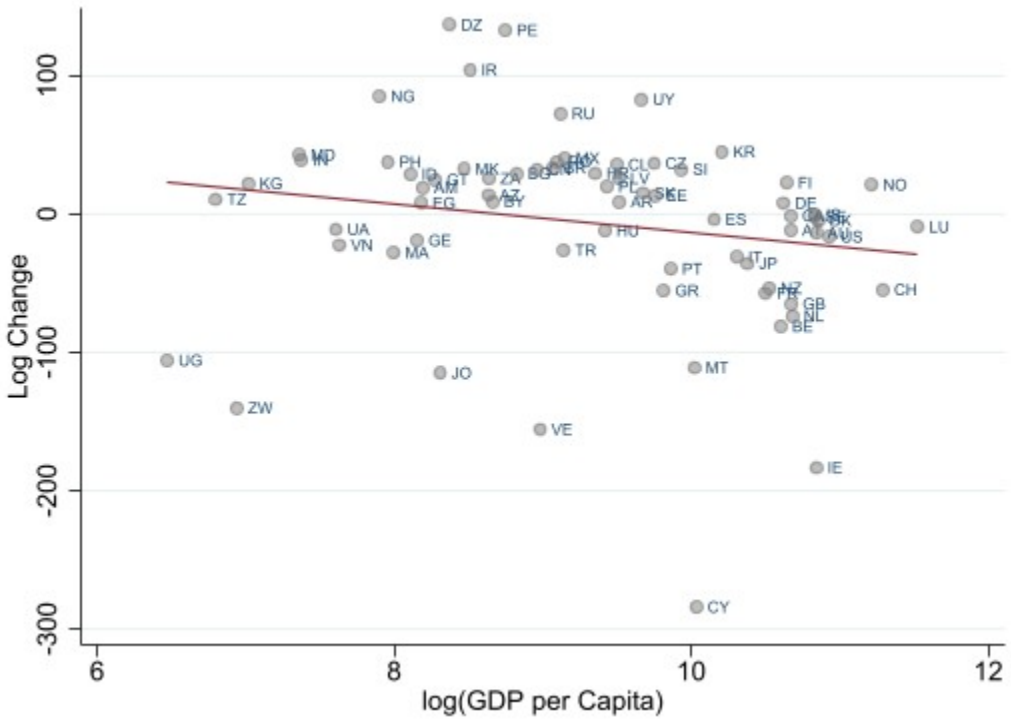


Figure 8: (Log) change in returns on local capital due to financial globalization

countries. Given that domestic portfolios shares are high, this general equilibrium effects more than offsets the reshuffling of portfolios.

The notion that financial globalization benefits capital-owners in high-income countries receives more support in one looks not just at the average returns on portfolios but at the total capital income, $R \times s$. It is possible that the latter increases if s increases faster than R decreases. We indeed find that in the richest countries total capital income increases by 12%, which we obtain by subtracting the change in the average returns of 18% to the change in output per capita of 30%. Intuitively, the increase in total saving, s, stems from the increase in output per capita in these countries: for a given saving rate, richer households can save more when their income increases.

As a result, we find that financial globalization leads to lower inequality within high-income countries. Wages of workers go up and returns for investors go down. Even the ratio of wages over total income go down. Using equation 20, we find that the ratio of total capital income over wages go down by 18%.

5.6 Relation to Literature

Our findings are easy to reconcile with those of PSW: we both find that barriers to international investment misallocate capital from low-income towards high-income countries: the key quantitative implication of this misallocation is the fact that emerging economies tend to display higher rates of return on capital. Our novel insight in this paper is to show that financial globalization has worsened this misallocation over time, as capital account liberalization has proceeded faster in high-income than it has in low-income ones and as liberalization favors large economies which tend to be high-income countries.

Our findings seem at a first glance to contrast with those of Monge-Naranjo et al. (2019): by measuring marginal revenue products of capital at the country-level in a manner that is consistent with ours, they find that the efficiency of capital allocation has *increased* since 1970.

The key to reconciling our results with those of Monge-Naranjo et al. (2019) lies in the fact that their measure of capital misallocation is the distance from an efficient allocation, while ours is the distance from a counterfactual allocation where we apply the wedges of 1970 to today's economy. The implication is that, while indeed we can confirm that the distance from the first best has decreased (in agreement with Monge-Naranjo et al. (2019)), it would have decreased *faster* had the financial openness wedges remained unchanged since 1970. How is this possible?

Monge-Naranjo provide a partial explanation: the increase in allocative efficiency, according to their analysis, is driven not by capital mobility (the force we focus on in this paper), but rather by internal capital accumulation in non-developed countries.

To shed additional light, we can use the result of PSW, that the GDP loss from capital misallocation can be approximated, to a second order (in a Taylor approximation sense), using the following formula:

$$\text{World GDP Loss} \;=\; -\frac{1}{2}E^{y_i}\left(\frac{\kappa_i}{1-\kappa_i}\right)V^{\mathcal{W}_i}\left(\log r_i\right) \tag{21}$$

where E^y is the GDP-weighted average and $V^{\mathcal{W}_i}$ is the weighted variance with weights

$$\mathcal{W}_i \;=\; \frac{\kappa_i y_i}{1-\kappa_i} \tag{22}$$

The formula above shows that an increase in allocative efficiency requires a decline in the *weighted* variance of log capital returns. These weights depend largely on output y_i, and their influence on the overall GDP loss is quantitatively important. One of our

findings is that the financial account opening of developed countries has contributed positively to the *unweighted* variance, with a resulting misallocation of capital towards high-income countries. However, at the same time, a number of countries with mid-range rates of return (such as South Korea) have experienced fast productivity and labor force growth, thereby inducing an endogenous accumulation of capital, and this has increased their weight in the formula. This effect has more-than-offset the effect of capital account liberalization in developed countries, and has led to a lower *weighted* variance, and thus better capital allocation. This explains why capital allocation has overall improved, and why it would have have improved even more in the absence of financial globalization.

6 Robustness Checks

6.1 Base Year

In the main text we choose 1970 as the base year. This is justified by the fact that financial globalization accelerated in the 1970s and that it is the first available year in the Wealth of Nations and the Penn World Tables datasets. One may however be worried that the results in the counterfactual exercise depend on the base year. Because the process of globalization is not even and not linear, the point of reference for the counterfactual may matter. In addition, one may be worried that the extrapolation backwards of a few variables described in appendix 6.2 drive some of the results for the earlier years and that it would reassuring to use a base year for which the coverage is better.

In appendix A, figure A.9 plots the output loss for three base years: 1970, 1981 and 1990. The graph shows that there is very litlle difference between the three series. The output losses are a bit larger when the base year is 1990. When the base year is 1990, the output cost goes up to 5%. This is because globalization in the 1970s and 1980s improved the allocation capital and generated output gains.

6.2 Extrapolation Method

In this section, we show that our results are robust to the extrapolation method. We first introduce the baseline extrapolation method and then present two alternative methods. We then show that the FGW thus obtained are highly correlated with the FGW obtained in the baseline approach.

To extrapolate the labor share and the natural resources share until 1970, we simply carry the first value backward and the last value forward whenever observations are missing. Given that these two ratios change only slowly over time, these assumptions are reasonable. The initial coverage of these two variables is shown in figure A.3. To extrapolate GDP backward, we use the series of GDP provided by the Maddison project (Bolt and Zanden (2014)) which has a broader coverage and apply the growth rate of GDP from this dataset to our measure of GDP. Because the GDP in the Wealth of Nations is in current dollars and is in PPP in the Maddison project, we are making the reasonable assumption that the relative PPP holds.

For external assets and liabilities, we consider two groups of countries: socialist and non-socialist countries. For non-socialist countries, we proceed as follows. Denote $\underline{s^e/y}$ ($\underline{k^e/y}$) the first non-missing value of the external assets (liabilities) over GDP ratio. Given that GDP is observed for all countries at all periods, we can compute s^e and k^e whenever they are missing as follows: $s^e_{it} = \underline{s^e/y} * y_{it}$. We are making the assumption that the ratio of external assets and liabilities remain constant before it is not observed. For socialist countries, we assume that they are completely closed in 1970 whenever they are not observed. Hence we assume $a^e_{1970} = k^e_{1970} = 0$ and interpolate from this first date until the first observation.

To extrapolate the domestic portfolio share, we use the data on the external assets and liabilities and the assumption that the total asset to output ratio is constant before the first time period the domestic share is observable. If σ_{it} denotes the total asset to output ratio in country i at time t, we start from the following accounting identity $s^e_{it} = (1 - \pi_{iit})s_{it} = (1 - \pi_{iit})\sigma_{it}y_{it}$. Assuming that before the first available observation, the total asset to output ratio is constant $\sigma_{it} = \underline{\sigma_i}$ we estimate $\underline{\sigma_i}$ using the same formula evaluated at the first time period for which we have the domestic share: $\underline{\sigma_i} = \frac{s^e_{it}}{(1-\pi_{iit})y_{it}}$. We can then compute the domestic portfolio shares as follows: $\pi_{iit} = 1 - \frac{s^e_{it}}{\underline{\sigma_i} y_{it}}$.

We now turn to the two alternative extrapolation methods. The first alternative differs from our baseline in that it treats socialist countries the same way the previous method treats non-socialist countries. Whenever the external assets or liabilities are missing for a socialist country we assume that the assets and liabilities over GDP are both constant until the first observation. We also compute the domestic portfolio shares for socialist countries in a way that is consistent with the alternative values for the external assets as explained in the previous paragraph.

The second alternative differs from the baseline in two ways. First it treats socialist and non-socialist economies symmetrically like the previous method. Second it doesn't

use the model-implied relationship between the domestic share of portfolio and the external asset to extrapolate the domestic share backward. Instead it simply carries backward the domestic portfolio shares. This extrapolation method is a lower bound on the degree of globalization since it assumes countries were as opened in 1970 as they were on the first date they enter the dataset.

Table A.1 reports the correlation of the log of the wedges $\log(\tau_{ij})$ across extrapolation methods. We find that the wedges are highly correlated across the different methods. The correlation between the baseline and the first alternative is .95. The correlation between the baseline and the second alternative is .94.

6.3 Decomposition Method

Recall that our baseline method decomposes the implicit tax on investment returns into an origin-specific, a destination-specific and a "distance" term which depends on geographic and cultural distances and uses the coefficients estimated in PSW. One advantage of this method is that it builds on a specification that has been shown to capture well the empirical distribution of investment positions across pairs of countries. One issue is that the measure of cultural distances is not available for all countries and the resulting sample has been shown to represent 92% of the world GDP (Pellegrino et al., 2021). One may worry that dropping countries with no data on cultural distances may drive some of our results.

We now consider an alternative parametrization of the distance terms in the portfolio shares. It is natural to set it equal to 1 which implies that the expression for the portfolio shares (equation 8) simplifies to $\pi_{ij} = \frac{\tau_{ij}\, r_i\, k_i}{\sum_{\iota=1}^{I} \tau_{\iota j}\, r_\iota\, k_\iota}$. We then apply the same methodology to back out the wedges for a broader set of countries. One disadvantage is that it doesn't capture well the barriers to asset trade that are origin and destination specific. Table A.1 shows the correlation matrix of the log of the wedges, $\log(\tau_{ij})$, across the two decomposition methods. We find that the FGW are highly correlated across the two decomposition methods: the correlation is .92.

7 Conclusion

This paper develops a wedge accounting approach in an international investment gravity model to quantify the effects of the last five decades of financial globalization on the world output, cross-country inequality, and the cross-section of wages and capital rents. Surprisingly it finds that uneven financial globalization has led to

a worsening of the allocation of capital, resulting in a lower world output by 4%. It also finds that inequality across countries has widened with output per capita of the poorest countries declining by up to 23%. Finally, it finds that inequality between wage-earners and capital-owners have increased within low-income countries and decreased in high-income countries.

These conclusions contribute to the discussion on the benefits and costs of capital account liberalization policies. First of all, our findings suggests that the conditions for capital account liberalization policies to have the expected positive effects on the allocation of capital were not met, partly because integration into the world capital market has been too uneven across countries. This calls for greater policy coordination at the global level for the process of integration to be more even. Not only do we find that the allocative efficiency has worsened but we also find negative redistributive implications across countries and individuals. The finding that financial globalization has redistributed income from low-income countries to high-income countries, and within low-income countries, from workers to capital-owners calls for policies that compensate those who lose from these changes.

The conclusions of this paper open up avenues for future research. First of all, it remains an open question to know what the drivers of the observed convergence in returns are if this is not due to financial globalization. Is it just by chance that countries have converged or are there other international forces, like the diffusion of technologies, that push towards convergence? Second, our counterfactual analysis holds constant a few factors that shape the redistributive implications of financial globalization and that might also be affected by it, such as the labor shares and the saving rates. For example, labor shares could vary if the technology displays more substitution than we assumed; or if wages are not determined competitively but through bargaining and bargaining power is a function of the degree of openness. We believe these are important avenues for future research.

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Online Appendix
Financial Globalization, 1970-2015

Damien Capelle & Bruno Pellegrino

A Additional Figures

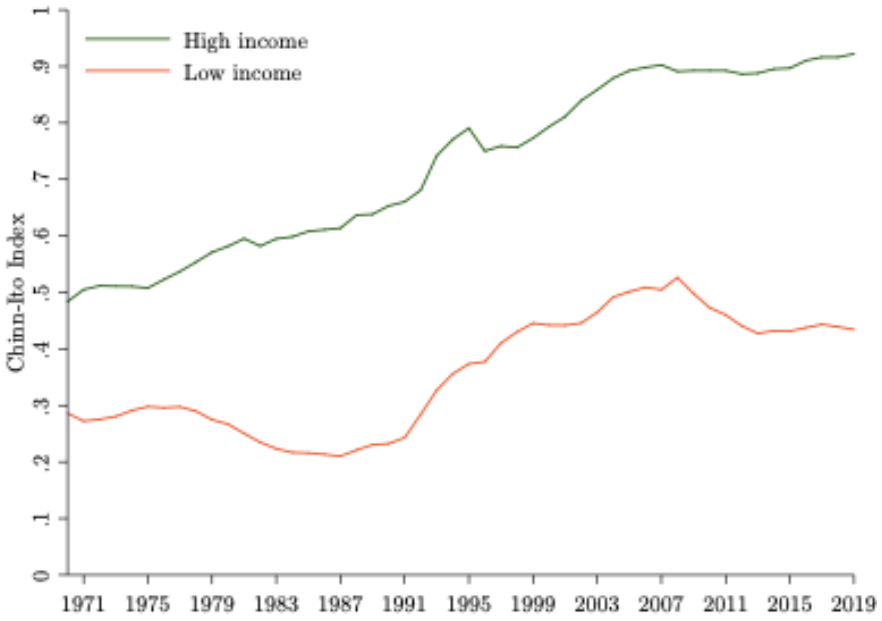
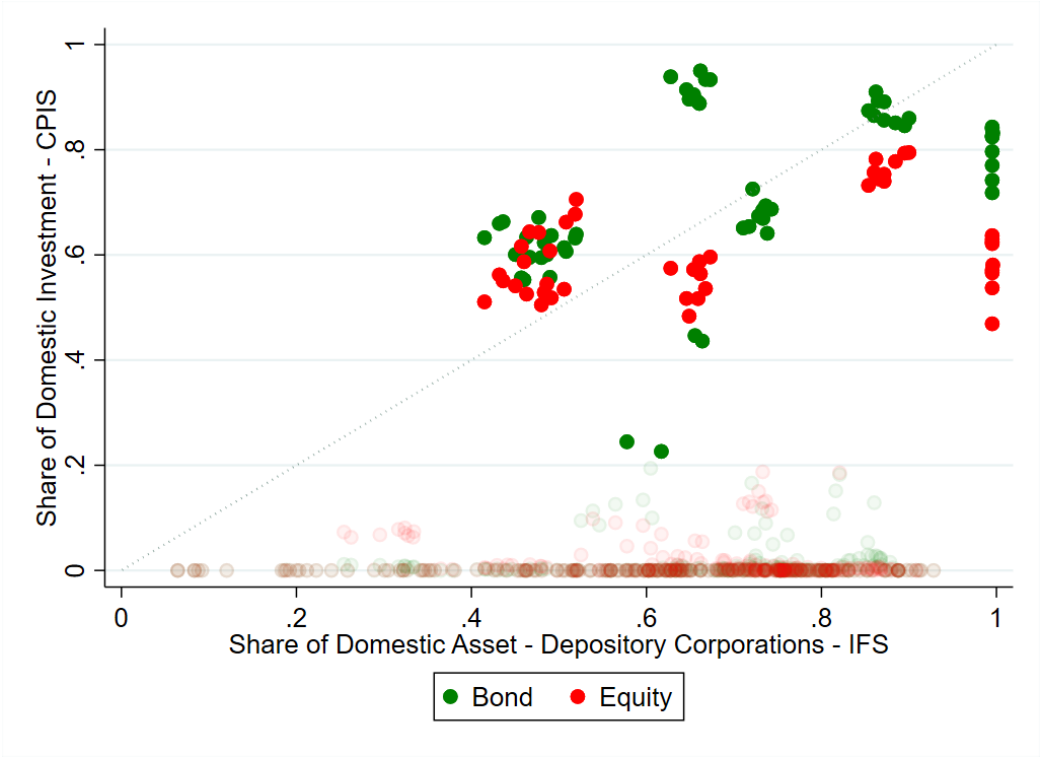


Figure A.1: Chinn-Ito Index for High and Low-Income Countries

Figure A.2: Comparison Domestic Portfolio Shares - IFS and CPIS



Legend: The x-axis of the scatter plot is our measure of domestic portfolio shares based on the IFS and the y-axis is the measure based on the CPIS. The solid dots correspond to the observations for which the domestic investment in the CPIS is above 20% of all reported investment. One issue with the CPIS is that, given the focus of the survey on cross-border positions, many countries do not report accurately domestic investment, when they do at all. Below the 20% threshold, we believe that domestic investment in the CPIS isn't accurately measured and we display as a transparent dot to indicate that they shouldn't be compared to our measure.

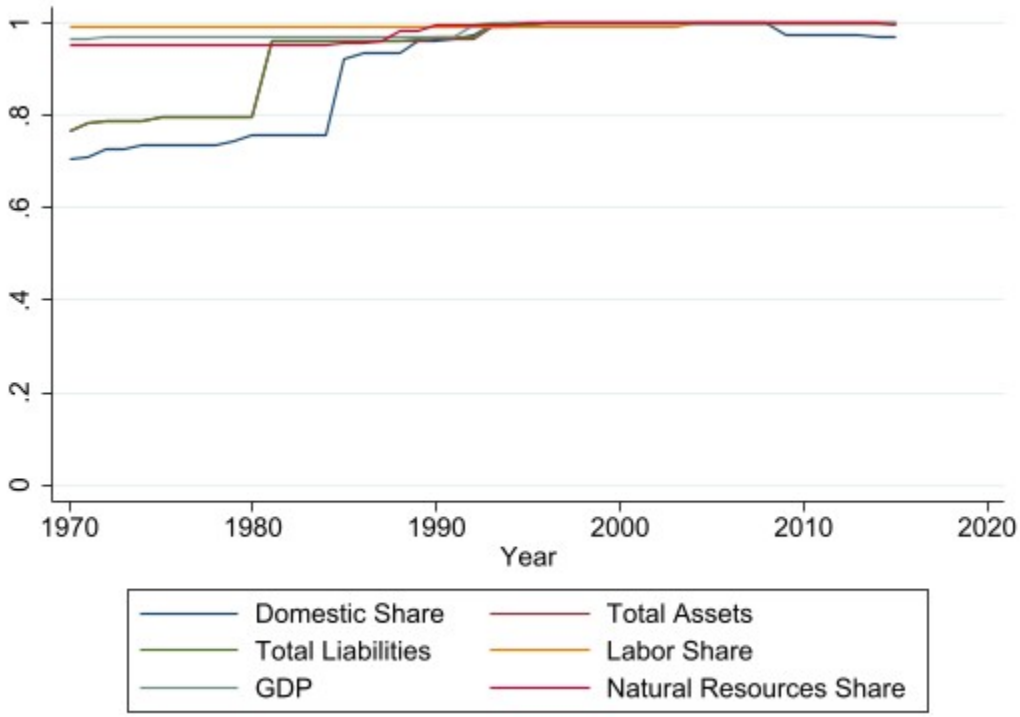


Figure A.3: Share of 2015 World GDP Covered by Each Variable

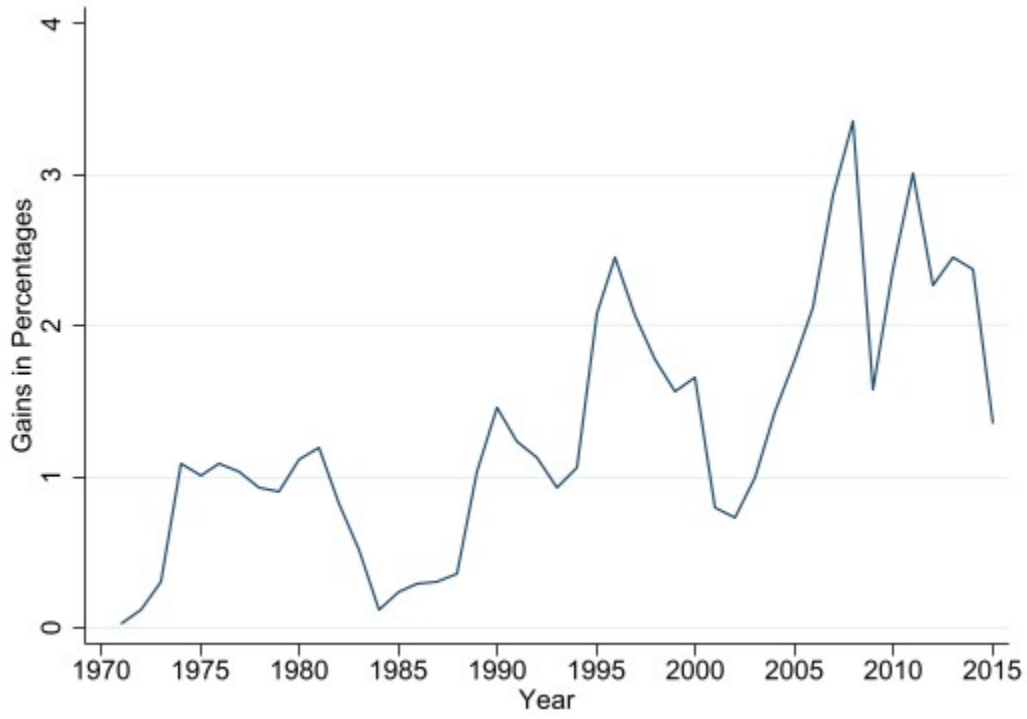


Figure A.4: Output Gains with an Even Financial Globalization

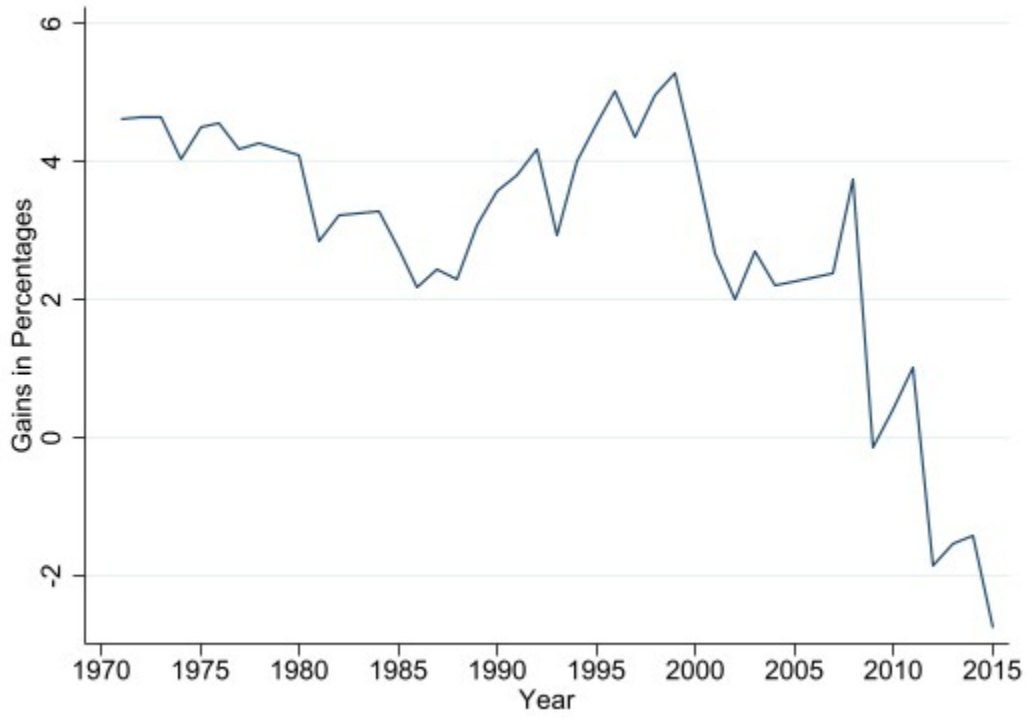
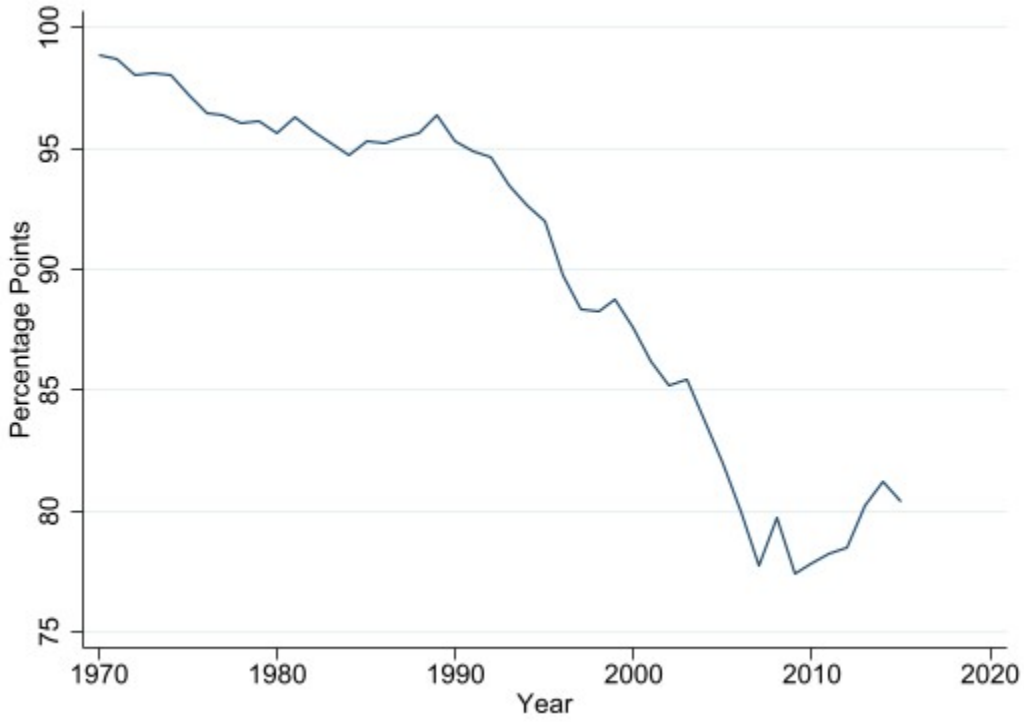


Figure A.5: Output Gains with Zero Elasticity to Size

Figure A.6: Implicit Tax Rate on Investment Returns $(1 - \tau_{ijt})$ - First Quartile

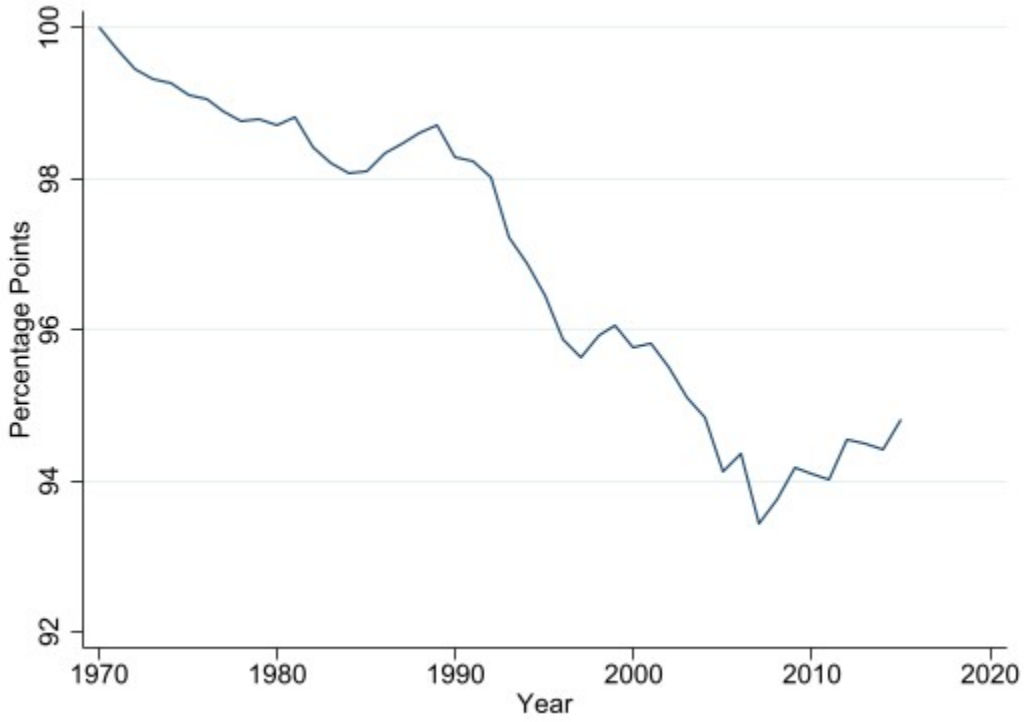
Legend: The weights for a pair (i, j) is the product of the nominal GDPs of country i and j. Nominal GDP refers to its value in dollars and in 2015.

Figure A.7: Implicit Tax Rate on Investment Returns $(1 - \tau_{ijt})$ - Median



Legend: The weights for a pair (i, j) is the product of the nominal GDPs of country i and j. Nominal GDP refers to its value in dollars and in 2015.

Figure A.8: Implicit Tax Rate on Investment Returns $(1 - \tau_{ijt})$ - Third Quartile



Legend: The weights for a pair (i, j) is the product of the nominal GDPs of country i and j. Nominal GDP refers to its value in dollars and in 2015.

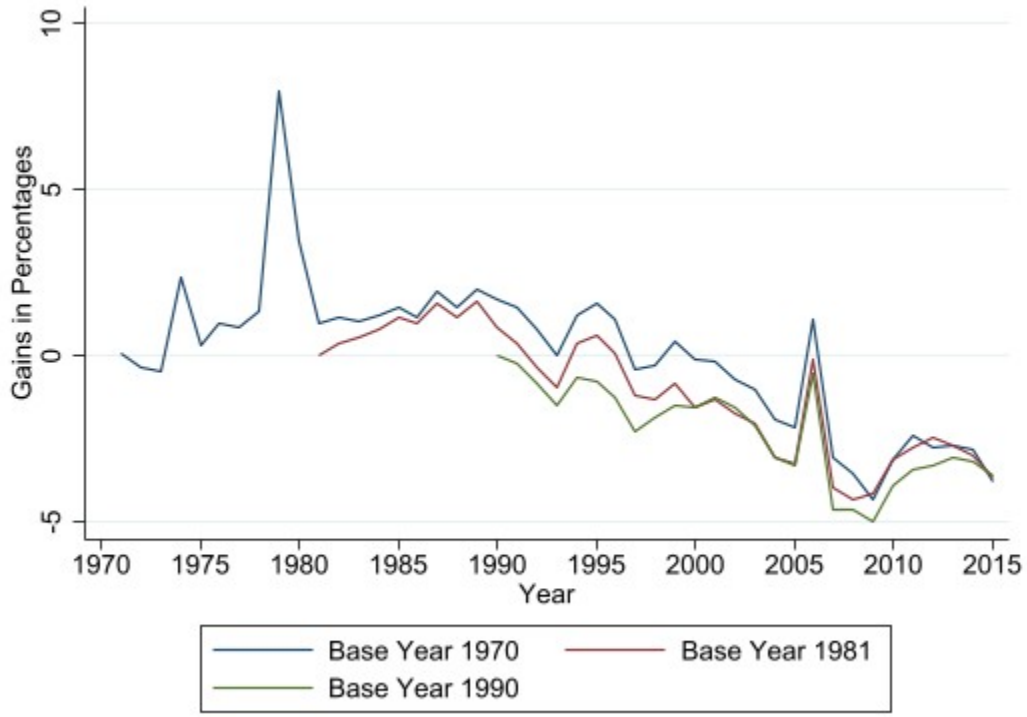


Figure A.9: Output Gains for Base Year = 1970, 1981 and 1990

Table A.1: Correlation of $\log(\tau_{ij})$ across decomposition and extrapolation methods

Variables	1-A	1-B	1-C	2-A	2-B	2-C
1-A	1.00					
1-B	0.95	1.00				
1-C	0.94	0.99	1.00			
2-A	0.92	0.87	0.86	1.00		
2-B	0.85	0.90	0.90	0.98	1.00	
2-C	0.85	0.90	0.90	0.96	0.99	1.00

Legend: "1" refers to the baseline decomposition method, "2" refers to the method that assumes that the distance is equal to 1 as explained in section 6.3. "A" refers to the baseline extrapolation method, "B" refers to the first alternative and "C" refers to the second alternative explained in section 6.2.