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ABSTRACT

We empirically and theoretically study the effects of capital flows on resource allocation within sectors and cross-sectors. Novel data on service firms – in addition to manufacturing firms – allows us to assess two channels of resource reallocation. Capital inflows lower the relative price of capital, which promotes capital-intensive industries – an input-cost channel. Second, capital inflows increase aggregate consumption, which tilts the demand towards goods with high income elasticities – a consumption channel. We provide evidence for these two channels using firm-level census data from the financial liberalization in Hungary, a policy reform that led to capital inflows. We show that firms in capital intensive industries expand, as do firms in industries producing goods with high income elasticities. In the short-term, the consumption channel dominates and resources reallocate towards high income elasticity activities, such as services. We build a dynamic, multi-sector, heterogeneous firm model with multiple sectors of an economy transitioning to its steady-state. We simulate a capital account liberalization and show that the model can rationalize our empirical findings. We then use the model to assess the permanent effects of capital flows and show that the long-term allocation of resources and, thus, aggregate productivity depend on degree of long-term financial openness of the economy. Larger liberalizations trigger long-run debt pushing the country to a permanent trade surplus. This tilts long-run production towards manufacturing exporters, which also increases aggregate productivity.

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1 Introduction

Over the past half-century, advanced economy countries, followed by emerging market countries, have received large capital inflows that have shaped the evolution of their economies. The macroeconomic implications of these inflows have attracted considerable attention from scholars and policy makers. In recent years, there has been a recognition that a deep empirical and theoretical understanding of these macroeconomic implications requires an understanding of the effect of capital flows on the allocation of resources within and across industries and firms. This recent research has thus focused on the reallocation of resources within manufacturing firms or across broadly defined sectors, such as manufacturing or services. However, so far, there is no evidence on the impact of capital flows on services firms, which of course, constitute the vast majority of firms, inputs, and output in an economy. This gap prevents a full understanding of the impact of capital inflows.

In this paper, we seek to expand our understanding of the micro and macro-dynamics of capital flows empirically and theoretically with comprehensive firm-level data and a calibrated heterogeneous firm dynamic model. Specifically, our paper makes three contributions. First, we bring novel evidence about the impact of capital flows on service and agricultural firms, in addition to manufacturing firms. In our empirical analysis, we employ the census of Hungarian firms over the period of Hungary's capital account liberalization in 2001. Second, we investigate the importance of two channels through which capital flows can affect the allocation of resources. Capital inflows reduce the relative price of capital, which favors capital intensive firms and industries – an input-cost channel. Also, such inflows increase current consumption and expand the demand for goods with high income elasticities – a consumption channel. Third, we develop and calibrate a multi-sector, heterogeneous firm, dynamic open economy model, and then we use it to study the firm, sector, and aggregate effects, as well as the short-run and long-run effects, of an unexpected capital account liberalization in an economy transitioning to its financial autarky steady-state.

Our empirical investigation is centered around the capital account liberalization in Hungary in 2001 for three main reasons. First, while many countries perform financial and trade reforms jointly, Hungary presents an unusual *quasi* natural experiment of a pure capital account liberalization. Second, our firm-level data (APEH) is unique as it provides information on balance sheets for the universe of firms in all economic activities in Hungary for almost two decades (1992-2008). Finally, this extensive data set allows us to dissect movements in the extensive margin, as it reports the creation and destruction of every firm in the economy, from unipersonal firms to large corporations. We can then study –for the first time– the impact of capital inflows by building from firm individual data to aggregate outcomes.

We start by documenting that the financial liberalization in Hungary in 2001 led to large capital inflows, and to a reduction in the domestic interest rate. Five years after the reform, the net capital flows had increased by four-times and the net international investment position had dropped 25 percentage points of GDP. These flows translated into an expansion of the credit supply and a decrease in the lending interest rate by 3 percentage points. As a result, the wage-to-interest rate ratio increased by three-times. Capital inflows were also associated with increased demand, as consumption expenditure over GDP rose by 3 percentage points within the five years before and after the reform.

To motivate our empirical strategy, we develop a simple version of our quantitative model and show

how the relative input-cost and consumption channels affect firms' outcomes through two structural parameters of the model, i.e. the capital and income elasticities. The model's structural relationships allow us to construct a difference-in-difference estimator to assess the impact of the reform within firms across industries. We exploit three sources of variation to identify the effect of capital inflows: reform (time) and heterogeneity in capital and income elasticities across industries (cross section).

Our empirical results provide evidence for the relative input-cost channel, as firms in sectors with a high capital elasticity increased their value-added, capital-labor ratio, and capital differentially. Additionally, our results also point to the presence of a consumption channel, as firms in high income elasticity industries differentially increase their value added. The estimated coefficients imply that moving from the p25 to the p75 of capital elasticity –such as moving from retail trade to machinery and equipment– increases value added by 1% per year, and yearly capital intensity and capital by 2% per year. Similarly, moving from the p25 to the p75 income elasticity –such as moving from wholesale to other business activities– raises value added by 3.5% per year. The estimated coefficients remain statistically significant and similar in magnitude when we let the mechanisms compete and include both the capital and income elasticities in the regression and add for a full set of controls.

The granularity of the data allows us to study the reallocation of resources within sectors. We show that there is a decrease in the number of producing firms in capital-intensive industries, and an increase in high income elasticity industries. The magnitude of these changes is economically significant. Going from the p25 to the p75 of the capital elasticity implies a decrease in the number of firms by 11%, while going from the p25 to p75 of income elasticity leads to almost a 20% increase in the mass of producing firms. The expansion in high income elasticity industries is driven by the increase in the number of net entrants. Strikingly, while the number of net entrants was not related to income elasticity in the pre-reform period, upon the increase in capital inflows the number of net entrants correlates strongly with the industry's income elasticity. After controlling for pre-trends, an industry with an income elasticity of 1.8 –as restaurants and bars– has on average more than 1,500 new firms created per year, which is 1,200 more firms than an industry with low income elasticity (such as agriculture). Importantly, entrants are small-domestic firms and have an average of only three employees. Changes in the mass of firms go hand -in-hand with changes in the size of operating firms, as – upon the reform – firms' size increases in the industry's capital elasticity and decreases in the industry's income elasticity.

These results suggest changes in the operational cut-off across industries with different capital and income elasticities. Following the liberalization, the operating threshold seems to rise with the capital elasticity of the industry. Thus, in these activities, there are fewer firms, but the firms are larger and more productive. By contrast, the threshold for operating profitably seems to fall by more, the higher the income elasticity of the industry. Thus, there are more firms, and the firms are smaller and less productive. We then build from the micro data to analyze the aggregate implications of input cost and consumption channels. Our data suggests that the consumption channel dominates and leads to reallocation of resources towards industries with high income elasticity, which are chiefly in the service sector. On the aggregate, we observe that the share of value added, employment and number of firms in services increases in the seven years after the financial liberalization.

These strong extensive margin movements and reallocation forces in the data are the motivation for developing a dynamic, heterogeneous firms, small open economy model. We build this model to

rationalize our empirical findings and to conduct a quantitative assessment on the macroeconomic importance of the reallocation of resources following the financial liberalization. In our model, there are two sectors: manufacturing and services. The two sectors differ in three key features. First, they differ in the capital elasticity of their production technology. Second, they differ in their expenditure elasticities of demand. Specifically, we employ the Comin, Lashkari, and Mestieri (2018) version of non-homothetic preferences to allow for heterogenous expenditure elasticities across sectors. Third, manufactured goods can be traded, while services goods are not. Imports of manufactured goods are used for consumption and investment. Within each sector, there is a continuum of monopolistically competitive firms with heterogeneous productivity à la Melitz.

Our model economy is in transition to its long-run steady state. The economy faces an exogenously given world real interest rate and capital controls, in the form of a tax on each unit of foreign borrowing, that potentially limit capital flows. Hence, the domestic real interest rate equals the world real interest rate plus the capital controls tax plus a risk premium that increases in the amount of foreign debt. Financial liberalization lowers the tax on foreign debt and triggers endogenous trade and current account dynamics. The endogenous current account dynamics affect the country's external foreign debt position during the transition and, potentially, the long-run steady state of the economy.

We calibrate the model primarily to match annual micro and macroeconomic data from Hungary. In particular, the model matches the differential labor and income elasticities between manufacturing and service sectors at the core of the input-cost and consumption channels. The economy is initially in financial autarky as the level of capital controls is sufficiently high that the real return to capital is lower than the domestic real interest rate and, thus, there are no capital inflows. We perform a full financial liberalization to this economy while it transits at 60% of its long-run steady state capital. We then assess how the unexpected decrease in capital controls affects the allocation of resources within and across sectors, as well as the economy's transition dynamics and its terminal steady state.

Through the lens of the model we can unveil the intricate firm-level, sectoral, and macroeconomic dynamics set in motion by a financial liberalization. The liberalization produces rich short-term adjustments that match the Hungarian experience. In fact, the domestic interest rate drops on impact and capital flows into the economy. Financial openness breaks the trade-off between investment and consumption as both expand simultaneously. These dynamics lead to reallocation of resources across and within sectors. Across sectors, the lower cost of capital triggers the relative input-cost channel, which leads to higher investment and manufacturing activity. Higher capital accumulation and borrowing for consumption smoothing increase aggregate consumption, which – through non-homothetic preferences – tilts sectoral consumption towards services. In the short term, whether production reallocates resources towards manufacturing or services depends on the strength of the relative input-cost and consumption channels. At the time of the liberalization, the consumption channel dominates and production reallocates towards services. There is also extensive within sector reallocation upon the liberalization. The relative increase in the demand for services leads to a decrease in the operation productivity cut-off to operate, encouraging entry. Within the manufacturing sector, the lower relative demand and a real exchange appreciation raise the operational cut-off of domestic and exporting firms. These short-term dynamics confirm the reallocation toward services and movements along the extensive margins reported in our empirical analysis.

We then leverage our calibrated model by going beyond the time horizon of our empirical analysis to investigate the long-run implications of a financial liberalization. In fact, the short-term capital inflows occur hand-in-hand with external borrowing – current account deficits – and repayment obligations. For a sufficiently large liberalization, the economy eventually stabilizes its net foreign asset position at a negative level. This long-run negative net foreign asset position is sustained by net trade surpluses in the long-run. At the sectoral level, the debt repayment implies that resources shift away from non-traded services towards tradable manufacturing, so that the economy can run a permanent trade surplus. Thus, in the medium and long-term, production shifts away from services towards manufacturing. In parallel, there is reallocation within the manufacturing sector. The exporting cutoff falls relative to the domestic cutoff, which leads to more manufacturing firms exporting, and existing exporting firms expanding in size. The trade surplus required by debt repayment also implies lower domestic consumption, and induces a real exchange depreciation. A depreciated currency, all else equal, reduces the export productivity cut-off, and further promotes exports.

The model shows that the size of a financial liberalization has long-run consequences in the allocation of resources across and within sectors and, therefore, on the long-run aggregate productivity of the economy. In fact, larger liberalizations trigger more capital inflows and potentially permanent debt repayments and trade surpluses. Therefore, large liberalizations imply long-run steady states tilted towards manufacturing production and with most resources among exporter firms. These economies have depreciated exchange rates and high aggregate productivity when compared to less liberalized economies. A full removal of capital controls increases the long-run share of manufacturing in GDP by two percent, and long-run aggregate productivity by three percent, relative to the autarky long-run.

Hence, our model shows that the short-term and long term dynamics of capital flows differ in their implications for the sectoral composition of production and for firm-dynamics. In the short term, increased consumption translates into an expansion of services and the entry of small firms but, in the long term – when the economy stabilizes its external debt – production tilts to manufacturing, especially towards the larger, most productive, exporting firms.

The empirical identification of the effect of the financial liberalization is based on heterogeneous capital and income elasticities across industries. To test that the observed effects correspond to the liberalization and not something else, we conduct a full set of robustness tests. First, we show that firms in sectors with different capital and income elasticities had similar growth trends prior to the reform. Second, we demonstrate that the results are not driven by sector-specific trends as they are robust to including sector-year fixed effects interacted. Third, we show that the expansion in services is not driven by an ease of financial constraints in this sector, as results are robust to excluding firms with bank credit, and to controlling for dependence on external finance of firms and suppliers. Fourth, results are robust to controlling for export status, foreign ownership, and using different methods to estimate the capital and the income elasticities. Fifth, the general context around the liberalization and its timing minimizes reverse causality concerns, as it was part of a general program of fourteen transition economies to join the European Union (EU). Importantly, by 2001, the deregulation of capital controls in Hungary was the only missing requirement to join the EU. The Hungarian economy was already deeply integrated with the EU and trade and foreign direct investment (FDI) flows remained constant around the reform. Additionally, other transition economies undergoing the same process of

joining the EU but with already deregulated financial accounts did not witness the same pattern of inflows of Hungary. Finally, to test external validity, we use data for 163 countries over 1970 to 2016 to assess whether financial liberalization associates with reallocation of resources towards services at the cross-country level. Confirming our results for Hungary, we find that liberalizing countries experience an increase in the value added share of services in the short term.

Related Literature. This paper adds to a long theoretical and empirical literature studying the impact of capital inflows into capital-scarce economies (among recent contributions, see, for example, Gourinchas and Jeanne 2006; Levchenko, Ranciere, and Thoenig 2009; Tille and van Wincoop 2010, Hoxha, Kalemli-Ozcan, and Vollrath 2013; Broner and Ventura 2015). Gourinchas and Jeanne (2006) study the aggregate macroeconomic effects of a financial liberalization in an open economy version of the neoclassical growth model. Levchenko, Ranciere, and Thoenig (2009) use an industry-level panel data set to study the growth and volatility effects of financial liberalization, as well as the drivers of these effects.

A related empirical literature consists of cross-country studies documenting that, in middle-income economies, expansions owing to capital inflows lead to resources shifting away from tradable activities (see, for example, Tornell and Westermann 2005; Reis 2013; Benigno, Converse, and Fornaro 2015). Building on these findings, Benigno and Fornaro (2013) develop a two-sector model with homogeneous agents and show that capital inflows can undermine productivity growth, as they reallocate resources from the tradable- productivity enhancing sector to the non-tradable stagnant sector.

Our paper also relates to recent literature assessing the impact of capital flows within and across firms (Gopinath, Kalemli-Ozcan, Karabarbounis, and Villegas-Sanchez 2017 and Varela 2018). This research focuses on incumbent manufacturing firm-level evidence and studies the productivity and/or mis-allocation effects of capital flows on these firms.

Our paper extends the above country-level and industry-level research by providing firm-level evidence on reallocation within sectors following a financial liberalization. Our paper extends the above firm-level research by focusing on services firms – for the first time – in addition to manufacturing firms. This enables us to study micro-level cross-sector reallocation over time.[1] In addition, we provide new evidence on the extensive margin of firms. Our paper also establishes the importance of two transmission channels, the input-cost channel, based on differences in the capital elasticity, and the consumption channel, based on differences in the income elasticity, across firms and sectors over time. Our quasi-natural experiment allows us to show empirically that, following an increase in aggregate consumption, differences in sectoral income elasticities lead to a shift in spending and resources towards services activities. This holds true even after controlling for firms' access to external finance. Our dynamic model quantifies the magnitude of these channels, and allows us to study the short-term and long-term allocation of resources, which depend on the degree of financial openness.

Our paper relates to Acemoglu and Guerrieri (2008) in that we build from heterogeneous capital elasticities across sectors to investigate capital accumulation We extend their analysis by introducing non-homothetic preferences –as in Herrendorf, Rogerson, and Valentinyi (2013); Boppart (2014) and Comin, Lashkari, and Mestieri (2018) – in a small open economy model and evaluating the input cost

[1]See Bernard, Redding, and Schott (2007) for a multi-sector Melitz-type trade model that is used to study theoretically the micro-level cross-sector reallocation following a trade liberalization.

and consumption channels together in a unified framework.

Our consumption channel suggests the importance of non-homotheticities in preferences, which we build into our multi-sector model. Hence, our paper is related to the literature showing that differences in income elasticities across sectors can lead, in response to a trade liberalization, for example, those with higher incomes to shift their consumption basket toward services. This, in turn, affects the income distribution further, reallocation across sectors, aggregate outcomes, and the long-term path of economies (Cravino and Levchenko 2017; Cravino and Sotelo 2019; Borusyak and Jaravel 2018; Fieler 2011; Hubmer 2018, among others). Our paper also relates to Aghion, Zilibotti, Peters, and Burgess (2019) who use micro data on expenditure shares on India to show that increases in income per capita associates with higher in the employment share in consumer services. Our paper contributes to this literature by assessing the impact of non-homotheticities in a dynamic open economy model with heterogenous firms, and by studying how they affect the extensive margin and reallocation within and across sectors at the short and long horizons.[2]

The paper is organized as follows. Section 2 reviews the financial liberalization in Hungary, and Section 3 overviews the data we use. Section 4 presents our identification strategy and empirical results. Section 5 lays out our model and Section 6 presents our quantitative analysis. Section 7 concludes.

2 Financial Liberalization in Hungary

To analyze the effect of capital inflows on the reallocation of resources, we exploit the deregulation of international borrowing in Hungary in 2001. This section presents briefly the capital controls that were in place in Hungary prior to 2001, and describes the deregulation and its aggregate implications.

Capital controls were implemented by the Act XCV of 1995, which employed two main tools to limit international financial flows. The first tool restricted banks' international financial flows by banning all foreign currency instruments -chiefly among them foreign currency swaps and forward contracts. These instruments allow hedging the currency risk and, thus, are critical for banks to raise foreign funds. The second tool required banks' exchange rate spot transactions to be pre-approved by the Central Bank, which made the spot exchange rate market illiquid. As discussed in Varela (2018), these restrictions substantially limited banks' ability to intermediate foreign funds and made them reluctant to borrow internationally. As a result, banks based their credit supply on domestic savings, which led to a low level of credit. In 2000, Hungary's credit-to-GDP ratio (0.27) was three times smaller than the OECD average (0.86), and its credit-to-deposit ratio was a third lower (0.83 against 1.2 in OECD countries).[3]

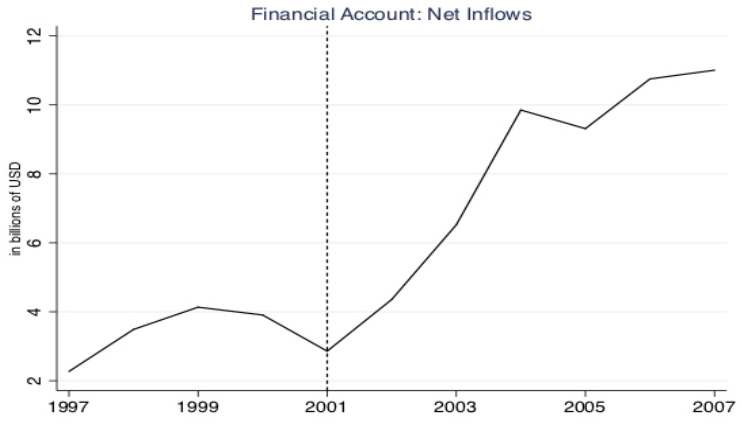
In 2001, the Act XCIII removed these regulations and allowed banks for intermediate international financial flows freely.[4] The reform had a large impact on capital inflows as shown in Figure 1. In

[2]Our paper also relates to firm dynamics models emphasizing how different allocation of resources across firms can affect aggregate productivity (Restuccia and Rogerson 2008; Hsieh and Klenow 2009; Peters 2020; Buera and Moll 2015; Buera and Shin 2017, among others).

[3]There were additional regulations that prevented domestically-owned firms from borrowing from abroad, by banning them from holding bank accounts in foreign currency (see Varela 2018 for more details).

[4]This reform was triggered by the accession to the European Union. To join the EU, all candidate countries have to accomplish the Copenhagen Criteria of 1993. One of these criteria is that candidates have to ensure free movement

the years after the liberalization (2001-2008), net financial inflows increased by more than three-fold compared to the pre-liberalization period (1995-2000) and rose from 2.5 to 8.2 billions of USD per year. The net foreign asset position of Hungary deteriorated and dropped by 25 percentage points of GDP between 1995-2000 and 2001-2008 (Figure C.2 in Appendix C). Banks started to raise foreign funds and to use intensively financial derivatives. Both cross-border and local derivatives soared and, by 2007, banks' stock of external debt had increased by nine-fold, from 5 billions U.S. dollars to 45 billions U.S. dollars (Figure C.1). These inflows translated into an expansion of the local credit supply and a decrease in the domestic lending rate. The credit-to-GDP ratio doubled (from 25 to 49%) and the domestic lending rate drop from 22% to 10% between 1995-2000 and 2001-2008. While there was already a deceasing trend in the domestic rate in Hungary since the nineties, after controlling from this pre-trend, the lending interest rate dropped by 3 percentage points in the years following the reform (see Table 7). Capital inflows associated an increased in consumption, shown by the raise of consumption expenditure over GDP by 3 percentage points within the five years before and after the reform.[5]



	Before 1995-2000	After 2001-2008
	(1)	(2)
Financial account (net)*	2.5	8.2
NFA/GDP	-62	-87
Credit-to-GDP ratio	25	49
Lending interest rate	22	10
Consumption/GDP	74	77

Note: in %. *In billions of USD dollars. Year averages.
Source: NBH, IMF, Lane and Milesi-Ferretti (2018).

Figure 1: Hungary: Net Capital Inflows

3 Data

To analyze the impact of financial liberalization at the micro level, we employ firm-level census data for the period 1992-2008. The dataset –APEH– contains panel data on balance sheets reported to tax authorities for all firms subject to capital taxation in agriculture, manufacture and services activities. It reports information on firms' value added, sales, output, capital, employment, wages, materials and exports that we employ to construct measures of labor productivity (value added per worker), capital intensity (capital per worker), export shares (export over sales). To obtain real values, we use price indexes at four-digit NACE industries for materials, investment, value added, and production.

To identify the input cost and consumption channels, we need to obtain capital and income elasticities. We estimate the capital elasticity at four-digit NACE industries using the Petrin and Levinsohn

of capital, the only missing requirement in Hungary. The reform completed the deregulation of international financial flows. Importantly, this reform was not associated with an increase in trade (export nor imports) with the EU not with an increase in foreign direct investment, as shown in Figures C.3, C.4 and C.6 and discussed in Section 4.1.

[5]Table C.1 in Appendix C confirms these patterns by splitting the before and after into different these time horizons.

(2012) and Wooldridge (2009) method to obtain the elasticities of the production function. We compute them for the pre-liberalization period (1992-2000) to avoid endogeneity concerns. We find that agricultural and manufacturing firms are more capital intensive –with capital elasticity of 0.36– and service firms are more labor intensive -with capital elasticity of 0.30 (Table C.2 in Appendix C). For robustness, we estimate the capital elasticity with the Olley and Pakes (1996) methodology and re-estimate our results using these elasticities. We employ the capital and labor elasticities to compute revenue total factor productivity (RTFP). To proxy income elasticity at the sector level, we employ the Engel curves produced by Bils, Klenow, and Malin (2013) who estimate product level Engel elasticities from the U.S. Consumer Expenditure Survey for 70 categories between 1982-2010. Importantly, Bils, Klenow, and Malin (2013) map the Engel elasticities estimated for consumers to producers using the EU-KLEMS data. We employ this map to assign to each two-digit sector an income elasticity. The sector with the highest elasticities is real estate with an elasticity higher than two, and the lowest is food, beverage and tobacco with an elasticity of 0.4 (Table C.3 in Appendix C). The mean income elasticity of manufacturing and services are 0.96 and 1.19. For robustness, we use the income elasticities estimated by Comin, Lashkari, and Mestieri (2018), who use data for thirty nine developed and developing economies since 1947 to estimate this elasticity for ten sectors (Table C.4 in Appendix C).

Our database covers the entire population of Hungarian firms between 1992 and 2008. We only exclude from our data education, health and public administration activities, as in Hungary these are mostly public and especially regulated activities. Since small firms are subject to measurement error problems, we keep firms that have a minimum of three employees in their lifetime. Our analysis covers approximately all employment in manufacturing and service activities –95% and 93% respectively– and more than 98% and 85% of their value added compared to EU-KLEMS data.[6] To better isolate the impact of the reform, we restrict the analysis to the period 1995-2008.

4 Empirics

4.1 Identification Strategy

To illustrate our empirical analysis, we start by sketching the main features of our model. We then present our identification strategy and discuss possible concerns regarding the analysis, such as differences in firms' initial characteristics and previous growth trends, sample selection, and reverse causality.

-Sketch of a Model

We identify the consumption and relative input-cost channels during capital inflows through the lens of a heterogeneous firm-dynamics model with multiple sectors where the consumer has non-homothetic preferences. We present the full model in Section 5 but, to illustrate our empirical analysis, we describe below the main relationships that drive our identification strategy. Think of a small economy that

[6]Although the database accounts for almost all employment in the agricultural sector (98%), its share of agricultural value added reaches 54%. This smaller representativeness on agricultural value added does not significantly affect our results as the these activities accounted only for 5% of GDP according to EU KLEMS data. Note that mis-reporting is not uncommon in agricultural activities, see for example Herrendorf and Schoellman (2015).

produces a final good –C– which is composed by multiple sectors j that differ in their income elasticity e_j. The representative household maximizes its intertemporal utility and has non-homothetic preferences à la Comin, Lashkari, and Mestieri (2018), with the following functional form $1 = \left[\sum_j \theta_j^{\frac{1}{\eta}} C_t^{\frac{e_j-\eta}{\eta}} C_{j,t}^{\frac{\eta-1}{\eta}}\right]$, where η is the elasticity of substitution between sectors and θ_j is constant weight parameter. Within each sector j, there are monopolistically competitive firms that produce an infinite number of differentiated varieties. These intermediate firms are heterogeneous in productivity à la Melitz (2003) and produce using a Cobb-Douglas technology based on capital and labor, $q_{(\varphi)t} = \varphi\, k_t^{\alpha_j} l_t^{\beta_j}$, where φ is a firm's productivity and the elasticities of capital and labor – α_j and β_j – are heterogenous across sectors. As in Melitz (2003), firms' optimal price is a constant markup over their marginal costs, e.g. $\frac{\phi_{j,t}}{\varphi\rho}$, where $\phi_{j,t} \equiv \left(\frac{r_t^k}{\alpha_j}\right)^{\alpha_j}\left(\frac{w_t}{\beta_j}\right)^{\beta_j}$ is the input-price bundle and $1/\rho$ is the markup. In equilibrium, the optimal production of each firm –$q_{jt}(\varphi)$– is given by

$$q_{jt}(\varphi) = \left[\left(\frac{\phi_j}{\varphi\rho}\right)^{-\sigma} \theta_j C_t^{e_j} P_{j,t}^{\sigma-\eta} P_t^{\eta}\right]. \tag{1}$$

Equation (1) illustrates how the relative input-cost and consumption channels impact a firm's production. Intuitively, other things equal, a decrease in the relative price of capital (r^k and, thus, $\phi_{j,t}$) lowers the input price bundle and encourages production, especially in sectors with higher capital elasticity (higher α_j). Similarly, an increase in the final good consumption (C) promotes the production of firms in sectors with high income elasticity (higher e_j) relatively more.[7] Hence, these two structural parameters of the model – α_j and e_j – allow us to identify the relative input-cost and consumption channels on firms' production. In the rest of the paper, we exploit differences in these two structural parameters to identify the impact of capital inflows across sectors.

-Identification Strategy

The identification strategy of the effect of the deregulation of capital flows in Hungary in 2001 is based on three sources of variation: the reform as a source of time variation and the differences in capital and income elasticities across sectors as sources of cross-sectional variation. We evaluate the relative input-cost and consumption channels in three steps. First, we assess the relative input-cost channel by estimating the differential impact of the reform across sectors with different capital elasticity, and assess whether firms in more capital intensive sectors expand differentially upon the reform. Second, we study the consumption channel by exploiting variations in terms of sector's income elasticity and testing whether firms grow differentially according to the implied income elasticity in the sector. Third, we conduct a horse race between the capital and income elasticities to assess whether the relative input cost or consumption channel dominates.

To identify the effect of the reform, it is important to determine whether firms differed in characteristics that could involve heterogeneous patterns of investment and growth across sectors. If these differences were not accounted for, the estimated coefficients could be biased. To assess this, we esti-

[7] As shown formally in Appendix B, the partial effects are given by $\frac{\partial log(q_{jt}(\varphi))}{\partial log(r_t^k/w_t)} = -\sigma\alpha_j < 0$ and $\frac{\partial log(q_{jt}(\varphi))}{\partial log(C_t)} = e_j > 0$.

mate firms' main characteristics according to sectors' capital and income elasticities in the pre-reform period (1995-2000). Table C.5 in Appendix C shows that capital elasticity correlates positively with firm size. In particular, firms in sectors with higher capital elasticity were –on average– larger (value added, capital, employment), older and more productive, and had a higher capital-labor ratio. Inversely, firms in sectors with higher income elasticity tend to be smaller, younger and less productive, and had a lower capital-labor ratio. Because the difference in means in these variables is statistically significant, we control for them in the reduced-form regressions.[8]

A critical assumption of the empirical strategy is that firms shared similar growth trends before the reform. To assess the parallel trend assumption, we check whether firms had different growth rates across sectors in accordance with their capital and income elasticities. With this end, we compute firms' yearly growth rates in the main variables analyzed –value added, capital intensity and capital– during the pre-liberalization period (1995-2000) and test whether they correlate with the capital and income elasticities. To control for sector-time invariant characteristics as well as sector-specific shocks, we include in our regressions sector-fixed effects and sector-year fixed effects interacted, which are defined at two-digit level for capital elasticity and at one-digit level for income elasticity. As we show in Table C.6 in Appendix C, neither the capital elasticity nor the income elasticity correlate with higher growth in the pre-reform period. This result addresses concerns over pre-existing growth trends, however, as shocks could affect sectors differently, in our reduced-form regressions, we control for year, and sector-year fixed effects interacted together. Because capital elasticities are estimated at four-digit NACE industries and income elasticities are at two-digit NACE industries, we define sector fixed effects at two-digit industries when estimating regressions with the former and one-digit when estimating regressions with the latter.

A critical hypothesis is that the sample is not subject to selection issues. If the survival probability differed across sectors over time, the estimated coefficients would only be assessed with respect to the surviving firms (see Heckman 1974 and Heckman 1979). To assess whether this missing data problem challenges our estimations, we check whether there are differences in the probability of firms being observed across sectors. In particular, we define a surviving firm if it existed the year before the reform (2000) and did not exit in 2008. Next, we compute the survival ratio and regress it on sectors' capital and income elasticities. Results show no statistically significant difference between the survival probability of firms across sectors with different capital elasticities (Table C.7 in Appendix C). Interesting, in sectors with high income elasticity, the survival probability decreases. This result is not surprising in light with our findings pointing to a differential increase in entry upon the liberalization (Section 4.2.1). It would not be surprising that entrants increase competitive pressure on existing firms and trigger some exit. Our results on income elasticity should then be considered as an upper bound conditional on survival.

The reform was driven by the accession of transition economies to the EU. The requirements to join the EU were predetermined by the Copenhagen Criteria in 1993 and have been equal for all accessing countries since then. In this sense, the content of the reform was exogenous to the country's political choice. As the agenda was jointly determined by the European Council and the candidate countries, it

[8]Table C.9 in Appendix C presents descriptive statistics for agriculture, manufacturing and services, and shows that these difference in firms' size is present across these broadly defined sectors. Additionally, Table C.10 shows that the difference in means is statistically significant among them.

is unlikely to have been driven by political pressure from Hungarian firms.[9] The economy was growing at a steady pace during the years prior to the liberalization. Notably, real external flows –as trade and foreign direct investment– remained constant.[10] Second, major reforms had already taken place during the early 1990s, such as privatization of public companies, bank deregulation, and competition laws.[11] Furthermore, the number of credit institutions did not change (Table C.8). Finally, the Hungarian economy was already deeply integrated with the EU: exports to the EU already accounted for 80% of total exports in 2001 (Figures C.3 and C.4). It is worth mentioning that the patterns of capital inflows observed in Hungary cannot be attributed to the joining of the EU, as the timing does not coincide with the accession, and other similar candidates with already deregulated financial accounts do not show the pattern of capital inflows observed in Hungary (Figure C.7). Notice that Hungary did not join the Euro zone and, hence, did not have to fulfill any monetary or fiscal criteria.

4.2 Firm-Level Analysis: Relative Input-Cost and Consumption Channels

In this section, we assess the relative input-cost and consumption effects implied in international financial integration at the firm-level. We use our theoretical framework to guide our empirical analysis and identify the effect of the financial liberalization through the structural parameters of the model. In particular, we test whether upon the financial liberalization in Hungary, firms expanded differentially according to the capital and income elasticity prevailing in the sector.

To illustrate our analysis, consider equation (1) that indicates a firm's production in equilibrium. After applying logs and rearranging terms, we can write this equation as follows (details of this derivation are in Appendix B):

$$\log(q_{i,t}) = -\alpha_j \sigma \log(r_t^k / w_t) + e_m \log(C_t) + (\sigma - \eta) \log(P_{jt}) + \mu_i + \iota_t + \varepsilon_{it}, \tag{2}$$

where i denotes the firm, and μ_i and ι_t are firm and year fixed effects. We denote the capital elasticity at four-digit NACE industry level as j, and the income elasticity at two-digit NACE industry level as m. Equation (2) shows how the relative input-cost and consumption channels affect firms' production. In particular, a comparative static exercise illustrates that a decrease in the relative price of capital increases a firm's production. Importantly, this effect is heterogeneous across sectors and is higher for sectors with high capital elasticity (high α_j), e.g. $\frac{\partial \log(q_{i,t})}{\partial \log(r_t^k / w_t)} = -\alpha_j \sigma < 0$. Equation (2) also illustrates the consumption channel. An increase in aggregate consumption expands differentially output of firms

[9] It is worth mentioning that, given the speed of the reform, it is unlikely that firms anticipated it and undertook investment in advance. In December 2000, the European Council defined the timing for the accession vote and the last requirements to be met by each candidate. The reform had to take place before the accession vote in December 2002. Soon after the European Council meeting, in March 2001, Hungary deregulated the remaining controls on financial flows.

[10] During the years preceding and following the reform, FDI remained constant and even showed a small slowdown following the deregulation (see Figure C.6). Moreover, Hungarian external trade did not seem to have particularly suffered from the world recession in 2001. The volume of exports and imports continued to grow during that period (Figure C.5).

[11] Major privatization programs occurred in the early 1990s, and by 1997, the share of public companies in manufacturing value added was only 2%. The banking sector had already achieved a major transformation by 1997, and neither banking concentration nor its efficiency changed around the liberalization. In particular, according to data from Beck, Demirguc-Kunt, and Levine (2010), there were no changes in banks' concentration index, interest rate margin, overhead costs-to-assets ratio, nor cost-income ratio (Varela 2018).

in sectors with higher income elasticity (high e_m), e.g. $\frac{\partial \log(q_{i,t})}{\partial \log(C_t)} = e_m > 0$.

Equation (2) is expressed at yearly basis, computing year-to-year variations. Yet, to estimate the impact of a policy reform, we can re-write this equation as a difference-in-difference estimator. In particular, we define a dummy variable FL_t for the post-liberalization period ($\text{FL}_t = 1$ if year $\geq$ 2001-2008 and 0 otherwise), and estimate differences between before and after the liberalization. That is,

$$\log(q_{i,t}) = \beta_1(\alpha_j \text{ x } \text{FL}_t) + \beta_2(e_m \text{ x } \text{FL}_t) + \mu_i + \iota_t + \log P_{jt} + \text{sector x year FE} + \varepsilon_{ijt}. \quad (3)$$

The coefficients of interest are β_1 and β_2 that capture the impact of the reform across sectors with different capital and income elasticities, respectively. Given that the financial liberalization decreased the relative price of capital and increased consumption, we expect both be positive, e.g. $\beta_1, \beta_2 > 0$. To account for changes in the industry price level, we include as a control the investment price index at four-digit NACE industries. Additionally, to control sector-specific shocks that could affect industries differentially, we add in our regression sector and year fixed effects interacted. We cluster standard errors at the firm-level.

Similarly, we express firms' capital demand and capital-labor ratio as a function of the structural parameters of the model, and obtain a similar expression as equation (3) (see Appendix B). In these regressions, we control by the producer price index at four-digit NACE industries (instead of the investment price index) to avoid simultaneity concerns.

4.2.1 Empirical Results

We start by describing the effect of the financial liberalization within firms across sectors with different capital and income elasticities in Hungary. The estimated coefficients are presented in Table 1, which reports in Panel A the results on the relative input cost channel, in Panel B the results on the consumption channel and in Panel C the horse race between the relative input-cost and consumption channels together.

Columns 1-3 in Panel A present the results on the cross-section of capital elasticities on firms' value added. The estimated coefficients are highly significant in all specifications and indicate that sectors with higher capital elasticity differently increase value added after the financial liberalization. In particular, column 1 shows that a one standard deviation increase in the capital elasticity (0.045) associates with a 2% expansion in firms' value added, after including firm and year fixed effects. This result implies that a sector in the p75 of capital elasticity –as machinery and equipment– has a 3% higher increase in value added than a sector in the p25 of capital elasticity –such as retail trade. Column 2 adds sector and year fixed effects interacted and column 3 controls by changes in the industry price index. After the inclusion of all controls, the estimated coefficient implies that one standard deviation increase in the capital elasticity associates with 1% higher expansion in value added.

Columns 4-6 reports the results of capital intensity and show that all the estimated coefficients are positive and highly statistically significant. In particular, sectors with high capital elasticity differentially increase their capital intensity following the reform. After including all controls, the coefficient in column 6 indicates that one standard deviation increase in the capital elasticity leads to 2% expansion in capital-labor ratio. This implies that a sector like machinery and equipment (p75) has a 2.3% higher increase

in the capital-labor ratio than retail trade (p25). The expansion in the capital intensity is driven by a differential increase in firms' capital, shown in columns 7-9.

Table 1: Relative Input Cost and Consumption Effects of Financial Liberalization

	Log Value Added			Log Capital Intensity			Log Capital		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Panel A. Capital Elasticity								
FL * Capital Elasticity	0.512***	0.199*	0.151**	0.435***	0.378***	0.369***	0.668***	0.470***	0.452***
	(0.098)	(0.107)	(0.070)	(0.075)	(0.062)	(0.062)	(0.104)	(0.132)	(0.132)
R^2	0.773	0.774	0.774	0.790	0.791	0.791	0.845	0.846	0.846
	Panel B. Income Elasticity								
FL * Income Elasticity	0.017**	0.026***	0.070***	-0.131***	-0.044**	-0.067***	-0.048***	-0.124***	-0.113***
	(0.008)	(0.009)	(0.010)	(0.011)	(0.018)	(0.018)	(0.012)	(0.008)	(0.008)
R^2	0.772	0.773	0.774	0.790	0.791	0.791	0.845	0.845	0.845
	Panel C. Capital and Income Elasticities								
FL * Capital Elasticity	0.538***	0.171***	0.116**	0.367***	0.223**	0.205*	0.636***	0.797***	0.757***
	(0.063)	(0.056)	(0.059)	(0.095)	(0.106)	(0.106)	(0.105)	(0.116)	(0.117)
FL * Income Elasticity	0.015*	0.016*	0.060***	-0.128***	-0.039**	-0.036**	-0.041***	-0.107***	-0.098***
	(0.008)	(0.009)	(0.010)	(0.012)	(0.018)	(0.018)	(0.012)	(0.018)	(0.018)
R^2	0.776	0.784	0.796	0.790	0.791	0.791	0.845	0.845	0.845
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes			Yes		
Sector* Year FE		Yes	Yes		Yes	Yes		Yes	Yes
Sector Price Index			Yes			Yes			Yes
N	1,211,051	1,211,051	1,211,051	1,187,372	1,187,372	1,187,372	1,187,372	1,187,372	1,187,372

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the income elasticity comes from Bils, Klenow, and Malin (2013), reported at two-digit NACE industries. Source: APEH.

Panel B reports the estimated coefficients for the consumption channel and shows that sectors with higher income elasticity see a differential expansion in their value added. After including all controls in column 3, the estimated coefficient implies that a one standard deviation increase in the income elasticity (0.42) raises firms' value added by 3%. This coefficient implies that, for example, a sector as other business activities (p75) experiences a 3.5% higher increase in value added than retail (p25). The estimated coefficient on capital intensity is negative indicating that firms decrease their capital-labor ratio, after the inclusion of all controls in column 6. Columns 7-9 present the results for capital and suggests that firms with high income elasticity decrease their capital.

Panel C presents the results of equation (3) where both capital and income elasticities are included together as regressors. Importantly, the estimated coefficients for both elasticities on value added are statistically significant and very closed to the regressions estimated individually in Panels A and B. This suggest that following the financial liberalization firms increase their value added in accordance with their capital and income elasticities. In particular, after including all controls in column 3, the estimated coefficient implies that firms' value added expands by 1% and 2.5% following a one standard deviation increase in the capital and income elasticities, respectively. Column 6 reports the coefficient for capital intensity after including all controls. As above, this coefficient indicates that sectors with higher capital elasticity increase their capital-labor ratio differentially. This expansion is explained by the increase firms' capital as a function of firms capital elasticity. To check whether the increased investment in

sectors with high capital elasticity corresponds to higher access to external finance after the reform –as the input-cost channel implies–, we regress equation (3) using leverage as dependent variable. Table C.11 confirms that firms in high capital elasticity sectors increase their leverage relatively more.[12]

We conduct a full set of robustness tests and extensions. First, to check that our results are not driven by exporters, we exclude them from the analysis. Columns 1-3 in Table C.12 in Appendix C show that, after including all controls, the estimated coefficients are similar in size for value added than in the benchmark specification, but are larger for capital intensity and capital. These results suggest that non-exporters with higher capital elasticity benefited most from the financial liberalization. Second, we assess whether results are robust to excluding foreign-owned companies. Columns 4-6 in Table C.12 show that the estimated coefficients are statistically significant, and higher, indicating that domestically-owned firms benefited most from the financial liberalization. Third, we omit government-owned companies and show that results are robust to this control (columns 7-9 in Table C.12). Together these results indicate that the expansion upon the financial liberalization is mainly driven by non-exporters and domestic firms. Fourth, in Table C.13, we estimate the capital elasticities using Olley and Pakes (1996) method and use the income elasticities estimated by Comin, Lashkari, and Mestieri (2018) to show that our results hold true under different methodologies to estimate these elasticities. Finally, Table C.14 shows that results are robust to using the balanced panel of firms present between 1995 and 2008.

An important assumption in the analysis is that sectors' characteristics do not correlate with differential access to external finance. If – for example– firms in sectors with high income elasticity were more credit constrained, the estimated coefficients could be subject to omitted variable bias and capture a relaxation of financial constraints, instead of the consumption channel. To check this possibility, we employ the financial dependence index of Rajan and Zingales (1998) at four-digit industries level, and re-estimate equation (3) augmented with an interaction variable of the financial dependence index with the reform dummy. This interaction term captures whether more financially dependent sectors expand more after the reform. Results – presented in Panel A of Table C.16 – show that this interaction term is positive and statistically significant, but it does not overpower the relative input-cost and consumption channels. The estimated coefficients for both capital and income elasticities remain similar in size and highly statistically significant, which confirms the validity of these two channels.[13] Additionally, we conduct a second exercise to assess whether changes in credit conditions along the supply chain could affect our results, we use the input-output matrix of Hungary in the pre-reform period (2000) and estimate the financial dependence index of the closest industry supplier. Then, we augment our previous regression in Panel A of Table C.16 with the interaction of the financial dependent index of the supplier and the reform dummy. Panel B in Table C.16 presents the results and confirms that the capital and income elasticities remain highly statistically significant after these controls.

To check whether the expansion in the consumption channel corresponds to increased demand and

[12]Our measure of leverage is short-term debt over sales, as our data does not report long-term debt before 2005.

[13]This index measures the amount of investment that cannot be financed through internal cash flows for U.S. listed firms and is used as a proxy for sectors' *technological* needs for external finance. As capital markets are largely advanced in the U.S. and listed firms are less likely to be credit constrained, this index tends to capture the technical needs for external finance in the sector. As this index was originally built for manufacturing firms, we follow Rajan and Zingales (1998) methodology to build this index for services at four-digit industry level. Note that using an index estimated for U.S. firms avoids endogeneity concerns of financial frictions in Hungary. The correlation of the financial dependence index and the capital and income elasticities is positive but small reaching 7.6% and 3.5%, respectively.

not to a differential ease of credit constraints for firms in high income elasticity sectors, we assess whether this channel remains valid for firms without access to external finance in two steps. First, we employ data from short-term loans with financial institutions between 1999 and 2008 to re-estimate regression (3) for firms that do not employ this financing.[14] Results – presented in column 1 of Table C.17– confirm that firms in sectors with high income elasticity expand differentially their value added, even in the absence of short-term credit. Second, we use credit registry data from 2005 and conduct a similar analysis for firms that do not report any type of credit between 2005 and 2008.[15] Column 3 in Table C.17 confirms our previous result and shows that firms in high income elasticity sectors expand their value added more, even in the absence of credit. Lastly, it is worth remarking on the results for capital intensity across industries with different capital elasticity – reported in columns 2 and 5 in Table C.17–, which are non-statistically significant. These results indicate that firms in capital intensive sectors without access to credit do not increase their capital intensity and, thus, confirm the relative input-cost channel proposed in this paper.

Results presented in this section indicate that capital inflows upon the financial liberalization in Hungary associate with relative input-cost effects across sectors with high capital elasticity and consumption effects towards goods with high income elasticity. In the next section, we evaluate the impact of these forces at the industry level.

4.3 Industry-Level Analysis

Last section considered the impact of the financial liberalization within firms for sectors with different capital and income elasticities. We now turn to assess its impact at the industry level. With this end, we analyze the data at four-digit NACE industries and estimate the following regression:

$$\log(y_{j,t}) = \beta_1(\alpha_j \text{ x } \text{FL}_t) + \beta_2(e_m \text{ x } \text{FL}_t) + \text{sector FE} + \iota_t + \varepsilon_{j,t}, \tag{4}$$

where y_{jt} represents the log number of firms, log firms' size (value added per firm), the log sectoral RTFP and the log producer price index.[16] We include year and sector fixed effects in all specifications.

Column 1 in Table 3 reports the estimated coefficient for the mass of firms. The coefficients for both capital and income elasticities are highly statistically significant, and indicate that the number of firms decreases in sectors' capital elasticity and increases in sectors' income elasticity. The magnitude of these changes is economically significant as well, following a one standard deviation increase in the capital elasticity the number of firms drops by 8%. In contrast, a one standard deviation increase in the income elasticity raises the number of firms by 16%. Moving from the p25 to the p75 of the capital elasticity implies a differential decrease in the number of firms by 11%, while moving from the p25

[14]Unfortunately, the APEH balance sheet data only reports short-term credit with financial institutions since 1999, but it does not report long-term credit.

[15]The credit registry data only begins in 2005. Nevertheless, it worth remarking that firms that access to credit tend to keep it during the period (i.e. there is not much turn over in the access to credit within firms from one year to another).

[16]Sectoral RTFP is computed as the sum of firms' individual productivities weighted by their respective value added share in the sector. See for example Foster, Haltiwanger, and Syverson (2008) and Baqaee and Farhi (2017) for a similar measure of RTFP.

to p75 of income elasticity leads to a 19% higher increase in the number of firms. These results are parallel to changes in firms' size. The estimated coefficients in column 2 indicate that the value added per firm increases in capital elasticity (5.4%), and decreases in income elasticities (5%). Together these results could suggest an increase in the operational cut-off for producing in industries with high capital elasticity, and a decrease in the cut-off in industries with high income elasticity.

Table 2: Industry-Level Analysis

	Log Number of Firms	Log Firm Size (VA x firm)	Log Industry RTFP	Log Producer Price Index
	(1)	(2)	(3)	(4)
	Capital and Income Elasticities			
FL * Capital Elasticity	-1.816***	1.212***	0.768**	-0.305***
	(0.239)	(0.281)	(0.331)	(0.052)
FL * Income Elasticity	0.384***	-0.111**	-0.036	0.061***
	(0.041)	(0.048)	(0.056)	(0.009)
R^2	0.936	0.900	0.847	0.941
Year FE	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
N	3,605	3,605	3,605	3,605

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the income elasticity comes from Bils, Klenow, and Malin (2013), reported at two-digit NACE industries. Source: APEH.

An alternative manner to assess whether there are changes in the operational cut-off is to study changes in industry's productivity. As in the standard Melitz's model, increases in the operational cut-off associate with increases in industry's productivity because only high productivity firms produce. In this line, column 3 shows that sectoral RTFP raises in industry's capital elasticity. The estimated coefficient is statistically significant and implies that a one percent increase in the capital elasticity raises the industry's RTFP by 3.5%. The coefficient for income elasticity is negative, albeit non-statistically different from zero. In line with these changes, the producer price index decreases in industry's capital elasticity and increases in income elasticity. A one standard deviation increase in the capital elasticity decreases the producer price index by 1.4%, while its increases by 3% in income elasticity.

4.4 Extensive Margin

Results presented in the previous section suggest changes in the operational cut-off as a function of industries' capital and income elasticities. In this section, we assess their implications in the entry of new firms and their characteristics.

We start by estimating equation (4) and employ the log number of net entrants (entry-exit) and entrants as dependent variables. In line with a decrease in the operational cut-off as a function of income elasticity, results in Table 3 indicate an increase in net entry in these industries. In particular, a one standard deviation increase in the income elasticity raises the number of net entrants by 12%. In contrast, the coefficient for capital elasticity on net entry is negative –albeit non-statistically significant– as the increase in the operational cut-off suggested above would imply. Column 2 confirms these

results when the log of number of entrants is considered in the analysis. To evaluate the characteristics of new entrants, we restrict our analysis to entrant firms and test whether they differ in observable characteristics –RTFP and value added – upon the financial liberalization. Columns 3 and 4 in Table 3 show that, in sectors with higher capital elasticity, entrants were more productive and larger, whilst, in sectors with high income elasticity, entrants were less productive and smaller. These results provide additional support for a decrease in the operational cut-off in high income elasticity industries and an increase in high capital elasticity industries.

Table 3: Extensive Margin

	Industry-Level Analysis		Firm-Level Analysis	
	Log Net Entrants	Log Entrants	Log RTFP	Log VA
	(1)	(2)	(3)	(4)
FL * Capital Elasticity	-0.110	0.414	0.702***	0.390*
	(0.764)	(1.123)	(0.212)	(0.215)
FL * Income Elasticity	0.289***	0.676***	-0.293***	-0.099***
	(0.105)	(0.163)	(0.030)	(0.026)
Year FE	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
R^2	0.904	0.858	0.081	0.072
N	3,605	3,605	93,149	168,558

Notes: *, **, *** significant at 10, 5, and 1 percent. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the income elasticity comes from Bils, Klenow, and Malin (2013), reported at two-digit NACE industries. Source: APEH.

To illustrate the expansion of entry as a function of the industry's income elasticity, we evaluate the yearly number of net entrants and entrants per industry in the pre- and post-reform periods. In particular, we estimate a regression: $y_{m,t} = \beta_1(e_m \text{ x } \text{FL}_t) + \beta_2 e_m + \beta_3(\alpha_m \text{ x } \text{FL}_t) + \beta_4 \alpha_m + \varepsilon_{m,t}$, where $y_{m,t}$ is net entry or entry, and plot the predicted values for these variables before and after the reform.[17] These values capture the relationship between entrants and income elasticity, once industry's capital elasticity is controlled for. Figure 2 shows clearly that the number of net entrants and entrants is highly and positively related with sector's income elasticity after the financial liberalization. The contrast with the pre-liberalization period is stunning. Before the reform the relationship between entry and income elasticity is almost flat, but after it is highly positive. After the reform, an industry with an income elasticity of 1.8 –as restaurants and bars– had on average more than 1,500 new firms created per year, which is 1,200 more firms than an industry with low income elasticity (such as agriculture).

This figure confirms that the financial liberalization in Hungary associates with higher entry in those sectors that high income elasticity and, hence, that experienced the highest increase in demand. We now go one step further and show in Table 4 the top fifteen sectors defined at four-digit NACE industries that experienced the highest number of net entrants in the post-liberalization period.

Column 1 shows that all these sectors are in services and are dominated by real estate, construction,

[17] R_t is a dummy variable that equals to 1 for the post-reform period ($\text{R}_t \geq 2001$) and 0 otherwise. Therefore, the coefficient β_1 captures the relationship in the post-liberalization period, and β_2 captures the relationship in the pre-liberalization period (i.e. when $\text{R}_t = 0$). For robustness, Figure C.8 in Appendix C presents these relationships constructed as simple difference in means (i.e. without regression analysis).

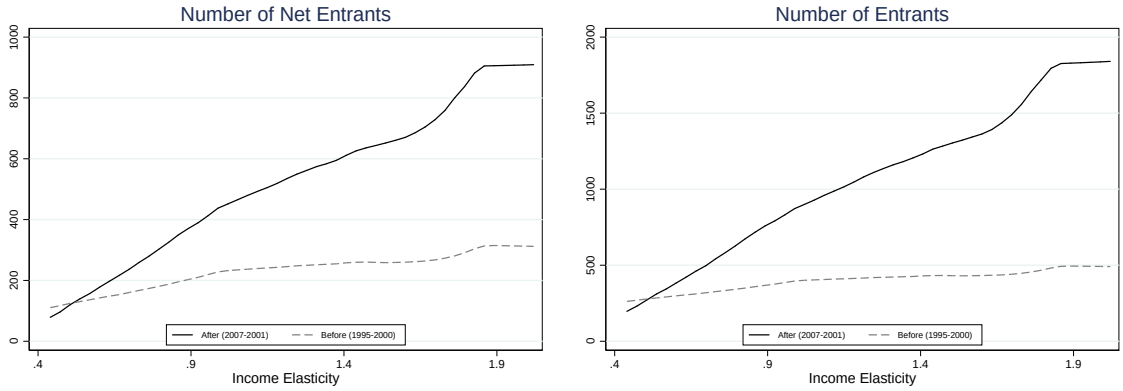


Figure 2: Net Entrants

Table 4: Top 15 Industries in Net Entry (2001-2007)

Broad Sector	Sector (II digits)	Industry (IV digits)	Description	Income elasticity	Net entry per year	Number of employees	Share agg. employment (in %)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Service	Real estate activities	7012	Buying and selling of own real estate	2.02	982	2	0.08
Service	Construction	4521	General construction of buildings and civil engineering works	0.89	505	3	0.21
Service	Hotels and restaurants	5530	Restaurants	1.80	480	3	0.13
Service	Other business activities	7414	Business and management consultancy activities	1.35	446	2	0.08
Service	Other business activities	7487	Other business activities n.e.c.	1.35	439	3	0.10
Service	Retail trade	5248	Other retail sale in specialized stores	0.83	420	2	0.06
Service	Land transport	6024	Freight transport by road	2.02	404	3	0.08
Service	Other business activities	7420	Architectural and engineering activities and related technical consultancy	1.35	363	2	0.06
Service	Real estate activities	7020	Letting of own property	2.02	297	4	0.03
Service	Retail trade	5211	Retail sale in non-specialized stores with food, beverages or tobacco predominating	0.83	271	4	0.11
Service	Sale, maintenance and repair of motor vehicles	5010	Sale of motor vehicles	0.85	250	2	0.06
Service	Hotels and restaurants	5540	Bars	1.80	248	2	0.04
Service	Retail trade	5263	Other non-store retail sale	0.83	229	2	0.02
Service	Construction	4531	Installation of electrical wiring and fittings	0.89	212	3	0.05
Service	Other business activities	7411	Legal activities	1.35	211	2	0.04
Total					5,755		1.68

Note: this table presents the yearly number of entrants in the post-liberalization period per four-digit NACE industries. Source: APEH.

restaurants and bars, retail trade, transport and business activities. The four-digit industries that have seen larger number of net entrants are: buying and selling own real state, construction of buildings, restaurants, consultancy and other business activities, which are sectors that have income elasticity (columns 4-6). It is important to note that firms entering are typically very small and do not exceed four employees on average (column 7). Finally, the importance of new entrants in aggregate employment is not negligible. In the year of entry, they account for 1.7% of aggregate employment.[18] By 2008, firms that entry after the reform accounted for more than 15 percentage points of the share of value added and employment in services (Figure C.9 in Appendix C).

[18]For completeness, Table C.18 in Appendix C presents the top 30 sectors in net entry.

4.5 Implications for Broadly Defined Sectors

The previous section reported an increase in the net entry of sectors with high income elasticity following the financial liberalization in Hungary. Our empirical evidence also points to reductions in the operational cut-off for producing in sectors with high income elasticity and increases in it in sectors with high capital elasticity. These changes in cut-offs suggest the presence of reallocation forces across sectors and, in particular, towards sectors with high income elasticity. To analyze the aggregate implication of these forces, we consider broadly-defined sectors –manufacturing and services– and check whether financial openness reallocates resources across them. As discussed in Section 3, our estimations for capital and income elasticities imply that the manufacturing sector is capital intensive and has lower income elasticity, while the service sector is labor intensive and has high income elasticity.

To assess whether the relative input-cost and consumption channels imply reallocation forces between manufacturing and services, we compute the share of value added, employment and mass of firms of services (on the total of manufacturing and service activities) and regress them on a time trend and dummy variables for the years following the financial liberalization. More precisely, we estimate $y_{s,t} = \sum_{i=2001}^{2008} \beta_i D_i + \text{Time}_t + \varepsilon_{st}$, where s denotes the service sector and $D_i = 1$ if year $= i$ and 0 otherwise. The β coefficients capture whether the share of services increases differentially than the time trend following the financial liberalization in 2001. Figure 3 plots the estimated coefficients for each year and shows that upon the liberalization, the share of services in value added, employment and mass of firms increases and is statistically different from the pre-liberalization trend. These results provide suggestive evidence that, on the aggregate, the consumption channel dominates the relative input-cost channel and resources reallocate toward services activities.[19]

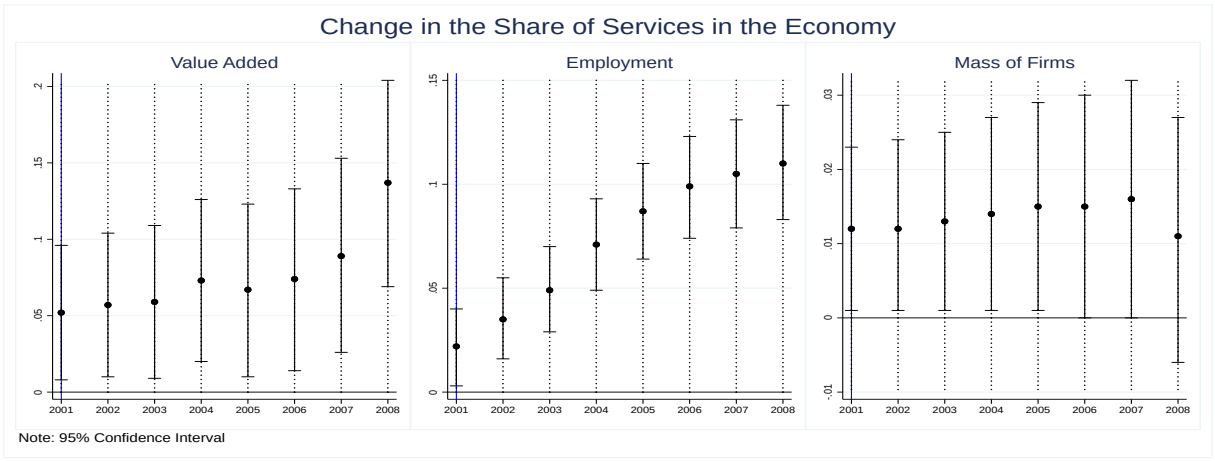


Figure 3: Reallocation across sectors

[19]Figure C.10 shows the estimated coefficient for the manufacturing sector.

Taking Stock and External Validity

Results presented above assessed the relative input-cost and consumption channels implied in financial liberalization. We showed that, accordingly with the relative input-cost channel, firms in industries with high capital elasticity differentially increased their value added and capital intensity. Additionally, we provided evidence for the consumption channel, as firms in high income elasticity industries increased their value added relatively more. Our results also point to large reallocation of resources within sectors. In particular, they suggest that the productivity threshold to operate increases as a function of sectors' capital elasticity. The decline in the number of producing firms and the rise in firms' size point to this direction. Inversely, in sectors with high income elasticity, our results suggest a decline in the productivity cut-off to operate. In these industries, we find an increase in the number of firms, a decrease in firms' size, an increase in net entry and a decline in the size of entrants. On the aggregate, our results suggest that the consumption channel dominates and resources shift toward services.

A final question about the external validity of our results remains. The Hungarian financial liberalization illustrates that after this reform resources shifted towards services, but does this fact hold true for the cross-section of countries? We now assess this question by checking whether financial liberalization correlates with increases in the share of value added in services in the cross-section of countries. For expositional purposes, we present the details of this analysis in Appendix A and focus here on the main results. We employ the Chinn and Ito (2008) index of capital account openness and World Bank Data for 163 countries over the period 1970 to 2015, and assess this correlation in three steps. First, we compute a simple correlation and show in Figure A1 that financial liberalization episodes correlate with increases in the value added share of services. Second, we employ five years non-overlapping panel data and confirm this correlation in an OLS estimator (Table A1 column 7). Finally, since the OLS estimator could be subject to simultaneity bias, we estimate a GMM dynamic panel. After including a full set of controls –such as trade openness, government size, financial depth and financial crises–, we confirm that financial liberalization episodes associate with reallocation of resources towards services. The estimated coefficient is highly statistically significant and indicates that a one standard deviation increase in the index of financial openness associates with a 2.1% increase in the value added share of services within the five years after the reform (Table A1, columns 8 and 9). This expansion is also economically significant and implies that – for the average country – the value added share of services raises by 1.1 percentage points five years after the liberalization.[20] In the next section, we build a heterogeneous firm dynamics model that rationalizes these findings, quantifies the aggregate implications of the financial liberalization, and assesses whether the findings are permanent.

5 Model

This section develops a small economy model to study the macroeconomic and microeconomic impacts of capital account liberalization. In the model, there are two sectors –manufacturing and services– each

[20]These results are close to Benigno, Converse, and Fornaro (2015) who identify episodes of large capital inflows for 70 middle- and high-income countries and show that large inflows associate with increases in the value added share of services.

of which consists of heterogeneous firms à la Melitz (2003). Firms use capital and labor as factors of production. The manufacturing good can be traded internationally, but services are non-traded. We allow for capital control to prevent local households from perfectly accessing international funds. We model a financial liberalization as an unexpected decrease in capital controls during the economy's transition to its steady state. We employ the model to study the impact of financial liberalization on consumption and saving patters, current account imbalances, entry and exit of firms, and the reallocation of resources within and across sectors. For expositional simplicity, in this section, we present only the main relationships of the model; all derivations are in the Appendix.

5.1 Representative Household

The domestic household has the following intertemporal preferences:

$$U = \sum_{t=0}^{\infty} \beta^t \frac{(C_t^{1-\gamma} - 1)}{1-\gamma}, \tag{5}$$

where $\beta \in (0,1)$ is the discount factor and γ determines the elasticity of intertemporal substitution. C_t represents the consumption basket, or aggregate consumption, which consists of composite manufacturing, C_{Mt}, and composite services, C_{St}, according to the implicitly defined function:

$$1 = \left[\theta_M^{\frac{1}{\eta}} C_t^{\frac{e_M - \eta}{\eta}} C_{Mt}^{\frac{\eta-1}{\eta}} + \theta_S^{\frac{1}{\eta}} C_t^{\frac{e_S - \eta}{\eta}} C_{St}^{\frac{\eta-1}{\eta}} \right], \tag{6}$$

where $\eta \in (0,1)$ is the elasticity of substitution between manufacturing and services goods, and θ_j with $j = \{M, S\}$ are constant weight parameters. e_j is the (constant) aggregate consumption elasticity of demand for sectoral good C_{jt}. The above preferences draw from Comin, Lashkari, and Mestieri (2018), and are a non-homothetic generalization of the CES aggregator. Equation (6) implies that, as aggregate consumption C_t increases, sectoral consumption C_{jt} grows more than proportionately if $e_j > 1$, and less than proportionately if $e_j < 1$. The usual homothetic CES preferences are a special case of the above with $e_j \equiv 1$.

The manufacturing good C_{Mt} is, in turn, a CES aggregate of domestically produced C_{Mt}^D and foreign imported goods C_{Mt}^F according to:

$$C_{Mt} = \left[(\theta_D)^{\frac{1}{\eta_M}} \left(C_{Mt}^D \right)^{\frac{\eta_M - 1}{\eta_M}} + (\theta_F)^{\frac{1}{\eta_M}} \left(C_{Mt}^F \right)^{\frac{\eta_M - 1}{\eta_M}} \right]^{\frac{\eta_M}{\eta_M - 1}}, \tag{7}$$

where $\eta_M \in (0,1)$ is the elasticity of substitution between C_{Mt}^D and C_{Mt}^F, and θ_D and θ_F control the importance of each good. Finally, C_{St} and C_{Mt}^D are each a CES aggregate of a continuum of differentiated varieties:

$$C_{St} = \left[\int_{\omega \in \Omega_t} q_{St}^d(\omega)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \qquad \text{and} \qquad C_{Mt}^D = \left[\int_{\omega \in \Omega_t} q_{Mt}^d(\omega)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \tag{8}$$

where Ω_t is the (endogenous) time-varying set of individual varieties sold in the domestic market and $\sigma > 1$ is the elasticity of substitution across varieties which, for simplicity, is the same in both sectors. Manufacturing varieties can be traded internationally, but services are non-tradable.

The representative household accumulates capital over time (K_t) by importing investment goods (I_t). K_t is rented to domestic manufacturing and services firms. The price of imported goods (including C^F_{Mt} and I_t) is the numéraire of the economy ($P^F_{Mt} = 1$). The household can issue foreign bonds (B_t) that are traded internationally and priced at the domestic interest rate (r_t), where $B_t < 0$ implies foreign debt. Importantly, the domestic interest rate includes capital controls that impose a tax τ per unit of foreign bond borrowing. This tax then is redistributed lump-sum to households via T_t.

The household maximizes her utility in equation (5) subject to the following budget constraint:

$$P^D_{Mt}C^D_{Mt} + C^F_{Mt} + P_{St}C_{St} + K_{t+1} - (1-\delta^k)K_t + B_{t+1} = w_t L + r^k_t K_t + (1+r_t)B_t + \Pi_t + T_t, \qquad (9)$$

where w and r^k are the wage and rental rate of capital, L denotes the country's labor endowment, which is supplied inelastically, and Π are economy-wide profits redistributed to households. The domestic interest rate r_t is endogenously determined and depends on the foreign interest rate (r^*), the level of capital controls, and the local risk premium:

$$r_t = r^* + \tau\left\{B_t < 0\right\} - \tau\left\{B_t > 0\right\} + \psi\left(\exp(-B_t) - 1\right). \qquad (10)$$

We assume the risk premium depends on the stock of foreign debt, as in Schmitt-Grohe and Uribe (2003), and ψ is a constant parameter guiding the risk premium elasticity. Note that, when $\tau \to \infty$, the economy is in financial autarky, $B_t = 0$ and trade must be balanced. For low enough τ, the economy is open to international financial flows, B_t could differ from zero, and there can be current account and trade imbalances. Given our focus on a capital-scarce economy, we focus on the case in which the economy receives capital inflows $B_t < 0$ and pays a tax.

The household's optimal demand for manufacturing and service goods are:

$$C_{S,t} = \left(\frac{P_{S,t}}{P_t}\right)^{-\eta}\theta_S C_t^{e_S} \qquad \text{and} \qquad C_{M,t} = \left(\frac{P_{M,t}}{P_t}\right)^{-\eta}\theta_M C_t^{e_M}, \qquad (11)$$

$$C^D_{M,t} = \left(\frac{P^D_{M,t}}{P_{Mt}}\right)^{-\eta_M}\theta_D C_{Mt} \qquad \text{and} \qquad C^F_{M,t} = \left(\frac{1}{P_{Mt}}\right)^{-\eta_M}\theta_F C_{Mt}, \qquad (12)$$

and the demands for individual varieties are given by:

$$q^d_{St}(\omega) = C_{St}\left(\frac{p_{St}(\omega)}{P_{St}}\right)^{-\sigma} \qquad \text{and} \qquad q^d_{Mt}(\omega) = C^D_{Mt}\left(\frac{p_{Mt}(\omega)}{P^D_{Mt}}\right)^{-\sigma}, \qquad (13)$$

where P_t, P_{jt}, and $p_{jt}(\omega)$ $\omega \in \Omega_{jt}$ are the price of the aggregate consumption bundle, the sectoral consumption bundles, and the prices of individual varieties. The household's maximization problem gives the following Euler equations:

$$1 = \Lambda_{t,t+1}(1 - \delta^k + r^k_{t+1}) \qquad \text{and} \qquad 1 = \Lambda_{t,t+1}\left(1 + r_{t+1} - \psi \cdot B_{t+1} \cdot \exp(-B_{t+1})\right). \qquad (14)$$

where the discount factor and the marginal utility of consumption are given by:

$$\Lambda_{t,t+1} = \beta \frac{\lambda_{t+1}}{\lambda_t} \qquad \text{and} \qquad \lambda_t = \frac{C_t^{-\gamma}}{P_t} \left[\frac{\epsilon_M \theta_M^{\frac{1}{\eta}} C_t^{\frac{\epsilon_M - \eta}{\eta}} C_{Mt}^{\frac{\eta-1}{\eta}} + \epsilon_S \theta_S^{\frac{1}{\eta}} C_t^{\frac{\epsilon_S - \eta}{\eta}} C_{St}^{\frac{\eta-1}{\eta}} - \eta}{1-\eta} \right]^{-1}. \tag{15}$$

5.2 Production

There is a continuum of firms in each sector $j \in \{S, M\}$. Firms are monopolistically competitive, so that each variety ω is produced by a single firm. Firms are heterogeneous in productivity (φ), which is drawn from a sector-specific distribution $G_j(\varphi)$ after paying a one-time sunk entry cost f_{jt}^e. In order to keep operating, firms must pay a fixed operational cost ($f_j^d > 0$) every period. Operating firms combine labor (l) and capital (k) in a Cobb-Douglas production function. The production function in sector $j \in \{S, M\}$ is given by $q_{jt}(\varphi) = \varphi k_{jt}(\varphi)^{\alpha_j} l_{jt}(\varphi)^{1-\alpha_j}$.

Manufacturing firms can also choose to export subject to paying an additional fixed exporting cost (f_M^x), in which case they face the following foreign demand: $q_{Mt}^x(\varphi) = A p_{Mt}(\varphi)^{-\sigma}$, where A is a constant reflecting that, in this small open economy, the non-price part of foreign demand is not affected by Hungary's liberalization. For simplicity, we assume that foreign consumers have the same price elasticity as domestic consumers.

All fixed and variable costs are valued in units of the (*sectoral*) composite price derived from the optimal input demands for production: $\phi_{jt} \equiv \left(\frac{r_t^k}{\alpha_j}\right)^{\alpha_j} \left(\frac{w_t}{1-\alpha_j}\right)^{(1-\alpha_j)}$. Firms choose their optimal price given the household demands in (13) and the production technology. A firm in sector j charges a constant markup ($1/\rho$) over its marginal costs $p_{jt}(\varphi) = \frac{\phi_{jt}}{\rho\varphi}$.

5.3 Value Functions, Entry and Exit

The value function of type-φ firms operating in services is:

$$V_{St}(\varphi) = \max\Big\{0, \pi_{St}^d(\varphi) + (1-\delta)\Lambda_{t,t+1} V_{S,t+1}(\varphi)\Big\}, \tag{16}$$

and in manufacturing is:

$$V_{Mt}(\varphi) = \max\Big\{V_{Mt}^d(\varphi), V_{Mt}^x(\varphi)\Big\}, \tag{17}$$

where,

$$V_{Mt}^d(\varphi) = \max\Big\{0, \pi_{Mt}^d(\varphi) + (1-\delta)\Lambda_{t,t+1} V_{M,t+1}(\varphi)\Big\}, \tag{18}$$

$$V_{Mt}^x(\varphi) = \max\Big\{0, \pi_{Mt}^d(\varphi) + \pi_{Mt}^x(\varphi) + (1-\delta)\Lambda_{t,t+1} V_{M,t+1}(\varphi)\Big\}. \tag{19}$$

Domestic profits are defined by $\pi_{jt}^d(\varphi) = \Big[p_{jt}(\varphi) - c_{jt}(\varphi)\Big] q_{jt}^d(\varphi) - \phi_{jt} f_j^d$ for $j \in \{S, M\}$. Exporting profits for manufacturing firms are defined by $\pi_{Mt}^x(\varphi) = \Big[p_{Mt}(\varphi) - c_{Mt}(\varphi)\Big] q_{Mt}^x(\varphi) - \phi_{Mt} f_M^x$. Therefore, total profits for manufacturing firms are $\pi_{Mt}(\varphi) = \pi_{Mt}^d(\varphi) + \pi_{Mt}^x(\varphi)$. δ is the exogenous exit rate.

The continuation value for service and manufacturing firms takes into account endogenous exit decisions:

$$V_{S,t+1}(\varphi) = \begin{cases} V_{S,t+1} & \text{if} \quad \varphi > \varphi^d_{S,t+1} \\ 0 & \text{otherwise,} \end{cases} \qquad V_{M,t+1}(\varphi) = \begin{cases} V^d_{M,t+1} & \text{if} \quad \varphi^d_{M,t+1} \leq \varphi < \varphi^x_{M,t+1} \\ V^x_{M,t+1} & \text{if} \quad \varphi \geq \varphi^x_{M,t+1} \\ 0 & \text{otherwise.} \end{cases}$$

The operational productivity cut-offs φ^d_{St}, φ^d_{Mt}, and φ^x_{Mt} are defined implicitly by the following marginal conditions: $V_{St}(\varphi^d_{St}) = 0$, $V^d_{Mt}(\varphi^d_{Mt}) = 0$, and $\pi^x_{Mt}(\varphi^x_{Mt}) = 0$.

In each period, there is a mass of potential entrants that draw their productivity from a cumulative distribution $G_j(\varphi)$ and a probability density function $g_j(\varphi)$. Denote M^e_{jt} as the mass of potential entrants that pays a sector-specific entry cost to observe their permanent individual productivity. This entry cost is composed of a fixed cost and a variable cost that depends on the current mass of potential entrant firms in the sector.[21] In particular, in sector j, the entry cost is given by $f^e_{jt} = f^e_j + \xi\left(\exp(M^e_{jt} - \overline{M}^e_j) - 1\right)$, where f_{ej} is the fixed entry cost and ξ is a constant governing the size of the variable cost. The parameters $\overline{M}^e_j$ are set to the long-run open economy ($\tau = 0$) steady state sector value of potential entry to eliminate the variable cost component in the long-run. The free-entry condition implies that the expected value of a firm in sector j should equal the sunk cost of entry in the sector:

$$\int_{\varphi^d_{jt}}^{\infty} V_{jt}(\varphi) g_j(\varphi) d\varphi = \phi_{jt}\left[f^e_j + \xi\left(e^{M^e_{jt} - \overline{M}^e_j} - 1\right)\right] \qquad j \in \{S, M\} \tag{20}$$

The time-varying distribution of producers in each sector depends on the mass of surviving producers ($M_{j,t}$) and the mass of potential entrants. In particular,

$$M_{j,t+1}\mu_{j,t+1}(\varphi) = \begin{cases} (1-\delta)M_{jt}\mu_{jt}(\varphi) + M^e_{j,t+1}g_j(\varphi) & \text{if} \quad \varphi \geq \varphi^d_{j,t+1} \\ 0 & \text{otherwise} \end{cases} \qquad j \in \{S, M\} \tag{21}$$

The law of motion that characterizes the mass of producers in sector j and time $t+1$ is:

$$M_{j,t+1} = (1-\delta)M_{jt}\int_{\varphi^d_{j,t+1}}^{\infty} \mu_{jt}(\varphi) d\varphi + M^e_{j,t+1}\int_{\varphi^d_{j,t+1}}^{\infty} g_j(\varphi) d\varphi \qquad j \in \{S, M\} \tag{22}$$

5.4 Equilibrium Conditions

Labor and Capital market. The inelastic household supply of labor L equals labor demand for production and entry costs used in both sectors. That is, $\overline{L} = L_{St} + L_{Mt}$, where $L_{jt} = L^{prod}_{jt} + L^{entry}_{jt}$

[21]The variable entry cost is common in the firm dynamics literature and captures the congestion externalities or competition for a fixed resource at entry, see Fattal Jaef and Lopez (2014) and Benguria, Saffie, and Urzua (2018). Importantly, it does not affect the model's qualitative results and helps avoiding corner solutions and excess volatility in the entry margin.

and $j \in \{S, M\}$. Similarly, the equilibrium condition in the capital market is given by $K_t = K_{St} + K_{Mt}$, where $K_{jt} = K_{jt}^{prod} + K_{jt}^{entry}$ and $j \in \{S, M\}$, where the capital supply is time-varying and predetermined by the household's investment decision in the previous period.

Goods markets. Using the ideal price indexes we can write the market-clearing conditions for service as $P_{St}C_{St} = M_{St}\int_{\varphi_{St}^d}^{\infty} p_{St}(\varphi)q_{St}^d(\varphi)\mu_{St}(\varphi)d\varphi$ and for manufacturing as $P_{Mt}^D C_{Mt}^D = M_{Mt}\int_{\varphi_{Mt}^d}^{\infty} p_{Mt}(\varphi)q_{Mt}^d(\varphi)\mu_{Mt}(\varphi)d\varphi$.

Balance of Payments. The small open economy's net foreign assets position evolves according to:[22]

$$B_{t+1} = (1 + r_t - \tau)B_t + TB_t, \tag{23}$$

where the trade balance – TB_t – can be written as:

$$TB_t = X_{Mt} - C_{Mt}^F - (K_{t+1} - (1 - \delta^k)K_t). \tag{24}$$

That is the trade balance is manufacturing exports (X_{Mt}) less imports of final consumption goods (C_{Mt}^F) less imports of new capital goods.

6 Quantitative Analysis

This section calibrates the quantitative model to the Hungarian economy in order to explore how the relative input-cost and consumption channels can shape the macro effects of a financial liberalization in the medium and long run.

6.1 Calibration

We calibrate the model at an annual frequency to Hungarian micro and macro data, and to standard parameters from the literature. We assume that Hungary reaches a financially open steady state characterized by $\tau = 0$ in the year 2008, and solve the model targeting that equilibrium. The model has 31 parameters that we divide into two groups.

Table 5 lists the first group of 17 parameters that are set directly to match the Hungarian data or to standard values from the literature. We set the international interest rate (r^*) to 4% and the discount factor (β) to 0.95. We choose standard values for the parameters governing risk aversion, substitution between varieties, and depreciation of capital ($\gamma, \eta, \eta_M, \sigma$, and δ). The exogenous exit rates of each sector (δ_S, δ_M) are set to the firm-level sectoral exit rate in the micro data. We set the capital intensity of each sector (α_S, α_M) to the sector level mean of the elasticity derived from the industry-specific productivity estimation. We set the fixed entry costs parameters in each sector (f_S^e, f_M^e) to unity, so that the operation cost is a ratio relative to the entry cost. We set the average log-productivity for the services productivity distribution (μ_S) to 0, so that μ_M captures relative differences in average size

[22] Assuming $B_t \leq 0$ for all t. If the economy saves ($B_t > 0$), then: $B_{t+1} = (1 + r_t + \tau)B_t + TB_t$.

between sectors. For simplicity, the foreign demand scale of each variety (A) is set to unity.[23] We set the parameter governing the variable entry cost (ξ) to 2 in order to avoid corner solutions (without significant impact on the dynamics). Consistent with a fully open economy calibration, we set the capital controls (τ) to zero.

Table 5: Externally-Calibrated Parameters

Parameter	Description	Value	Source
r^*	World interest rate	0.04	Macro Data
β	Discount Rate	0.95	Literature
γ	Risk aversion	2	Corsetti, Dedola, and Leduc (2008)
η	Substitution C_M-C_S	0.50	Comin, Lashkari, and Mestieri (2018)
η_M	Substitution C_M^D-C_M^F	0.85	Corsetti, Dedola, and Leduc (2008)
σ	Substitution M varieties	3.8	Ghironi and Melitz (2005)
δ^k	Depreciation of capital	0.12	Macro Data
δ_S	Exogenous exit rate M	0.11	Micro data
δ_M	Exogenous exit rate S	0.08	Micro data
α_S	Capital Share S Sector	0.30	Micro data
α_M	Capital Share M Sector	0.36	Micro data
f_S^e	Fixed entry cost S	1	normalization
f_M^e	Fixed entry cost M	1	normalization
ξ	Variable entry cost	2	small[24]
μ_S	Mean prod dist S	0	normalization
A	Foreign demand for M	1	normalization
τ	Capital control tax	0	na

A second group of 14 parameters is internally calibrated, i.e., the parameters are chosen so that the model matches particular moments or targets. Table 6 presents the result of the calibration. Although every moment is affected by every parameter, we can point to some strong economic relationships between particular moments and particular parameters. The consumption share of services disciplines the weight of services in the aggregate basket ($\theta_S = 1 - \theta_M$), and the share of domestic manufacturing consumption is related to the weight of domestic manufacturing on the manufacturing basket ($\theta_D = 1-\theta_F$).[25] The mean of the log-productivity entry distribution in the manufacturing sector determines the relative mass of firms between sectors. Intuitively, on average, manufacturing firms are larger and more productive; hence, few firms can produce a large share of production. The fixed operating costs (f_M^d, f_S^d) along with the standard deviations of the log-productivity entry distribution (Σ_M, Σ_S) determine the distribution of value-added within and across sectors. In particular, we target inter-quantile ranges and relative moments of this distribution. The fixed exporting cost in manufacturing (f_x) is used to discipline the fraction of exporters in the manufacturing sector. The parameters governing the non-homotheticity of the preferences (ϵ_S, ϵ_M) are used to target the average income elasticity for services and manufacturing estimated by Bils, Klenow, and Malin (2013) for U.S. sectors. The pass-through of debt to the spread (ψ) determines the steady-state level of debt of the economy, and, hence, it is used to target the trade surplus of the Hungarian economy. Labor supply ($\bar{L}$) is set so that nominal GDP equals unity in the steady state. The centrality parameters of the congestion externality in the entry

[23] Because we target the trade balance and the fraction of exporters, other values for A just change the level of entry cost into exporting and debt elasticity.

[25] Because there are 8 times more services firms than manufacturing firms, a small θ_S generates a large share of consumption by services.

cost $(\overline{M}_S^e, \overline{M}_M^e)$ are set internally to the open economy entry levels so that there are no congestion externalities in the long-run absent any capital controls.

Table 6: Internally Calibrated Parameters: Open Steady State

Parameter	Description	Value	Target	Data	Model
θ_S	Share C_S in C	0.18	$(P_S \cdot C_S)/(P \cdot C)$	0.59	0.59
θ_D	Share C_M^D in C_M	0.63	$(P_M^D \cdot C_M^D)/(P_M \cdot C_M)$	0.64	0.64
μ_M	Mean Prod. dist. M	2.32	M_S/M_M	8.10	8.10
f_S^d	Fixed operating cost M	0.03	$\log(VA_S^{p75}) - \log(VA_S^{p50})$	1.10	1.10
f_M^d	Fixed operating cost S	0.14	$\log(VA_M^{p75}) - \log(VA_M^{p50})$	1.35	1.35
Σ_S	Std. Prod. dist. S	1.08	$\log(VA_M^{p50}) - \log(VA_S^{p50})$	1.13	1.12
Σ_M	Std. Prod. dist. M	2.06	$\log(VA_M^{p25}) - \log(VA_S^{p25})$	1.02	1.03
f_M^x	Fixed exporting cost M	13.03	$\frac{1-G(\varphi_M^x)}{1-G(\varphi_M^d)}$	0.13	0.13
e_S	Income Elasticity S	1.58	Bils, Klenow, and Malin (2013)	1.15	1.15
e_M	Income Elasticity M	0.97	Bils, Klenow, and Malin (2013)	0.78	0.78
ψ	Debt-Elasticity	0.01	TB-to-GDP TB/Y	0.02	0.02
$\overline{L}$	Labor supply	2.9e-4	Nominal GDP Y	1	1
$\overline{M}_S^e$	Convex entry cost S	3.5e-4	Open SS Value	na	na
$\overline{M}_M^e$	Convex entry cost M	5.8e-4	Open SS Value	na	na

Table 6 indicates that the manufacturing sector is more capital-intensive, but has a lower income elasticity, compared to the service sector. Therefore, we would expect that the manufacturing sector expands more from the increase in investment, but less from the front-loading of consumption.

The reminder of this section explores the calibrated economy to study the medium-run and long-run effects of financial liberalizations. In order to give the economy reasons to borrow, we select as the initial condition an economy in which capital is practically at 60% of its long-run autarky level. Then, we set $\tau > \bar{\tau}$, where $\bar{\tau}$ is the smallest level of capital controls that prevents borrowing from the household along the path, and solve for a transition with a closed current account, and balanced trade, in every period. With this financial autarky baseline, we then study an unexpected financial liberalization, in which capital controls are removed completely and permanently – setting $\tau = 0$. This allows the economy to smooth consumption by supporting trade imbalances and borrowing in the long-run.

6.2 Model Validation

In order to validate the calibrated model, we compare the model's predictions with the Hungarian post-financial liberalization experience (2001-2008). For the Hungarian data, we estimate differences with respect to the trend by regressing the variable on a time trend and a dummy for the reform period, i.e., $y_t = \alpha \mathrm{FL}_t + T_t + \varepsilon_t$, where $\mathrm{FL}_t = 1$ if year ≥ 2001 and 0 otherwise, and T is a time trend. In the model, we calculate the average difference between the liberalization path and the financial autarky path in the seven periods following liberalization. Recall that the calibration does not use any information from the Hungarian economy along its transition path. Table 7 compares the model and data along seven non-targeted dimensions.

The table shows that the model is able to replicate the increase in the share of services at the onset of the reform in terms of value added, employment and consumption. The model also captures the

Table 7: Non Targeted Moments

	Model	Data
	(1)	(2)
Interest rate	-0.053	-0.035*
		(0.019)
Capital (log diff)	0.215	0.064*
		(0.034)
Share of consumption in services	0.009	0.009*
		(0.004)
Share value added in services	0.016	0.038*
		(0.021)
Share employment in services	0.037	0.039*
		(0.021)
Relative entry rate (S/M)	0.004	0.153**
		(0.063)
Relative price index (S/M) (log diff)	0.014	0.047***
		(0.013)

Note: *, **, *** significant at 10, 5, and 1 percent. Std. errors in parenthesis. Coefficients in column 2 are computed in a regression of the variable on a time trend and a dummy for the reform period: $y_t = \alpha \text{FL}_t + T_t + \varepsilon_t$, where $\text{FL}_t = 1$ if year ≥ 2001 and 0 otherwise. Relative consumption data comes from OECD expenditure of households data. Interest rate and wage data come from the World Bank data.

increase in the relative price of services. The macro moments of the model are also comparable with the data, as capital increases and the interest rate decreases. Therefore, the model economy correctly captures the main qualitative features of the reallocation of resources at the onset of the transition. The next section describes the forces at play during the transition to the open economy steady-state, and explores the micro and macro dynamics that a financial liberalization can trigger.

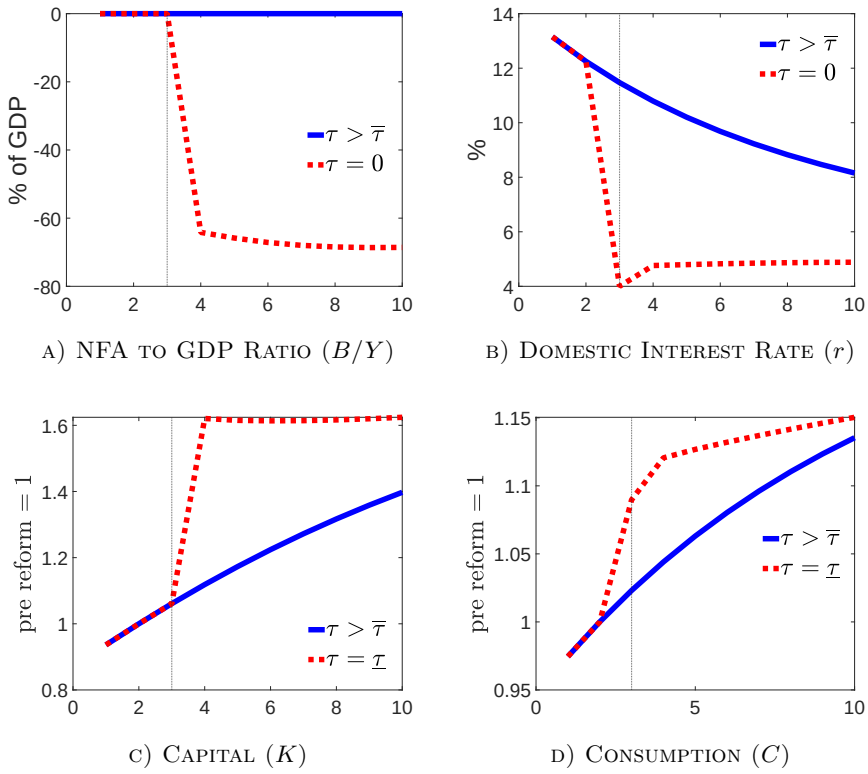
6.3 Macro and Micro Dynamics in the Short-Term

To study the impact of a reduction in capital controls, we start with an economy in financial autarky that is transitioning to its steady state. The economy then does an unexpected and permanent decrease in capital controls that lowers the tax on foreign borrowing to zero. This shock triggers dynamics at both the macro and micro levels.

At the macro-level, the reduction in capital controls promotes investment and consumption growth. Investment increases because the reduction in the tax for foreign borrowing lowers the domestic interest rate, which – becoming lower than the autarky rental rate – encourages the household to borrow internationally to invest in physical capital. This is the relative input-cost channel that promotes capital accumulation. Consumption increases for two reasons. First, the increased rate of capital accumulation raises the permanent income of the economy. Second, the lower interest rate encourages an intertemporal shift of consumption to the present. These two forces will also lead to higher international borrowing,

in part because current income does not rise as much as permanent income. Hence, both higher capital accumulation and higher consumption lead to increased international borrowing.

These dynamics are plotted in Figure 4, which shows the dynamics of the domestic interest rate, the net foreign asset position (NFA) as a share of GDP, the consumption level, and the capital level for an economy in financial autarky that transitions to its steady-state, and for an economy that starts on the autarky transition path, but then, in the third year, has the financial liberalization. The economy in financial autarky is depicted by the solid blue line, which shows that – as the economy transitions and accumulates more capital – the interest rate decreases and consumption increases. The dashed red line shows the dynamic of the economy hit by the liberalization. Panel A shows that the liberalization triggers international borrowing, and a deterioration of the net foreign asset position of the country. The expansion in foreign borrowing is accompanied by a decrease in the domestic interest rate, higher capital accumulation and consumption (panels B, C and D). Note that, in the year of the liberalization, the domestic interest rate is lower than in the subsequent years after the reform. This rebound in the interest rate is driven by the dynamic of the risk premium. When the economy opens to international flows, its foreign debt is nil and, hence, the risk premium is zero (equation 10). As the economy borrows internationally, the risk premium increases and, with it, the domestic interest rate. Yet, because the interest rate is always lower than the financial autarky rate, there is capital accumulation at a faster rate than under autarky.



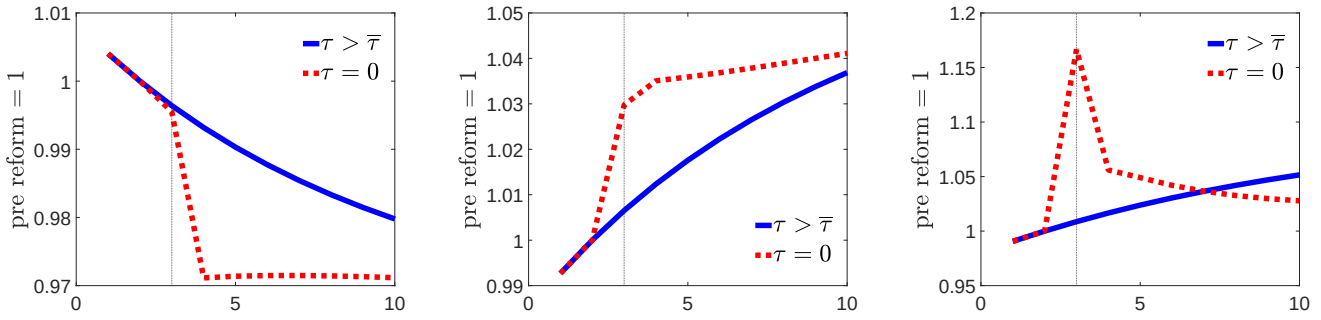
A) NFA to GDP Ratio (B/Y) B) Domestic Interest Rate (r)

C) Capital (K) D) Consumption (C)

Figure 4: Relative Input-Cost and Consumption Channels in the short term

Note: This figure shows the dynamics of the domestic interest rate (top left), the net foreign asset position over GDP (top right), the consumption level (left bottom), and the capital level (right bottom). The blue and solid line corresponds to an economy in financial autarky and the red and dashed line corresponds to a financially open economy.

The relative input-cost and consumption channels imply intricate dynamics at the micro level, and trigger reallocation effects across sectors. The reduction in capital controls affects the manufacturing input-bundle cost relative to that of services – $\frac{\phi_M}{\phi_S}$ – and lowers the relative cost of production of manufacturing goods (Panel A in Figure 5). This lower relative production cost stems from the lower rental rate of capital and higher wages owing to higher capital accumulation. Hence, the relative input-cost channel favors the manufacturing capital-intensive sector. In parallel, increased aggregate consumption raises demand relatively more for goods with a high income elasticity, encouraging production of service goods. These two forces – relative input-cost and (non-homothetic) consumption forces – compete with one another and can shift resources to manufacturing or services depending on which force dominates. As Figure 5 shows, in the short-term, the consumption channel dominates and resources reallocate towards services. Upon the liberalization, the consumption share of services increases, which is parallel to an increase its production share (Panels B and C).



A) Relative Cost Ratio ($\frac{\phi_M}{\phi_S}$)

B) Consumption share of Services ($\frac{P^S \times C^S}{P \times C}$)

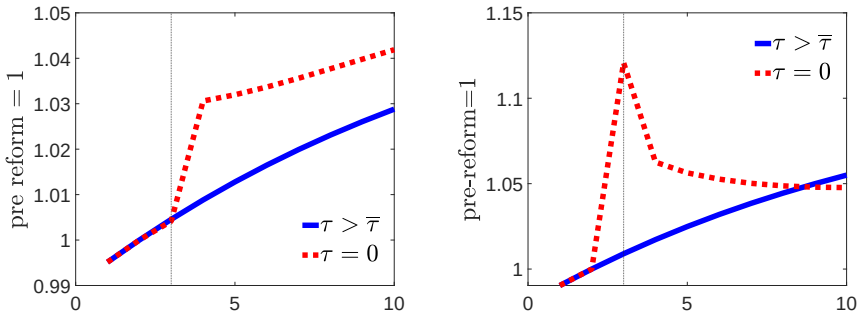
C) Production share of Services ($\frac{P^S \times C^S}{P^S \times C^S + P_D^M \times C_M^D + XM}$)

Figure 5: Reallocation across Sectors in the short term

Note: This figure shows the dynamics of the relative cost ratio (left), the consumption share of services (middle) and the production share of services (right). The blue and solid line corresponds to an economy in financial autarky and the red and dashed line corresponds to a financially open economy.

This higher consumption of services raises the relative price of services and the ideal price index (Panels A and B in Figure 6), which induce a real exchange rate appreciation.

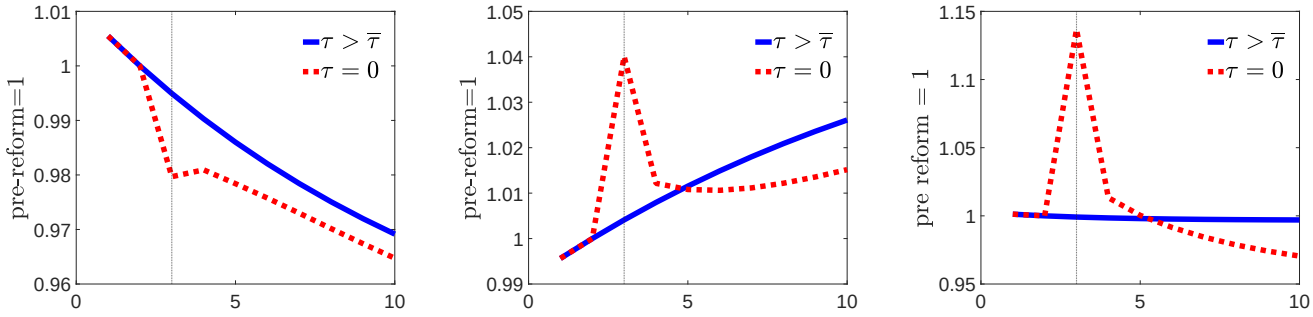
There are also reallocation effects within sectors. Higher consumption of services increases expected profits and expands the extensive margin. As Panels A and B in Figure 7 show, there is a decrease in the relative cut-off for producing ($\frac{\varphi_s^d}{\varphi_M^d}$) and an increase in the relative entry rates in services. Conversely, in manufacturing, resources shift to large and productive firms. The higher demand for services, which have a high income elasticity, shifts demand away from manufacturing products, which reduces the market share of these goods. Among manufacturing firms, resources shifts towards domestic production. Because foreign demand is constant in this small open economy, but domestic demand has increased, manufacturing firms shift their production towards the domestic market. As Panel C in Figure 7, there is an increase in the cut-off for exporting in the short term. This shift in production away from exports is the flip side of a real exchange rate appreciation, which arises from the increase in wages and the relative price of services.



A) Relative Price ($\frac{P_S}{P_M^D}$) B) Ideal Price Index (P)

Figure 6: Relative Price and Ideal Price Index in the short term

Note: This figure shows the dynamics of the relative price of service-to-manufacturing goods (left) and the ideal price index (right). The blue and solid line corresponds to an economy in financial autarky and the red and dashed line corresponds to a financially open economy.



A) Relative Domestic Production Cut-off $\left(\frac{\varphi_S^d}{\varphi_M^d}\right)$ B) Relative Entry Rate ($\frac{S}{M}$) C) Relative Cut-offs within Manufacturing $\left(\frac{\varphi_M^x}{\varphi_M^d}\right)$

Figure 7: Reallocation Within Sectors in the short term

Note: This figure shows the dynamics of the relative domestic production cut-offs (left), the relative entry rate (middle), the relative cut-offs in the manufacturing sector (right). The blue and solid line corresponds to an economy in financial autarky and the red and dashed line corresponds to a financially open economy.

In sum, the liberalization leads to a short-term boost in capital accumulation, consumption and foreign borrowing. Because the consumption channel dominates the relative input-cost channel, consumption and production shift towards services. The liberalization, then, triggers resources reallocation across sectors and towards services. There is also reallocation within sectors. The higher demand for services allows expanding the extensive margin, encouraging the entry of small firms in the services sector. Conversely, the lower relative demand for manufacturing goods increases the relative cut-off for producing in this sector, which increases exit. Among surviving manufacturing firms, the real exchange appreciation and increased domestic demand shift resources away from exports towards domestic production. In Appendix F, we assess an economy that gradually opens to capital flows and show that these short-term effects are more persistent in a sequential liberalization compared to a one-time reform.[26]

[26]This sequential liberalization can be thought as mimicking an economy that only gradually takes advantage of access

6.4 Permanent Effects of Financial Liberalization

The size of the reduction of capital controls has implications for the characterization of the transition path, as well as of the long-run steady state. A modest liberalization episode would induce an economy to accumulate foreign debt along the transition, but the economy will return to financial autarky in the long-run. However, a larger liberalization can result in long term foreign debt in the new steady-state.

To understand this point, consider an economy that has a tax on foreign financial transactions high enough such that the rental rate of capital net of depreciation is lower than the domestic interest rate at $t = 0$, i.e. $r_0^k - \delta < r = r^* + \tau$. Therefore, the cost of borrowing from abroad is higher than the return of capital; the optimal decision for the household is not to issue foreign debt. Because the household accumulates capital along the transition path, $r_0^k > r_t^k$, $\forall t > 0$. Thus, this economy follows a path of financial autarky and balanced trade until it reaches its steady state.

Now, consider two alternative levels of capital controls. First, define $\bar{\tau}$ to be the tax rate that makes the household marginally indifferent from issuing foreign bonds at $t = 0$ when $B_0 = 0$: $\bar{\tau} = r_0^k - \delta - r^*$. Note that the long-run return to capital in any long-run steady state has to satisfy $r_{ss}^k - \delta = \frac{1}{\beta} - 1$. Second, define $\underline{\tau}$ as the tax rate that makes the household marginally indifferent about holding debt in the long run; that is: $\underline{\tau} = \frac{1}{\beta} - 1 - r^* \leq \bar{\tau}$. Then, for any initial condition characterized by $r_0^k\left(K_0, M_{j0}, \mu_{j0}, B_0 = 0\right)$, we can define three potential types of transition paths:

1. **Financial Autarky**: $\forall \tau, \tau \geq \bar{\tau}$ the economy is closed to international financial markets. In this case, $\forall t > 0$, foreign bond holdings are $B_t = 0$.

2. **Transitional Debt (long-run financial autarky)**: $\forall \tau, \underline{\tau} \leq \tau < \bar{\tau}$ the economy is closed to international financial markets in the long-run. In this case, $\forall t$, $T > t > 0$, foreign bond holdings are $B_t < 0$, and $B_t = 0$ for $t \geq T$, with T being the final period of the transition.

3. **Long-Run Debt (full financial openness)** $\forall \tau, 0 \leq \tau < \underline{\tau}$ the economy is open to international financial markets. In this case, $\forall t > 0$, foreign borrowing B_{t+1} adjusts to eliminate arbitrage opportunities. Hence, foreign borrowing is implicitly defined by:

$$1 + r_{t+1}^k - \delta^k = \left(1 + r^* + \tau + \psi \cdot (e^{-B_{t+1}} - 1) - \psi B_{t+1} \cdot e^{-B_{t+1}}\right) \tag{25}$$

   In particular, in the long-run bond holdings B_{ss} are given implicitly by:

$$\frac{1}{\beta} = \left(1 + r^* + \tau + \psi \cdot (e^{-B_{ss}} - 1) - \psi B_{ss} \cdot e^{-B_{ss}}\right) \tag{26}$$

   When $B_{ss} < 0$, trade is not balanced in the long-run steady-state, and the economy must run a trade surplus of $-r_{ss} B_{ss}$.

Figure 8 illustrates the three regions in $(\tau - K_0)$ space for given initial firm distributions and no initial debt holding. The function $\bar{\tau}\left(K_0\right)$ maps the location of the level of capital control that leaves an economy with initial capital K_0 marginally indifferent between borrowing or not at the beginning

to international capital flows. For example, a mixture of consumption habit and capital adjustment costs can also smooth the initial spike and make the short-run effects more persistent.

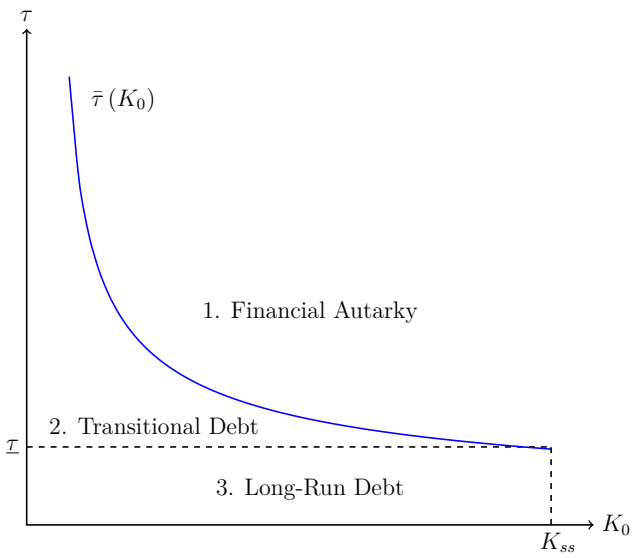


Figure 8: Initial Endowment, Capital Controls, and Borrowing

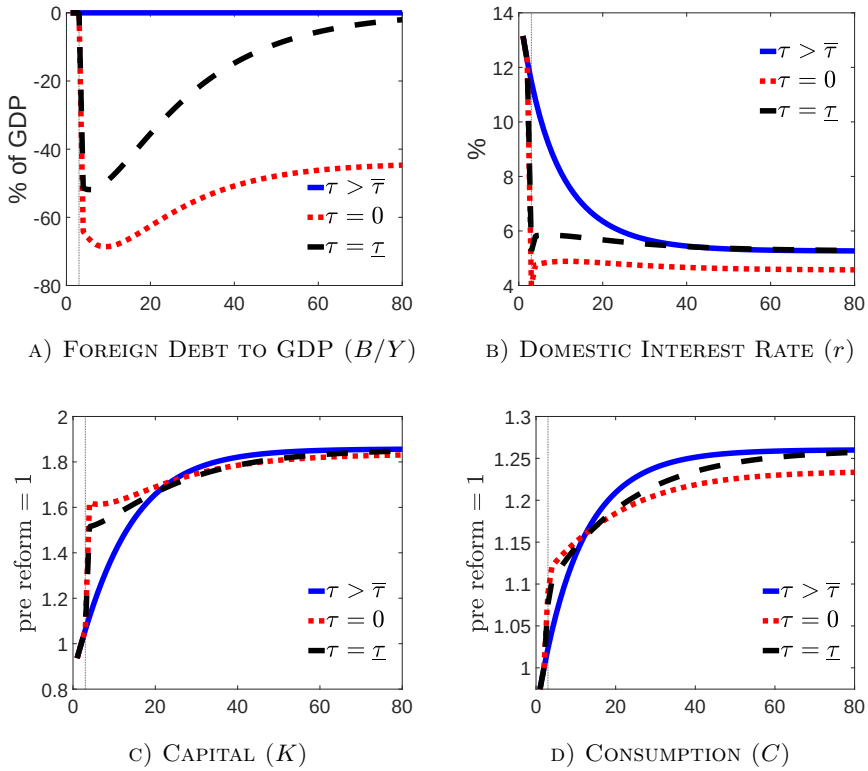
Note: This figure illustrates the function $\bar{\tau}(K_0)$ fixing the other initial states. It also depicts the level of capital control $\underline{\tau}$ below wish long-term borrowing is supported. These curves are used to show three regions: 1) financial autarky, 2) Transitional Debt, and 3) Long-run Debt.

of the transition. The figure also shows the level $\underline{\tau}$, independent of the initial conditions, above which no long-run debt can be supported. Note that as the initial capital approaches its steady state level, $\bar{\tau}(K_0)$ converges to $\underline{\tau}$. In addition, as capital approaches 0, $\bar{\tau}(K_0)$ increases to infinity and any level of capital control can support transitional debt.

To illustrate how these different regions imply heterogeneous transition paths and long-run equilibria, we study the macroeconomic dynamics for two types of unexpected financial reforms. First, we study a moderate financial liberalization that decreases capital control from $\tau > \bar{\tau}$ to $\tau = \underline{\tau}$. This reform maximizes transitional borrowing dynamics without sustaining borrowing in the long-run. Second, we study a large financial liberalization that sets $\tau = 0 < \underline{\tau}$. This last reform generates transitional and long-run borrowing dynamics, and results in a new steady state of the economy. The short-run consequences of this reform was what we studied in the previous sub-section.

Figure 9 shows the net foreign asset to GDP ratio, the domestic interest rate, physical capital, and the consumption paths for these two alternative reforms and compares them with a transition under financial autarky (the solid blue line). Consistent with Figure 8, the moderate liberalization – the dashed black dashed line – does not support long-run borrowing (Panel A). Therefore, this economy reaches exactly the same steady state as the financially closed economy. The moderate financial liberalization only accelerates the transition and allows for consumption to tilt towards the initial periods. Panel A also shows that the large liberalization (dotted red line) entails a new steady-state characterized by a sustainable level of debt. After the sharp increase in borrowing that finances capital and consumption growth, the debt level stabilizes at a new long-run level. At this new steady-state, the economy must transfer resources to the rest of the world, i.e., run a trade surplus; hence, consumption, in particular, and also capital, are lower than in the financial autarky steady state (Panels C and D).

The large liberalization (dotted red line) case above is the maximum liberalization that can occur



A) Foreign Debt to GDP (B/Y) B) Domestic Interest Rate (r)

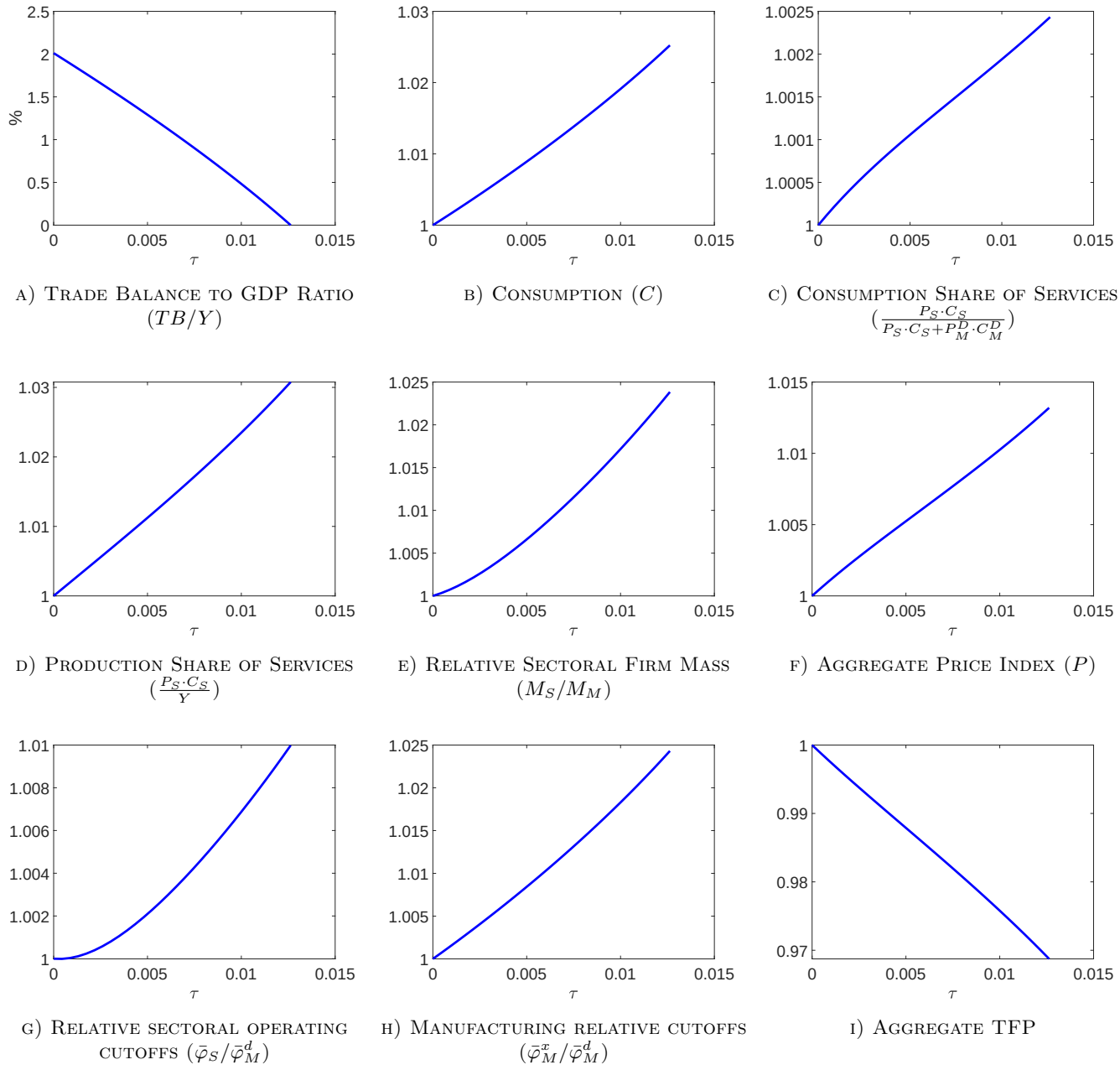
C) Capital (K) D) Consumption (C)

Figure 9: Medium and Long-Term Adjustments of Macroeconomic Aggregates

Note: This figure shows the long-term dynamics of the domestic interest rate (top left), the net foreign asset position over GDP (top right), the consumption level (left bottom), and the capital level (right bottom). The solid blue corresponds to an economy in financial autarky; The dashed black line corresponds to the moderate liberalization economy, and the dotted red line corresponds to the large liberalization economy.

($\tau = 0$). More broadly, any reform that brings capital controls below $\underline{\tau}$ will lead to long-run debt. The lower the level of the post-liberalization capital control tax τ, the higher the long-run debt, as given by Equation (26). Servicing the long-run debt requires, of course, a positive trade balance in the long-run. Because exporting is only possible in the manufacturing sector, this implies that the manufacturing sector is larger in the long-run relative to that in an economy with no long-run debt (and balanced trade). In addition to this between-sector reallocation, long-run debt also has consequences for within-sector reallocation between firms. In particular, long-run debt reallocates resources towards exporters within manufacturing.

To further explore the between-sector and within-sector reallocation, we compare long-run steady states with different sizes of capital control tax τ. The results are shown in Figure 10. As stated above, to sustain long-run borrowing, economies with larger reforms (lower τ) exhibit a larger long-run trade balance (Figure 10a) and lower long-run consumption (Figure 10b). The lower income elasticity in manufacturing, coupled with the slight decrease in long-run consumption, implies a modest shift of the consumption basket towards manufacturing goods (Figure 10c). Because only manufacturing output is tradable and the higher long-run debt is serviced by exporting, production is shifted further towards manufacturing (Figure 10d). Consequentially, an economy with larger debt holding must also have more



A) Trade Balance to GDP Ratio (TB/Y)

B) Consumption (C)

C) Consumption Share of Services ($\frac{P_S \cdot C_S}{P_S \cdot C_S + P_M^D \cdot C_M^D}$)

D) Production Share of Services ($\frac{P_S \cdot C_S}{Y}$)

E) Relative Sectoral Firm Mass (M_S/M_M)

F) Aggregate Price Index (P)

G) Relative sectoral operating cutoffs ($\bar{\varphi}_S/\bar{\varphi}_M^d$)

H) Manufacturing relative cutoffs ($\bar{\varphi}_M^x/\bar{\varphi}_M^d$)

I) Aggregate TFP

Figure 10: Comparison of Long-Run Steady States

Note: In figures (b)-(i), the values in the open steady state with no capital control tax are normalized to 1.

firms in the manufacturing sector (Figure 10e). Importantly, the lower domestic demand reduces the ideal consumption price, inducing a real exchange depreciation (Figure 10f). Smaller services sectors in more open economies imply a larger services price index relative to manufacturing, which in turn implies the services cutoff shifts left (relative to manufacturing) (Figure 10g). Along with the reallocation towards manufacturing goods, there is reallocation within this sector towards exports. The reduction in the domestic demand relative to the foreign demand, and the real exchange depreciation, imply the export cutoff shifts left. More manufacturing firms export, and existing exporting firms expand.

(Figure 10h). Both of these reallocation exporting effects imply economy-wide long-run productivity gains (Figure 10i). These gains can be sizable, as the fully open economy ends has 3% higher aggregate productivity in the long run when compared to an economy with no long-run borrowing.

Taking Stock and Relationship with the Literature

Our model shows that capital flows imply non-trivial short-run and long-run dynamics in the allocation of resources across and within sectors. At the onset of the liberalization, large capital inflows boost consumption, and tilt consumption and production towards the sector with the higher income elasticity, i.e. services. This reallocation leads to an increase in the extensive margin of services, allowing less productive firms to join the market. The increase in entry of service firms, along with increased consumption, raise the value added share of this sector.

Over time, as the economy transitions to the new open steady-state, the dynamics evolve. In particular, the accumulated debt must be serviced. If the reduction in capital controls is sufficiently small, then all debt accumulated during the transition is repaid and the new steady-state is the same as the one under financial autarky. Instead, if the reduction in capital controls is sufficiently large, then there will be long-run debt in the new steady-state. The economy will continuously transfers resources to foreigners, which implies that production must shift to exportable manufacturing goods. This, in turn, leads to a decrease in the extensive margins in services relative to manufacturing and, as described above, resources reallocating towards the most productive manufacturing firms in the economy. Aggregate productivity increases and is higher than in financial autarky.

These long-run effects complement other forces that can also generate long-run effects following a financial liberalizations. For example, Benigno and Fornaro (2013) consider a two-sector economy in which productivity growth depends on the size of the domestic tradable sector. In their model, financial liberalization tilts domestic consumption towards the nontradable sector, because the economy borrows internationally to import tradable goods. As a result, the long-run technology gap between the economy and the world frontier increases with financial openness. In contrast, following a large liberalization, our model generates endogenous movements in aggregate productivity through reallocation effects within and across sectors (without relying on productivity externalities). In this respect, the effect in our model can be related to the study of commodity cycles in Alberola and Benigno (2017). In their model, because of debt repayment forces, a wealth shock (changes in the price of the commodity good) can trigger permanent differences in the allocation of resources between non-tradable and tradable sectors even in the absence of growth externalities in manufacturing. Both of these papers used perfect competition and representative firm models, ignoring by design the reallocation within manufacturing between exporters and non-exporters.[27] This reallocation among heterogeneous firms is key to rationalize the entry and selection dynamics studied in Section 4. Moreover, firm selection generates permanent productivity effects after a financial liberalization that are independent of any endogenous growth externality.

[27] Benguria, Saffie, and Urzua (2018) do not focus on capital inflows, but their model does generate permanent changes in the allocation of resources between and within sectors after a commodity boom.

7 Conclusion

In our paper, we demonstrate that services play an integral role in the short-run and long-run adjustment of an economy following the capital inflows that accompany a financial liberalization. Services tend to have higher expenditure elasticities, lower capital elasticities, and less tradability, than manufactured goods. Using the census of firms in Hungary, we are able to trace out the dynamics of manufacturing and services firms' adjustment following Hungary's financial liberalization in 2001. A key part of the adjustment is the two channels we have highlighted – the consumption channel, which stems from different expenditure elasticities across firms and sectors, and the input cost channel which stems from different capital elasticities across firms and sectors. Owing to the higher expenditure elasticities, existing services firms grow, and there is increased entry. The latter force is sufficiently strong that value-added per firm in services declines. The forces affecting services are stronger, overall, then the forces that affect manufacturing. The input-cost channel favors manufacturing firms, as they are more capital elastic, and existing firms grow. But, there is also less entry, and the mass of firms declines. Overall, the share of services (manufacturing) in employment and value-added increases (decreases).

Our calibrated model delivers the above short and medium-term firm and sector-level dynamics, even as it also implies at the macroeconomic level that the domestic interest rate falls, the net foreign asset position becomes negative, and consumption and capital accumulation increase. In addition, the relative price of services rises, and the real exchange rate appreciates. We examine our model's implications for the long-run, as well. If the liberalization is sufficiently large, then there will be long-run debt that must be sustained via a trade surplus, in the long-run. This long-run surplus implies another set of dynamics, which, reverses much of the short and medium-term dynamics. For example, in the long-run the trade surplus must occur in manufacturing. As part of the adjustment, the manufacturing exporting cutoff falls; more firms export and existing exporters become larger. There is reallocation to manufacturing, and to manufacturing exporters in particular. A real exchange rate depreciation facilitates this reallocation. Overall, the manufacturing sector becomes larger, and the services sector smaller. Finally, there are important shifts in productivity. Productivity in the manufacturing sector, and aggregate productivity, increase in the long-run, and the increase is larger, the larger the liberalization.

Our model, then, shows how the micro-level and sector-level heterogeneity have implications for the macro-dynamics, and vice versa, and that these micro-macro interrelationships differ in the short-run and the long-run. In the long-run, in particular, aggregate productivity increases only because of the selection effects induced within and across firms.

We have emphasized two important ways in which services firms differ from manufacturing firms. But, there is much more heterogeneity across these firms. Two sources of heterogeneity are skill intensity differences and differences in tradability. Home health care services, for example, have low tradability, while corporate legal services have high tradability. Studying how these sources of heterogeneity serve as transmission mechanisms following a financial liberalization would be useful for future work.

References

Abiad, A., E. Detragiache, and T. Tressel (2010): "A New Database of Financial Reforms," *IMF Staff Papers*, 57(2), 281–302.

Acemoglu, D., and V. Guerrieri (2008): "Capital Deepening and Nonbalanced Economic Growth," *Journal of Political Economy*, 116(3), 467–498.

Aghion, P., F. Zilibotti, M. Peters, and R. Burgess (2019): "Structural Change and Service-led Growth in India," 2019 Meeting Papers 393, Society for Economic Dynamics.

Alberola, E., and G. Benigno (2017): "Revisiting the commodity curse: a financial perspective," *Journal of International Economics*, 108, S87–S106.

Arellano, M., and S. Bond (1991): "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *The Review of Economic Studies*, 58(2), 277–297.

Baqaee, D. R., and E. Farhi (2017): "Productivity and Misallocation in General Equilibrium.," Working Paper 24007, National Bureau of Economic Research.

Beck, T., A. Demirguc-Kunt, and R. Levine (2010): "Financial Institutions and Markets across Countries and over Time: The Updated Financial Development and Structure Database," The World Bank Economic Review 24, The World Bank.

Bekaert, G., C. Harvey, and C. Lundblad (2011): "Financial Openness and Productivity," *World Development*, 39(1), 1–19.

Bekaert, G., C. R. Harvey, and C. Lundblad (2005): "Does financial liberalization spur growth?," *Journal of Financial Economics*, 77(1), 3–55.

Benguria, F., F. Saffie, and S. Urzua (2018): "The Transmission of Commodity Price Super-Cycles," Working Paper 24560, National Bureau of Economic Research.

Benigno, G., N. Converse, and L. Fornaro (2015): "Large capital inflows, sectoral allocation, and economic performance," *Journal of International Money and Finance*, 55, 60 – 87, Macroeconomic and financial challenges facing Latin America and the Caribbean after the crisis.

Benigno, G., and L. Fornaro (2013): "The Financial Resource Curse*," *The Scandinavian Journal of Economics*, 116(1), 58–86.

Bernard, A. B., S. J. Redding, and P. K. Schott (2007): "Comparative Advantage and Heterogeneous Firms," *The Review of Economic Studies*, 74(1), 31–66.

Bils, M., P. J. Klenow, and B. A. Malin (2013): "Testing for Keynesian Labor Demand," *NBER Macroeconomics Annual*, 27(1), 311–349.

Blundell, R., and S. Bond (1998): "Initial conditions and moment restrictions in dynamic panel data models," *Journal of Econometrics*, 87(1), 115 – 143.

Bonfiglioli, A. (2008): "Financial integration, productivity and capital accumulation," *Journal of International Economics*, 76(2), 337–355.

Boppart, T. (2014): "Structural Change and the Kaldor Facts in a Growth Model With Relative Price Effects and Non-Gorman Preferences," *Econometrica*, 82(6), 2167–2196.

Borusyak, K., and X. Jaravel (2018): "The Distributional Effects of Trade: Theory and Evidence from the United States," 2018 Meeting Papers 284, Society for Economic Dynamics.

Broner, F., and J. Ventura (2015): "Rethinking the effects of financial globalization," Economics Working Papers 1128, Quarterly Journal of Economics.

Buera, F. J., and J. P. Kaboski (2009): "Can Traditional Theories of Structural Change Fit the Data?," *Journal of the European Economic Association*, 7(2-3), 469–477.

Buera, F. J., and B. Moll (2015): "Aggregate Implications of a Credit Crunch: The Importance of Heterogeneity," *American Economic Journal: Macroeconomics*, 7(3), 1–42.

Buera, F. J., and Y. Shin (2017): "Productivity Growth and Capital Flows: The Dynamics of Reforms," *American Economic Journal: Macroeconomics*, 9(3), 147–85.

Chinn, M., and H. Ito (2008): "A New Measure of Financial Openness," *Journal of Comparative Policy Analysis*, 9, 309–322.

Comin, D., D. Lashkari, and M. Mestieri (2018): "Structural Change with Long-run Income and Price Effects," CEPR Discussion Papers 12458, C.E.P.R. Discussion Papers.

Corsetti, G., L. Dedola, and S. Leduc (2008): "International risk sharing and the transmission of productivity shocks," *The Review of Economic Studies*, 75(2), 443–473.

Cravino, J., and A. A. Levchenko (2017): "The Distributional Consequences of Large Devaluations," *American Economic Review*, 107(11), 3477–3509.

Cravino, J., and S. Sotelo (2019): "Trade-Induced Structural Change and the Skill Premium," *American Economic Journal: Macroeconomics*, 11(3), 289–326.

Fattal Jaef, R., and J. I. Lopez (2014): "Entry, trade costs, and international business cycles," *Journal of International Economics*, 94(2), 224 – 238.

Fieler, A. C. (2011): "Nonhomotheticity and Bilateral Trade: Evidence and a Quantitative Explanation," *Econometrica*, 79(4), 1069–1101.

Foster, L., J. Haltiwanger, and C. Syverson (2008): "Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability?," *American Economic Review*, 98(1), 394–425.

Ghironi, F., and M. J. Melitz (2005): "International trade and macroeconomic dynamics with heterogeneous firms," *The Quarterly Journal of Economics*, 120(3), 865–915.

Gopinath, G., S. Kalemli-Ozcan, L. Karabarbounis, and C. Villegas-Sanchez (2017): "Capital Allocation and Productivity in South Europe," *The Quarterly Journal of Economics*, 132(4), 1915–1967.

Gourinchas, P.-O., and O. Jeanne (2006): "The Elusive Gains from International Financial Integration," *Review of Economic Studies*, 73(3), 715–741.

Heckman, J. J. (1974): "Shadow Prices, Market Wages, and Labor Supply," *Econometrica*, 42(4), 679–94.

——— (1979): "Sample Selection Bias as a Specification Error," *Econometrica*, 47(1), 153–61.

Henry, P. B. (2007): "Capital Account Liberalization: Theory, Evidence, and Speculation," *Journal of Economic Literature*, 45(4), 887–935.

Herrendorf, B., R. Rogerson, and A. Valentinyi (2013): "Two Perspectives on Preferences and Structural Transformation," *The American Economic Review*, 103(7), 2752–2789.

——— (2014): "Chapter 6 - Growth and Structural Transformation," in *Handbook of Economic Growth*, ed. by P. Aghion, and S. N. Durlauf, vol. 2 of *Handbook of Economic Growth*, pp. 855 – 941. Elsevier.

Herrendorf, B., and T. Schoellman (2015): "Why is measured productivity so low in agriculture?," *Review of Economic Dynamics*, 18(4), 1003 – 1022.

Hoxha, I., S. Kalemli-Ozcan, and D. Vollrath (2013): "How big are the gains from international financial integration?," *Journal of Development Economics*, 103, 90 – 98.

Hsieh, C.-T., and P. Klenow (2009): "Misallocation and Manufacturing TFP in China and India," *Quarterly Journal of Economics*, 124(4), 1403–1448.

Hubmer, J. (2018): "The race between preferences and technology," *Unpublished Working Paper*.

Jorgenson, D. W., and M. P. Timmer (2011): "Structural Change in Advanced Nations: A New Set of Stylised Facts*," *The Scandinavian Journal of Economics*, 113(1), 1–29.

Lane, P., and G. M. Milesi-Ferretti (2018): "The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis," *IMF Economic Review*, 66(1), 189,Äì222.

Levchenko, A. A., R. Ranciere, and M. Thoenig (2009): "Growth and risk at the industry level: The real effects of financial liberalization," *Journal of Development Economics*, 89(2), 210–222.

Melitz, M. J. (2003): "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica*, 71(6), 1695–1725.

Olley, G. S., and A. Pakes (1996): "The Dynamics of Productivity in the Telecommunications Equipment Industry," *Econometrica*, 64(6), 1263–97.

Peters, M. (2020): "Heterogeneous Mark-Ups and Endogenous Misallocation," *Econometrica (forthcoming)*.

Petrin, A., and J. Levinsohn (2012): "Measuring aggregate productivity growth using plant-level data," *The RAND Journal of Economics*, 43(4), 705–725.

Rajan, R. G., and L. Zingales (1998): "Financial Dependence and Growth," *American Economic Review*, 88(3), 559–586.

Reinhart, C. M., and K. S. Rogoff (2014): "This Time is Different: A Panoramic View of Eight Centuries of Financial Crises," *Annals of Economics and Finance*, 15(2), 1065–1188.

Reis, R. (2013): "The Portuguese Slump and Crash and the Euro Crisis," *Brookings Papers on Economic Activity*, pp. 143–193.

Restuccia, D., and R. Rogerson (2008): "Policy Distortions and Aggregate Productivity with Heterogeneous Plants," *Review of Economic Dynamics*, 11(4), 707–720.

Tille, C., and E. van Wincoop (2010): "International capital flows," *Journal of International Economics*, 80(2), 157–175.

Tornell, A., and F. Westermann (2005): *Boom-Bust Cycles and Financial Liberalization*. CESifo Book Series.

Varela, L. (2018): "Reallocation, Competition, and Productivity: Evidence from a Financial Liberalization Episode," *Review of Economic Studies*, 85(2), 1279–1313.

Wooldridge, J. M. (2009): "On estimating firm-level production functions using proxy variables to control for unobservables," *Economics Letters*, 104(3), 112–114.

Empirical Appendices

Appendix A Cross-Country Analysis

In this section we assess whether international financial integration associates with sectoral allocation across countries. In particular, we test if financial liberalization episodes –measured with the Chinn and Ito (2008) index of capital account openness– associates with changes in the share of value added in agriculture, manufacturing and services, using World Bank Data for 163 countries over 1970 to 2015.[28]

A first glance at the data suggests that, indeed, financial liberalization episodes correlate with reallocation of resources towards services to the expense of agriculture and manufacturing. Figure A1 shows that, within the three years before and after the reform, capital account liberalization associates with an increase share of value added share of services activities (blue line on the right axis), and with a parallel decrease in the value added share in agriculture activities (green-dashed line, left axis) and, to a lesser extent, a drop in manufacturing (red-dotted line, left axis).

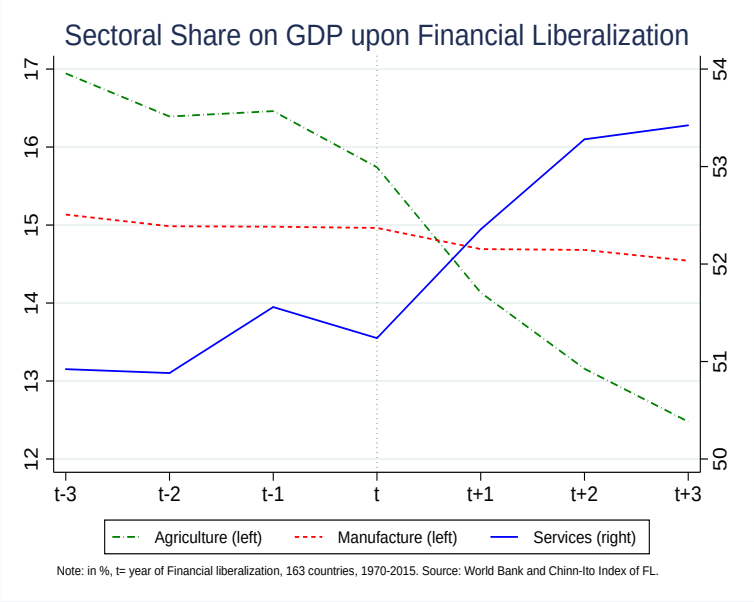


Figure A1: Financial Liberalization: A Cross-Country Analysis

Yet this correlation could certainly be omitting other factors and mislead the real effect of financial liberalization. As extensively discussed in the international economics literature, capital account openness often associates with other reforms, such as trade liberalizations or banking deregulations (see Henry 2007, Bonfiglioli 2008 and Varela 2018 for example). To account for these factors, one could estimate this relationship econometrically by regressing:

$$\log s_{jit} = \alpha \log s_{ijt-1} + \beta FL_{it} + \gamma X_{it} + \varepsilon_{ijt}, \tag{A.1}$$

[28]The Chinn and Ito index uses the Annual Report on Exchange Arrangements and Exchange Restrictions produced by the International Monetary Fund to create a measure accounting for restrictions on capital account and current account transactions. This measure goes from -1.9 to 2.35 –with a standard deviation of 1.52– for closed to fully open economies.

where j, i, t represent sector (agriculture, manufacturing, services), country and year, respectively; s is the value added share in the sector, FL is the measure of financial liberalization; and X_{it} is a vector of controls including trade openness (export+ import/ GDP), government size (government expenditure/ GDP), financial depth (private credit/GDP) and a dummy for financial crisis. Our control data comes from the World Development Indicators of the World Bank and the indicator for financial crisis from Reinhart and Rogoff (2014). The variable $\log s_{ijt-1}$ is the sector's previous year value added share that controls for the sector's specific trend. The variable of interest is β, which captures the effect of financial liberalization on the value added share of each sector.

Nevertheless, estimating equation (A.1) with OLS poses two econometric concerns: simultaneity bias –if sectoral reallocation induces countries to deregulate their capital accounts– and inconsistent estimators due to the presence of lagged dependent variable. To address these issues, we follow the literature on capital account openness (Bekaert, Harvey, and Lundblad 2005 and Bekaert, Harvey, and Lundblad 2011, and Bonfiglioli 2008) and estimate a GMM dynamic panel (Arellano and Bond 1991 and Blundell and Bond 1998), where we employ five years past information of endogenous variables as instrument for current variables. We employ five years non-overlapping panel data to avoid endogeneity issues. The identification assumption is that the five year lags of the sectoral shares are valid instruments for the lagged dependent variable and the financial liberalization measure. In particular, we estimate the following system:

$$d\log s_{jit} = \alpha\ d\log s_{ijt-5} + \beta\ dFL_{it} + \gamma\ dX_{it} + d\iota_t + d\varepsilon_{ijt}, \tag{A.2}$$

$$\log s_{jit} = \alpha\ \log s_{ijt-5} + \beta FL_{it-5,t} + \gamma\ dX_{it-5,t} + \mu_i + \iota_t + \varepsilon_{ijt}, \tag{A.3}$$

where $d\log s_{ijt-5}$ is the log difference between t and $t-5$, variables indexed by $(t-5, t)$ are averages over the period $t-5$ and t, and μ_i and ι_t are country and year fixed effects. The identification strategy is to estimate differences of the endogenous and the pre-determine variables in equation (A.2) with lagged levels, and levels in equation (A.3) with differenced variables. We estimate the system by the two-step Generalized Method of Moments with moments conditions $E[\log s_{jit-5s}(\varepsilon_{it} - \varepsilon_{it-5})] = 0$ and $E[\log z_{it-5s}(\varepsilon_{ijt} - \varepsilon_{ijt-5})] = 0$ for $s \geq 2$ on the predetermined variables z for equation (A.2); and $E[d\log s_{ijt-5}\varepsilon_{ijt}] = 0$ and $E[dz_{it-5}\varepsilon_{ijt}] = 0$ for equation (A.3). We treat both the financial liberalization measure and controls as pre-determined. Instruments would be valid whenever the residuals from equation (A.2) are not second order serially correlated. Then, the coefficients are efficient and consistent where both the moment conditions and the no-serial correlation are satisfied. In order to test for no-serial correlation of the residuals, we employ the Sargan test of over-identifying restrictions. To ensure the consistency of results, we keep countries that report at least ten years of consecutive data.

Table A1 presents the results. Column 1 shows the OLS coefficient of equation (A.1) for the agricultural sector. The estimated coefficient is negative and highly statistically significant, suggesting that financial liberalization associates with a decrease in the value added share of agriculture activities. Columns 2 and 3 confirm this correlation when estimating the dynamic panel. After the inclusion of all controls in column 3, the coefficient implies that one standard deviation increase in the index of financial liberalization (1.52) associates with a 3.9% decrease in the value added share in agriculture activities.

Table A1: Financial Liberalization: A Cross-Country Analysis

	Log share in value added								
	Agriculture			Manufacturing			Services		
	OLS	GMM		OLS	GMM		OLS	GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
FL Index	-0.020***	-0.028*	-0.026***	0.007	0.032**	-0.000	0.010**	0.007**	0.014***
	(0.007)	(0.015)	(0.008)	(0.008)	(0.015)	(0.017)	(0.004)	(0.003)	(0.005)
Trade Openness			-0.363**			-0.136			0.100***
			(0.143)			(0.315)			(0.022)
Government Size			0.337***			0.132			-0.109***
			(0.127)			(0.264)			(0.019)
Financial Depth			-0.041*			-0.017			0.032***
			(0.021)			(0.062)			(0.006)
Financial Crisis			0.034**			-0.103**			0.033***
			(0.015)			(0.051)			(0.006)
Lag Dep. Var.	1.006***	0.983***	1.004***	0.877***	0.827***	0.709***	0.817***	0.807***	0.704***
	(0.009)	(0.040)	(0.027)	(0.027)	(0.047)	(0.132)	(0.037)	(0.028)	(0.023)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	914	914	342	914	914	342	914	914	342
Countries	163	163	62	163	163	62	163	163	62
Sargan (pvalue)		0.410	0.821		0.313	0.220		0.208	0.265

Notes: *, **, *** significant at 10, 5, and 1 percent. All regressions include a constant term. Period 1970-2015. Chinn and Ito (2016) index of Financial Liberalization. Source: World Bank, IMF, Chinn and Ito (2016).

This result implies that, upon the financial liberalization, the value share in agriculture decreases 0.7 percentage points in the average country. Columns 4-6 present the results for the manufacturing sector. Interestingly, the estimated coefficient of the dynamic panel is close to zero and non-statistically significant after the inclusion of all controls in column 6. This insignificant effect is not surprising given that the value added share in manufacturing usually displays a hump shape on country's income per capita (Buera and Kaboski 2009; Jorgenson and Timmer 2011; Herrendorf, Rogerson, and Valentinyi 2014, among others). Lastly, columns 7-9 confirm the increase in services following financial liberalization episodes. In particular, a one standard deviation increase in the level of international financial integration associates with a 2.1% increase in the share of service activities. This expansion implies an increase of 1.1 percentage points for the average country.

We present below several robustness tests and extensions. First, we show in Table A2 that the expansion in value added share of services remains significant in a shorter horizons using a GMM of 3 non-overlapping year panel (columns 1-3). Second, in columns 4-6, we use data from Abiad, Detragiache, and Tressel (2010) who construct a narrowly defined measure of financial openness by focusing on restrictions on capital flows and show that the increase in the share of services change remains true when using this measure.[29] Third, to assess whether the effect of financial integration for manufacturing varies according with the country's level of economic development, in Table A3, we split countries by below and above the median income per capita and re-estimate column 6. For less developed economies, the coefficient is positive and statistically significant suggesting that financial liberalization enhances

[29]In particular, Abiad, Detragiache, and Tressel (2010) create an index indicating: whether the exchange rate system is unified, whether banks are allowed to borrow from abroad, and whether capital outflows are allowed to flow freely.

the manufacturing sector in countries with a low income per capita. The effect is non-significant in developed economies. Finally, Table A3 uses the employment shares as dependent variables and confirms the increase in the share of services following financial openness. Columns 3 and 5 report the decrease in the employment share in agriculture and the increase in this share in services.[30]

Table A2: Financial Liberalization: A Cross-Country Analysis-Robustness

	Log VA Share (3 years)			IMF- Index of FL		
	Agriculture	Manufacturing	Services	Agriculture	Manufacturing	Services
	(1)	(2)	(3)	(4)	(5)	(6)
FL Index	-0.018	0.013	0.007*	-0.111***	0.000	0.014***
	(0.015)	(0.015)	(0.004)	(0.022)	(0.014)	(0.005)
Trade Openness	-0.232	-0.021	-0.015	0.478***	0.049	-0.153**
	(0.171)	(0.238)	(0.054)	(0.143)	(0.223)	(0.074)
Government Size	0.228	0.036	0.007	-0.388***	-0.052	0.112*
	(0.176)	(0.211)	(0.052)	(0.086)	(0.204)	(0.064)
Financial Depth	-0.039	0.024	0.018*	-0.002	-0.001	0.038***
	(0.031)	(0.049)	(0.011)	(0.015)	(0.029)	(0.009)
Financial Crisis	0.03	-0.003	0.003	0.028	0.001	0.014*
	(0.031)	(0.030)	(0.007)	(0.036)	(0.054)	(0.007)
Lag Dependent Variable	0.926***	0.842***	0.747***	0.991***	0.751***	0.795***
	(0.042)	(0.127)	(0.060)	(0.013)	(0.098)	(0.052)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
N	602	602	602	229	229	229
Countries	62	62	62	48	48	48
Sargan (pvalue)	0.638	0.796	0.898	0.318	0.116	0.147

Notes: *, **, *** significant at 10, 5, and 1 percent. All regressions include a constant term. Period 1970-2015. Source: World Bank, IMF, Chinn and Ito (2008) and Abiad, Detragiache, and Tressel (2010).

[30]Note that sectors have a slightly different classification in the employment data of World Bank. In particular, the World Bank uses data from International Labour Organization, ILOSTAT database, which defines industry (instead of manufacturing) as manufacturing, construction and utilities (electricity, gas and water). In consequence, the service data excludes construction and utilities.

Table A3: Financial Liberalization: A Cross-Country Analysis-Extensions

	Log share in value added		Log share in employment		
	Manufacturing		Agriculture	Industry	Services
	(1)	(2)	(3)	(4)	(5)
FL Index	0.041*	0.003	-0.009*	-0.015	0.003*
	(0.022)	(0.064)	(0.005)	(0.014)	(0.002)
Trade Openness	-0.613	-0.936***	0.348***	-0.256	-0.086***
	(0.950)	(0.313)	(0.085)	(0.195)	(0.029)
Government Size	0.735	0.862***	-0.292***	0.256	0.028
	(1.018)	(0.328)	(0.087)	(0.169)	(0.026)
Financial Depth	0.018	0.015	-0.214***	0.043	0.026***
	(0.077)	(0.075)	(0.010)	(0.029)	(0.006)
Financial Crisis	-0.033	-0.023	0.024**	-0.047	0.022***
	(0.054)	(0.048)	(0.010)	(0.043)	(0.003)
Lag Dep. Var.	0.613**	0.792***	0.872***	0.732***	0.840***
	(0.278)	(0.216)	(0.007)	(0.057)	(0.015)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
N	209	127	187	187.000	187
Countries	31	27	63	63	63
Sargan (pvalue)	0.314	0.648	0.236	0.110	0.100

Notes: *, **, *** significant at 10, 5, and 1 percent. All regressions include a constant term. Period 1970-2015. Chinn and Ito (2016) index of Financial Liberalization. Industry: includes construction and utilities (electricity, gas and water) as reported in the WDI. Source: World Bank, IMF and Chinn and Ito (2008) .

Appendix B Structural Estimation

-*Value Added.* To assess the impact of the financial liberalization on firms' value added, we consider the production function $q_{ijt} = \varphi\, k_{ijt}^{\alpha_j} l_{ijt}^{\beta_j}$ and use the optimal capital and labor demand employed in domestic production. In particular, recall that optimal capital and labor demands for variable domestic costs are

$$k_{dj,t}(\varphi) = \frac{\alpha_j}{r_t^k}\phi_{j,t}\left[\left(\frac{p_{j,t}(\varphi)}{P_{j,t}}\right)^{-\sigma}\left(\frac{P_{j,t}}{P_t}\right)^{-\eta}\frac{\theta_j C_t^{e_j}}{\varphi}\right] \quad \text{and} \quad l_{dj,t}(\varphi) = \frac{\beta_j}{w_t}\phi_{j,t}\left[\left(\frac{p_{j,t}(\varphi)}{P_{j,t}}\right)^{-\sigma}\left(\frac{P_{j,t}}{P_t}\right)^{-\eta}\frac{\theta_j C_t^{e_j}}{\varphi}\right].$$

Replacing them into the production function, we obtain

$$q_{jt}(\varphi) = \left[\left(\frac{p_{j,t}(\varphi)}{P_{j,t}}\right)^{-\sigma}\left(\frac{P_{j,t}}{P_t}\right)^{-\eta}\theta_j C_t^{e_j}\right]$$

Applying logs and re-arranging terms,

$$\begin{aligned}\log(q_{ijt}) = \quad & -\alpha_j\sigma\log(r_t^k/w_t) + e_j\log(C_t) + (\sigma-\eta)\log(P_{jt}) + \\ & \underbrace{\sigma\log(\varphi)}_{\text{Firm FE}} - \underbrace{[\sigma(\alpha_j+\beta_j)\log(w_t) - \eta\log(P_t)]}_{\text{Year FE}} + \underbrace{\log(\theta_j)}_{\text{Sector FE}} + \underbrace{B}_{\text{Const.}},\end{aligned}$$

where B is a log constant of parameters. We can re-write equation (B.1) in a panel regression form as

$$\log(q_{ijt}) = -\alpha_j\sigma\log(r_t^k/w_t) + e_j\log(C_t) + (\sigma-\eta)\log(P_{jt}) + \mu_i + \iota_t + \varepsilon_{ijt},$$

where μ_i and ι_t are firm and year fixed effects, and firm-fixed effects absorb all firm and industry time-invariant characteristics.

-*Capital.* We can employ a similar procedure for capital to derive firms' optimal demand for capital for local variable production. Applying logs in the optimal demand for capital and re-arranging terms, we obtain

$$\begin{aligned}\log(k_{dj,t}(\varphi)) = \quad & -(1-\alpha_j+\alpha_j\sigma)\log(r_t^k/w_t) + e_j\log(C_t) + (\sigma-\eta)\log(P_{jt}) + \\ & \underbrace{(\sigma-1)\log(\varphi)}_{\text{Firm FE}} - \underbrace{[\sigma(\alpha_j+\beta_j)\log(w_t) - \eta\log(P_t)]}_{\text{Year FE}} + \underbrace{\log(\theta_j)}_{\text{Sector FE}} + \underbrace{C}_{\text{Const.}},\end{aligned}$$

where C is a log constant of parameters. Writing this equation in a panel regression form gives

$$\log(k_{dj,t}(\varphi)) = -(1-\alpha_j+\alpha_j\sigma)\log(r_t^k/w_t) + e_j\log(C_t) + (\sigma-\eta)\log(P_{jt}) + \mu_i + \iota_t + \varepsilon_{ijt}.$$

This equation shows that, other things equal, a decrease in the relative input prices raises firms' optimal demand for capital, specially more in sectors with higher capital elasticity, e.g. $\frac{\partial\log(k_{i,t})}{\partial\log(r_t^k/w_t)} = -(1-\alpha_j+\alpha_j\sigma) < 0$. Furthermore, increased consumption increases as well the demand for capital,

especially in sectors with higher income elasticity, e.g. $\frac{\partial \log(k_{i,t})}{\partial \log(C_t)} = e_m > 0$. We next re-write this equation in a difference-in-difference estimator form and obtain an equivalent expression for equation (3) with capital as a dependent variable.

Combining firms' capital and labor demand, we can compute a capital intensity of a firm, as $\frac{k_{i,t}}{l_{idj,t}} = \frac{\alpha_j}{\beta_j}\frac{w_t}{r_t^k}$. This expression shows that a decrease in the relative price of capital raises the capital labor ratio, particularly in sectors with high capital elasticity: $\frac{\partial (k/l)_{i,t}}{\partial (w_t/r_t^k)} = \frac{\alpha_j}{\beta_j} > 0$. To estimate the differential impact of the financial liberalization according to firms with different capital elasticity, we follow a similar analysis as above and express this ratio as a difference-in-difference estimator. Since firms' capital intensity is not affected by the income elasticity, after the liberalization firms should not vary their capital intensity as a function of it.

Appendix C Additional Figures and Tables

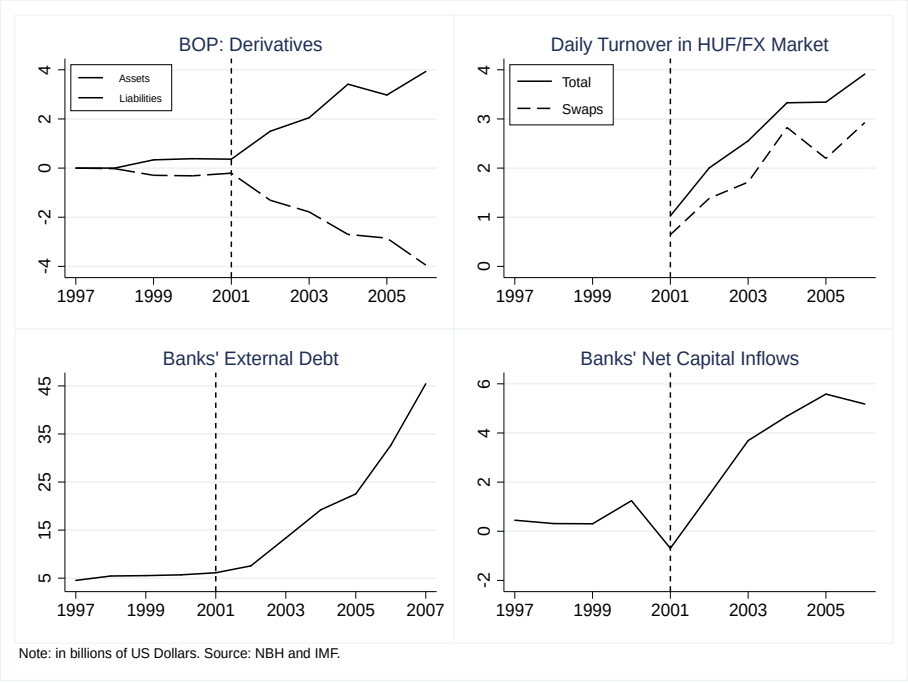


Figure C.1: Capital Flows and Financial Liberalization in Hungary

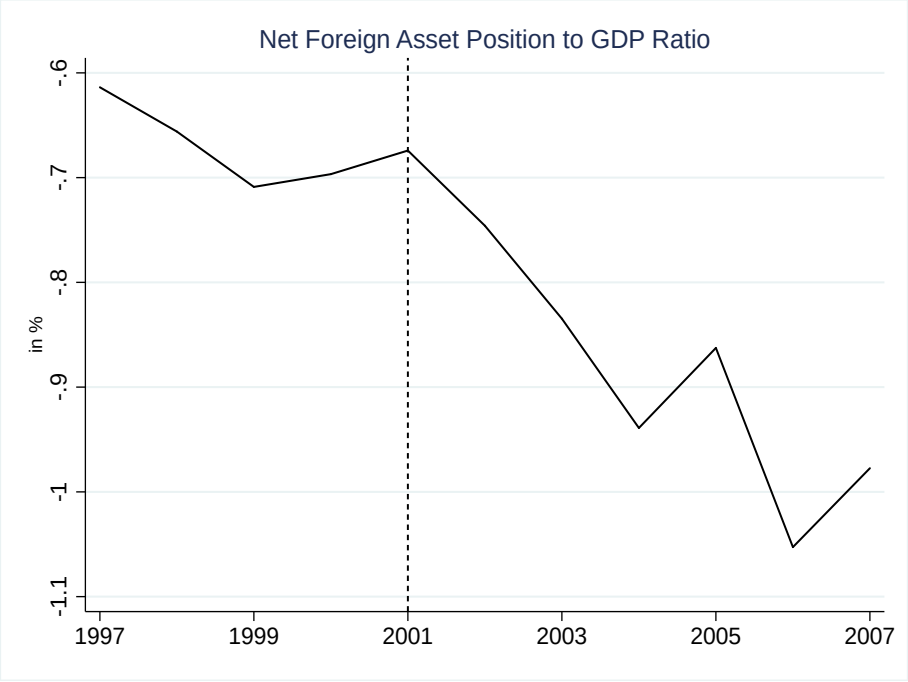


Figure C.2: Hungary: Evolution of Net Foreign Asset Position over GDP

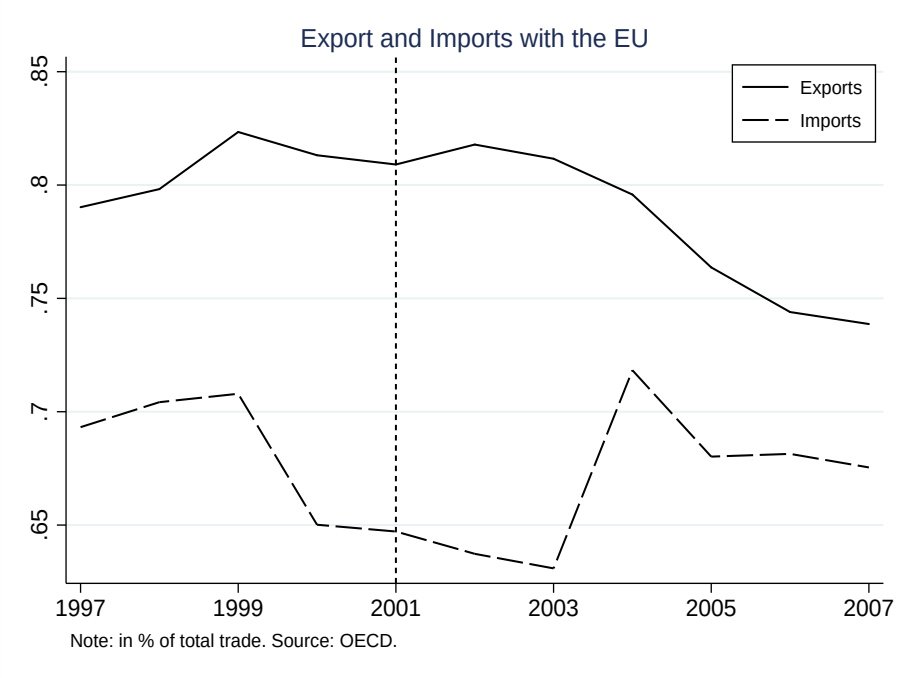


Figure C.3: Hungary: Total Exports and Imports with the EU

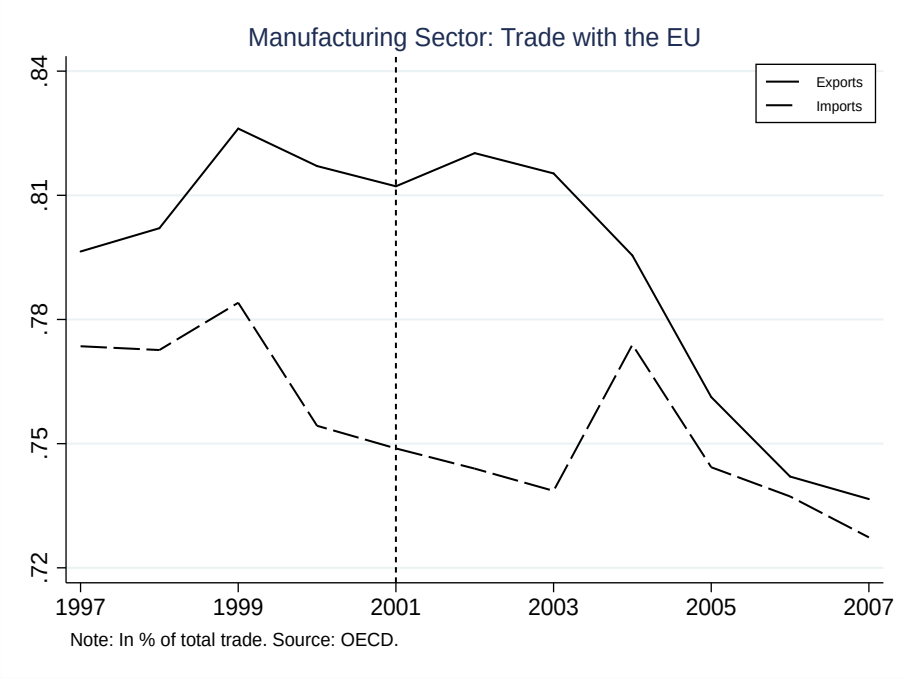


Figure C.4: Hungary: Manufacturing Trade and Exports with the EU

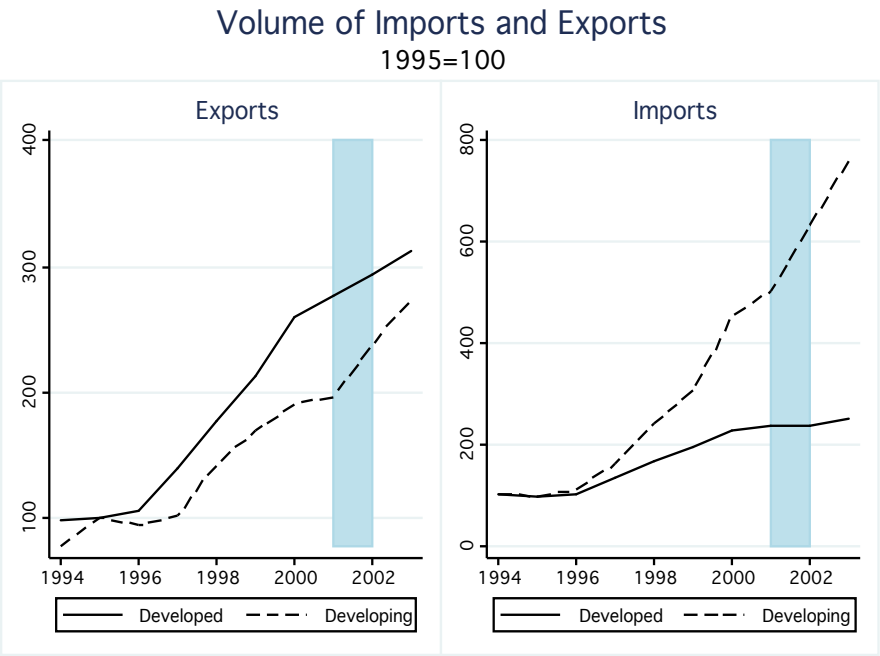


Figure C.5: Hungary: Volume of Trade

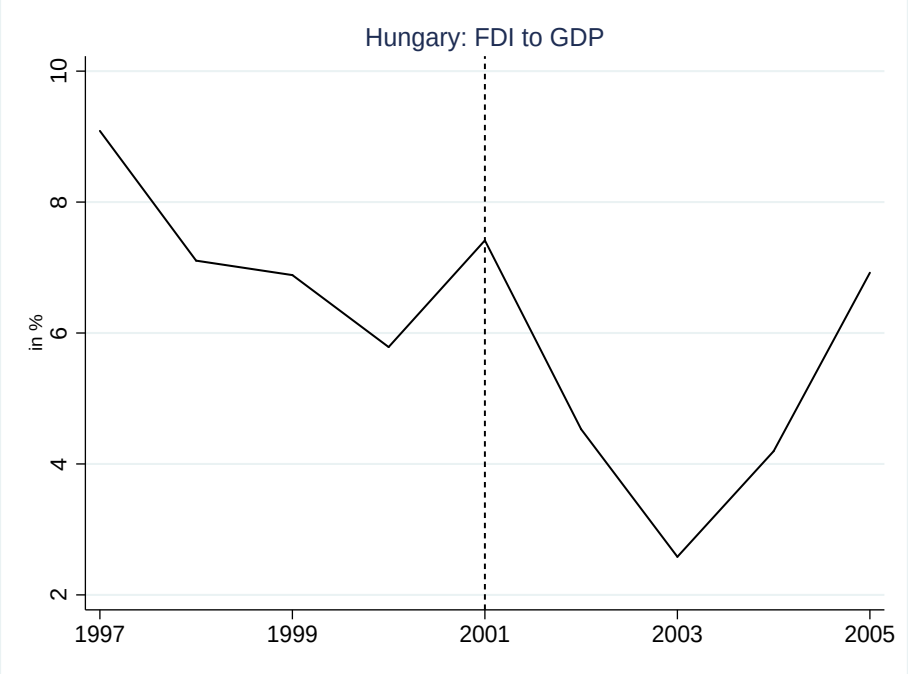
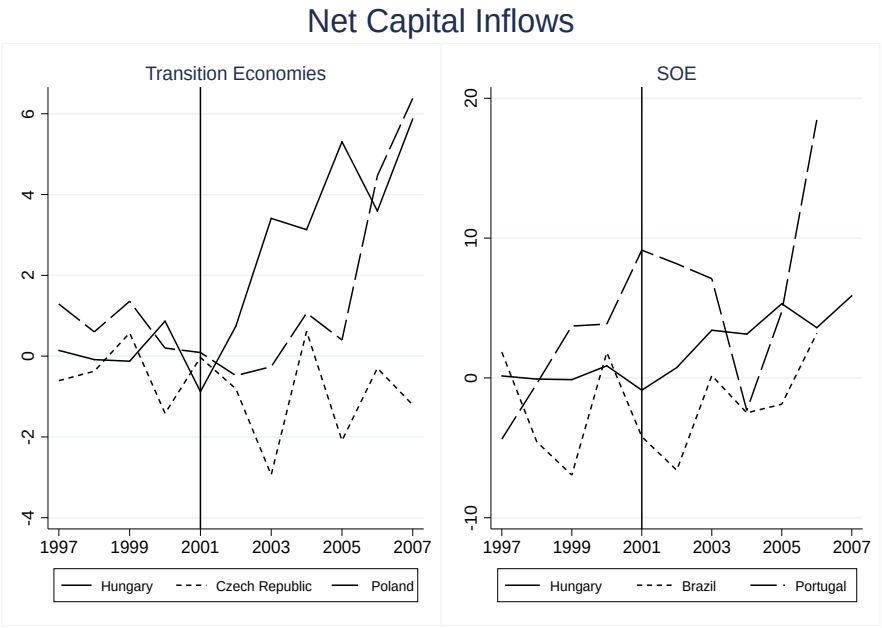


Figure C.6: Hungary: Evolution of Foreign Direct Investment



Note: In billions US dollars. Source: IMF

Figure C.7: Net Capital Inflows to Transition and Small Open Economies

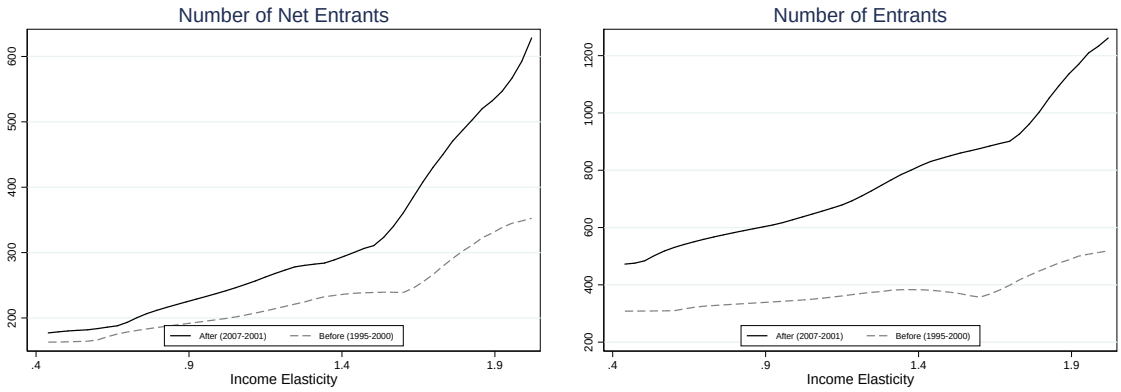


Figure C.8: Net Entrants

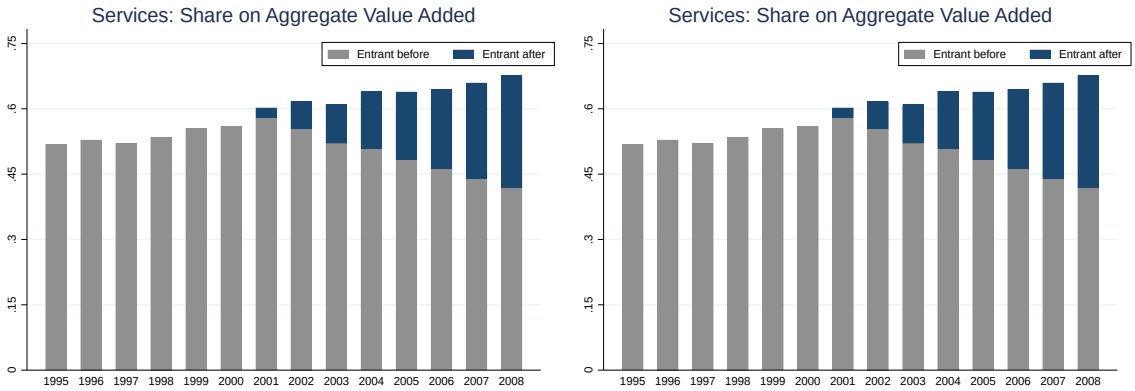


Figure C.9: Entrants Before and After the Financial Liberalization

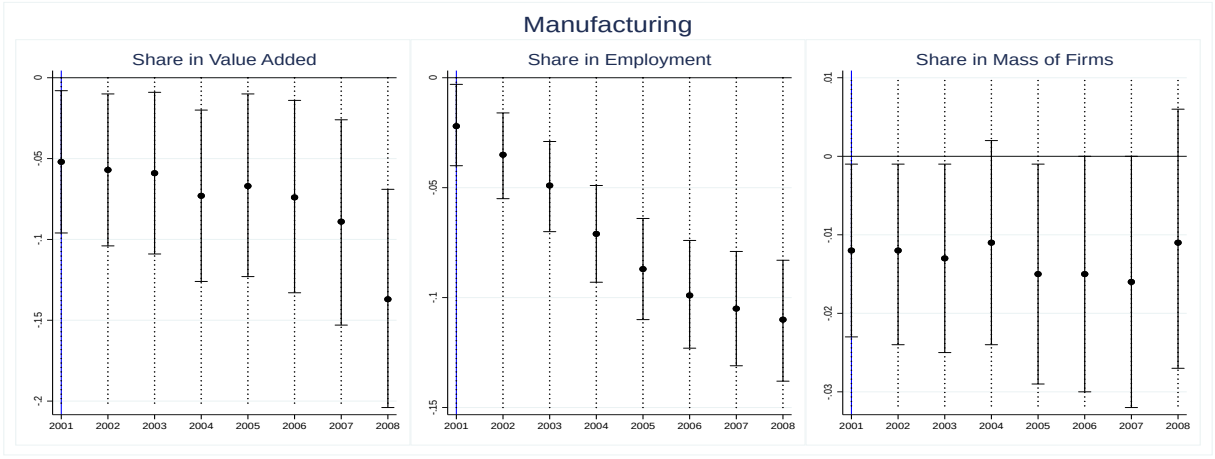


Figure C.10: Reallocation across sectors: Manufacturing Sector

Table C.1: Financial Liberalization and Net capital Inflows

	Before 1995-2000	**After 2001-2008**	Before		After	
			1995-1998	1998-2000	2001-2004	2005-2008
	(1)	(2)	(3)	(4)	(5)	(6)
Financial account (net)*	2.5	8.2	1.2	3.8	6.1	10.4
NFA/GDP	-62	-87	-57	-67	-79	-95
Credit-to-GDP ratio	25	49	23	27	39	59
Lending interest rate	22	10	27	16	11	9
Consumption/GDP	74	77	74	74	77	76

Note: in %. *In billions of USD dollars. Before is 2000 and after is 2004. Source: NBH, IMF, Lane and Milesi-Ferretti (2018).

Table C.2: Capital Elasticities of the Production Function

	Agriculture	Manufacturing	Services
	(1)	(2)	(3)
Mean	0.29	0.36	0.33
Median	0.28	0.36	0.31
Weighted average	0.36	0.36	0.30

Notes: Elasticities of the production function are estimated at four-digit NACE industries following Wooldridge (2009) and Petrin and Levinsohn (2012) methodology for the period 1992-2000. Weighted average is weighted by firms' value added. of the Source: APEH.

Table C.3: Income Elasticity (Bils, Klenow, and Malin 2013)

Sector	Description	Income elasticity
1	Agriculture, hunting and related services	0.44
2	Forestry, logging and related services	0.44
10	Mining of coal and lignite; extraction of peat	0.57
11	Extraction of crude petroleum and natural gas	0.57
12	Mining of uranium and thorium ores	0.57
13	Mining of metal ores	0.57
14	Other mining and quarrying	0.57
15	Manufacture of food products and beverages	0.44
16	Manufacture of tobacco products	0.44
17	Manufacture of textiles	1.1
18	Manufacture of wearing apparel; dressing and dyeing of fur	1.1
19	Tanning & dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	1.1
20	Manufacture of wood & wood products & cork and straw & plaiting materials	0.82
21	Manufacture of pulp, paper and paper products	1.35
22	Publishing, printing and reproduction of recorded media	1.35
23	Manufacture of coke, refined petroleum and nuclear fuel	0.66
24	Manufacture of chemicals, and chemical products	0.9
25	Manufacture of rubber and plastic products	0.8
26	Manufacture of other non-metallic mineral products	0.8
27	Manufacture of basic metals	1.04
28	Manufacture of fabricated metal product, except machinery and equipment	1.04
29	Manufacture of machinery and equipment n.e.c	0.96
30	Manufacture of office machinery and computers	1.03
31	Manufacture of electrical machinery and apparatus n.e.c	0.98
32	Manufacture of radio, television and communication equipment and apparatus	0.98
33	Manufacture of medical, precision and optical instruments, watches and clocks	0.98
34	Manufacture of motor vehicles, trailers	0.89
35	Manufacture of other transport equipment	0.89
36	Manufacture of furniture; manufacturing n.e.c	1.18
37	Recycling	0.49
40	Electricity, gas, steam and hot water supply	0.49
41	Collection, purification and distribution of water	0.49
45	Construction	0.89
50	Sale, maintenance & repair of motor vehicles; retail sale of automotive fuel	0.85
51	Wholesale trade & commission trade, except of motor vehicles & motorcycles	0.85
52	Retail trade, except of motor vehicles and motorcycles; repair of personal & household goods	0.83
55	Hotels and restaurants	1.8
60	Land transport; transport via pipelines	2.02
61	Water transport	1
62	Air transport	1.41
63	Supporting & auxiliary transport activities; activities of travel agencies	1.41
64	Post and telecommunications	0.6
65	Financial intermediation, except insurance and pension funding	1.44
66	Insurance and pension funding, except compulsory social security	1.44
67	Activities auxiliary to financial intermediation	1.44
70	Real estate activities	2.02
71	Renting of machinery & equipment without operator & of personal & household	0.82
72	Computer and related activities	1.35
73	Research and development	1.35
74	Other business activities	1.35
85	Health and social work	1.25
90	Sewage and refuse disposal, sanitation and similar activities	0.69
91	Activities of membership organization n.e.c.	1.79
92	Recreational, cultural and sporting activities	1.79
93	Other services activities	1.18

Notes: Income elasticity from Bils, Klenow, and Malin (2013).

Table C.4: Income Elasticity (Comin, Lashkari, and Mestieri 2018)

	Income Elasticity
Agriculture	0.32
Mining	0.41
Public Utilities	1.59
Construction	1.03
Wholesale and Retail	1.62
Transport, storage, communications	1.44
Finance, insurance, real estate	2.17
Community, social and personal services	1.18

Notes: sectoral elasticities computed relative to manufacturing, which is normalized to 1. Sample: 39 developed and developing economies since 1947. Source: Comin, Lashkari, and Mestieri (2018).

Table C.5: Firms' Characteristics across Sectors

	Mean	Capital Elasticity	Income Elasticity
	(1)	(2)	(3)
Log value added	7.165	7.408***	-0.399***
		(0.225)	(0.018)
Log capital	7.103	6.211***	-0.227***
		(0.249)	(0.019)
Log capital-labor ratio	5.839	5.138***	-0.069***
		(0.214)	(0.019)
Log RTFP	5.139	1.146***	-0.125***
		(0.159)	(0.013)
Log age	1.319	1.058***	-0.127***
		(0.068)	(0.005)
Log export share	0.036	0.415***	-0.007***
		(0.014)	(0.001)
Number of firms	255,008	255,008	255,008

Notes: *, **, *** significant at 10, 5, and 1 percent. This table reports the estimated coefficients from a regression of the log of each variable on the capital and income elasticities for the pre-reform period (1995-2000). The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods and the income elasticity is obtained from Bils, Klenow, and Malin (2013). Source: APEH. Source: APEH.

Table C.6: Growth Rate in the Pre-Reform Period

	Value Added Growth		Capital Intensity Growth		Capital Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Capital Elasticity	-0.210	-0.182	0.050	0.050	-0.061	-0.012
	(0.142)	(0.095)	(0.051)	(0.051)	(0.121)	(0.037)
Income Elasticity	-0.003	0.007	-0.010	-0.011	0.038	0.035
	(0.013)	(0.015)	(0.039)	(0.005)	(0.072)	(0.070)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector * Year FE		Yes		Yes		Yes
N	313,512	313,512	335,895	335,895	335,895	335,895

Notes: *, **, *** significant at 10, 5, and 1 percent. This table reports the estimated coefficients from a regression of the growth rate of each variable on the capital and income elasticities for the pre-reform period (1995-2000). Columns 1, 3 and 5 include sector fixed effect. Columns 2, 4 and 6 add sector-year fixed effects interacted. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods, and the income elasticity is obtained from Bils, Klenow, and Malin (2013). Source: APEH.

Table C.7: Identification Strategy: Survival Ratio

	Capital Elasticity	Income Elasticity
	(1)	(2)
Survival Ratio	0.036	-0.064***
	(0.033)	(0.007)
N	103,555	103,555

Notes: *, **, *** significant at 10, 5, and 1 percent. This table reports the estimated coefficients from a regression of the survival rate between 2000 and 2007 on the capital and income elasticities. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the income elasticity comes from Bils, Klenow, and Malin (2013). All regressions include a constant term. Source: APEH.

Table C.8: Number of Banks in Hungary

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of banks	43	43	43	45	45	45	45	44	44	44	44

Source: National Bank of Hungary.

Table C.9: Firms' Characteristics across Sectors

	Agriculture	Manufacture	Services
	(1)	(2)	(3)
Value Added*	2,058	3,029	1,008
Capital*	5,200	2,140	1,038
Capital Intensity*	1,150	386	358
Employment	5	6	3
Log RTFP	5.40	5.53	5.10
Age	5	5	4
Export Share**	0.19	0.31	0.19
Number of firms	6,925	23,231	115,949

Notes: *in thousands of Forints. ** Conditional on Exporting/Importing. Median values. Average over 1995-2000. Source: APEH.

Table C.10: Firms' Characteristics across Sectors: Difference in Means

	Agriculture	Manufacturing	Services
Log value added	7.618	8.057	6.933
F-stat	177.69		4541.20
pvalue	0.00		0.00
Log capital	8.361	7.624	6.805
F-stat	471.15		2054.66
pvalue	0.00		0.00
Log capital Intensity	6.821	5.775	5.685
F-stat	1212.91		34.19
pvalue	0.00		0.00
Log employment	1.889	1.979	1.180
F-stat	19.50		5867.70
pvalue	0.00		0.00
Log TFP	5.209	5.498	5.060
F-stat	154.60		1452.39
pvalue	0.00		0.00
Log age	1.345	1.305	1.197
F-stat	17.21		446.86
pvalue	0.00		0.00
Log export share	0.025	0.082	0.029
F-stat	872.38		2608.26
pvalue	0.00		0.00
Log import share	0.023	0.098	0.042
F-stat	773.73		1424.46
pvalue	0.00		0.00

Notes: estimated coefficients of a regression of each variable on sectoral dummies in the pre-reform period (1995-2000). In particular, $y = \beta_1 \text{Agriculture} + \beta_2 \text{Manufacturing} + \beta_3 \text{Services}$. F-statistics and p-value come from the test of equality of coefficients with respect to manufacturing firms. Source: APEH.

Table C.11: Leverage

	Log Leverage		
	(1)	(2)	(3)
FL * Capital Elasticity	0.454**	0.824***	0.730**
	(0.226)	(0.313)	(0.314)
FL * Income Elasticity	-0.110***	-0.117**	-0.105**
	(0.027)	(0.052)	(0.052)
Firm FE	Yes	Yes	Yes
Year FE	Yes		
Sector* Year FE		Yes	Yes
Sectoral Price Index			Yes
R^2	0.469	0.469	0.469
N	986,018	986,018	986,018

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. Source: APEH.

Table C.12: Substitution and Income Effects: Robustness

	Non-Exporters			Domestically-Owned Firms			Non-Government Firms		
	Log Value Added	Log Capital Intensity	Log Capital	Log Value Added	Log Capital Intensity	Log Capital	Log Value Added	Log Capital Intensity	Log Capital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
FL * Capital Elasticity	0.106**	0.396***	0.889***	0.129**	0.427***	0.990***	0.100**	0.202***	0.763***
	(0.054)	(0.058)	(0.127)	(0.058)	(0.060)	(0.129)	(0.047)	(0.054)	(0.117)
FL * Income Elasticity	0.042***	-0.052***	-0.070***	0.081***	-0.052***	-0.091***	0.063***	-0.035***	-0.099***
	(0.009)	(0.010)	(0.020)	(0.010)	(0.009)	(0.019)	(0.008)	(0.009)	(0.018)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector* Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sectoral Price Index	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.773	0.784	0.834	0.774	0.792	0.839	0.813	0.790	0.845
N	1,082,601	1,061,499	1,061,499	1,072,824	1,043,081	1,043,081	1,198,173	1,177,768	1,177,768

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. Columns 1-3 exclude multinational firms (where MNC are firms with 10% foreign ownership). Columns 4-6 exclude exporters. Columns 7-9 exclude government firms (firms with more than 10% local and state shares). The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the income elasticity comes from Bils, Klenow, and Malin (2013), reported at two-digit NACE industries. Source: APEH.

Table C.13: Substitution and Income Effects: Robustness Capital and Income Elasticities

	Capital Elasticity Olley and Pakes (1996)			Income Elasticity Comin, Lashkari, and Mestieri (2018)		
	Log Value Added	Log Capital Intensity	Log Capital	Log Value Added	Log Capital Intensity	Log Capital
	(1)	(2)	(3)	(4)	(5)	(6)
FL * Capital Elasticity	0.156***	0.103*	0.217**	0.160**	0.208**	0.804***
	(0.035)	(0.059)	(0.090)	(0.076)	(0.105)	(0.115)
FL * Income Elasticity	0.015*	-0.031**	-0.106***	0.309***	-0.109***	-0.181***
	(0.009)	(0.013)	(0.018)	(0.036)	(0.031)	(0.047)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector* Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector Price Index	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.749	0.681	0.845	0.801	0.791	0.845
N	1,197,521	1,176,736	1,176,736	1,188,332	1,170,171	1,170,171

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. Columns 1-3 employ capital elasticities computed with Olley and Pakes (1996) method and income elasticity from Bils, Klenow, and Malin (2013). Columns 4-6 employ capital elasticity estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods and income elasticity from Comin, Lashkari, and Mestieri (2018). Source: APEH.

Table C.14: Substitution and Income Effects: Balanced Panel

	Balanced Panel (1995-2008)		
	Log Value Added	Log Capital Intensity	Log Capital
	(1)	(2)	(3)
FL * Capital Elasticity	0.196***	0.282*	0.981***
	(0.074)	(0.151)	(0.170)
FL * Income Elasticity	0.065***	-0.035	-0.134***
	(0.014)	(0.028)	(0.028)
Firm FE	Yes	Yes	Yes
Sector* Year FE	Yes	Yes	Yes
Sector Price Index	Yes	Yes	Yes
R^2	0.805	0.761	0.836
N	353,279	353,279	353,279

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. Balanced panel of firms between 1995 and 2008. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods and the income elasticity comes from Bils, Klenow, and Malin (2013). Source: APEH.

Table C.15: Controlling for Imports

	Log Value Added	Log Capital Intensity	Log Capital
	(1)	(2)	(3)
FL * Capital Elasticity	0.345***	0.231**	0.683***
	(0.059)	(0.098)	(0.102)
FL * Income Elasticity	0.035***	-0.003	-0.046***
	(0.010)	(0.017)	(0.016)
Log Imports	-0.044***	0.004***	-0.037***
	(0.000)	(0.001)	(0.001)
Firm FE	Yes	Yes	Yes
Sector* Year FE	Yes	Yes	Yes
Sectoral Price Index	Yes	Yes	Yes
R^2	0.799	0.824	0.877
N	986,776	950,303	950,303

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. Source: APEH.

Table C.16: Financial Dependence

	Log Value Added	Log Capital Intensity	Log Capital
	(1)	(2)	(3)
	Panel A		
FL * Capital Elasticity	0.099**	0.325***	0.825***
	(0.045)	(0.057)	(0.124)
FL * Income Elasticity	0.067***	-0.069***	-0.119***
	(0.008)	(0.009)	(0.019)
FL * Financial Dependence	0.012***	0.030***	0.019***
	(0.002)	(0.003)	(0.006)
R^2	0.841	0.792	0.847
	Panel B		
FL * Capital Elasticity	0.100**	0.328***	0.827***
	(0.045)	(0.057)	(0.124)
FL * Income Elasticity	0.068***	-0.074***	-0.118***
	(0.008)	(0.009)	(0.019)
FL * Financial Dependence	0.015***	0.027***	0.018***
	(0.002)	(0.003)	(0.006)
FL * Financial Dependence Supplier	-0.039***	0.041***	0.021*
	(0.005)	(0.006)	(0.012)
Firm FE	Yes	Yes	Yes
Sector* Year FE	Yes	Yes	Yes
Sector Price Index	Yes	Yes	Yes
R^2	0.841	0.792	0.847
N	1,072,401	1,049,205	1,049,205

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. Balanced panel of firms between 1995 and 2008. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods and the income elasticity comes from Bils, Klenow, and Malin (2013). Financial Dependence is the Rajan and Zingales (1998) index estimate at four-digit NACE industries. We use the input-output table reported by the OECD for Hungary 2000 to construct the financial dependence index of the larger industry supplier. Panel A uses the financial dependence index of the firms' industry. Panel B includes the financial dependence index of the larger industry supplier. Source: APEH.

Table C.17: Firms without Debt

	Firms Without Debt					
	Log Value Added	Log Capital Intensity	Log Capital	Log Value Added	Log Capital Intensity	Log Capital
	(1)	(2)	(3)	(4)	(5)	(6)
FL * Capital Elasticity	-0.009	0.170	0.556***	-0.453***	0.098	0.241
	(0.133)	(0.251)	(0.142)	(0.092)	(0.159)	(0.158)
FL * Income Elasticity	0.077***	0.022	-0.006	0.118***	0.016	-0.001
	(0.022)	(0.029)	(0.021)	(0.015)	(0.024)	(0.022)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector* Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Sectoral Price Index	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.793	0.769	0.813	0.754	0.803	0.849
N	641,476	599,383	599,383	641,515	595,683	595,683

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. Columns 1-3 exclude firms that report short-term debt between 1999-2008. Columns 4-6 exclude firms that report any type of debt with banks between 2005-2008. Source: APEH and credit registry.

Table C.18: Top 30 Sectors: Net Entry (2001-2007)

Activity	Broad sector (II digits)	Sector (IV digits)	Description	Income elasticity	Net entry per year	Number of employees	Share agg. employment (in %)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Service	Real estate activities	7012	Buying and selling of own real estate	2.02	982	2	0.08
Service	Construction	4521	General construction of buildings and civil engineering works	0.89	505	3	0.21
Service	Hotels and restaurants	5530	Restaurants	1.80	480	3	0.13
Service	Other business activities	7414	Business and management consultancy activities	1.35	446	2	0.08
Service	Other business activities	7487	Other business activities n.e.c.	1.35	439	3	0.10
Service	Retail trade	5248	Other retail sale in specialized stores	0.83	420	2	0.06
Service	Land transport	6024	Freight transport by road	2.02	404	3	0.08
Service	Other business activities	7420	Architectural and engineering activities and related technical consultancy	1.35	363	2	0.06
Service	Real estate activities	7020	Letting of own property	2.02	297	4	0.03
Service	Retail trade	5211	Retail sale in non-specialized stores with food, beverages or tobacco predominating	0.83	271	4	0.11
Service	Sale, maintenance and repair of motor vehicles	5010	Sale of motor vehicles	0.85	250	2	0.06
Service	Hotels and restaurants	5540	Bars	1.80	248	2	0.04
Service	Retail trade	5263	Other non-store retail sale	0.83	229	2	0.02
Service	Construction	4531	Installation of electrical wiring and fittings	0.89	212	3	0.05
Service	Other business activities	7411	Legal activities	1.35	211	2	0.04
Service	Retail trade	5242	Retail sale of clothing	0.83	201	2	0.06
Service	Computer and related activities	7222	Other software consultancy and supply	1.35	199	2	0.04
Service	Construction	4533	Plumbing	0.89	197	3	0.04
Service	Sale, maintenance and repair of motor vehicles	5020	Maintenance and repair of motor vehicles	0.85	189	2	0.03
Service	Activities auxiliary to financial inter	6720	Activities auxiliary to insurance and pension funding	1.44	182	1	0.02
Service	Real estate activities	7011	Development and selling of real estate	2.02	176	2	0.01
Service	Other business activities	7460	Investigation and security activities	1.35	170	6	0.11
Service	Other services activities	9302	Hairdressing and other beauty treatment	1.18	151	2	0.02
Service	Retail trade	5246	Retail sale of hardware, paints and glass	0.83	143	2	0.03
Service	Other business activities	7440	Advertising	1.35	141	2	0.03
Service	Recreational, cultural and sporting activities	9262	Other sporting activities	1.79	131	2	0.01
Service	Activities auxiliary to financial inter	6713	Activities auxiliary to financial intermediation n.e.c.	1.44	123	2	0.01
Service	Computer and related activities	7220	Software consultancy and supply	1.35	121	2	0.03
Service	Other business activities	7470	Industrial cleaning	1.35	121	7	0.08
Service	Construction	4544	Painting and glazing	0.89	112	2	0.03
Total					8109		1.68

Theory Appendices

Appendix D Steady State System

$$
\begin{aligned}
Endogenous(39) &= \{P, P_S, P_M, P_M^D, w, r^k, r, \phi_j\} = 8 \\
&= \{C, C_S, C_M, C_M^D, C_M^F, B, TB, K, X_M, Y, TBY\} = 11 \\
&= \{M_j, M_j^e, \varphi_S^d, \varphi_M^d, \varphi_M^x\} = 5 \\
&= \{c_j(\varphi), p_j(\varphi), q_j^d(\varphi), q_M^x(\varphi), \pi_j^d(\varphi), \pi_M^x(\varphi), V_S(\varphi), V_M(\varphi), V_M^d(\varphi), V_M^x(\varphi), \mu_j(\varphi)\} = 11 \\
&= \{k_j^d(\varphi), k_M^x(\varphi), l_j^d(\varphi), l_M^x(\varphi)\} = 4
\end{aligned}
$$

Appendix D.1 Household

$$P_M = \left[\theta_D (P_M^D)^{1-\eta_M} + \theta_F (P_M^F = 1)^{1-\eta_M}\right]^{\frac{1}{1-\eta_M}} \tag{G.1}$$

$$P = \left[\theta_M P_M^{1-\eta} C^{e_M - 1} + \theta_S P_S^{1-\eta} C^{e_S - 1}\right]^{\frac{1}{1-\eta}} \tag{G.2}$$

$$C_S = \left(\frac{P_S}{P}\right)^{-\eta} \theta_S C^{e_S} \tag{G.3}$$

$$C_M = \left(\frac{P_M}{P}\right)^{-\eta} \theta_M C^{e_M} \tag{G.4}$$

$$C_M^D = \left(\frac{P_M^D}{P_M}\right)^{-\eta_M} \theta_D C_M \tag{G.5}$$

$$C_M^F = \left(\frac{P_M^F = 1}{P_M}\right)^{-\eta_M} \theta_F C_M \tag{G.6}$$

$$r^k = \frac{1}{\beta} - 1 + \delta^k \tag{G.7}$$

$$1 = \beta \left(1 + r - \psi \cdot B_{t+1} \cdot e^{-B_{t+1}}\right) \tag{G.8}$$

$$r = r^* + \psi(e^{-B} - 1) + \tau \tag{G.9}$$

Appendix D.2 Production

Appendix D.2.1 Composite price, costs, prices, demands, profits, inputs demands

$$\phi_j = \left(\frac{r^k}{\alpha_j}\right)^{\alpha_j}\left(\frac{w}{1-\alpha_j}\right)^{1-\alpha_j} \quad j \in \{S, M\} \tag{G.10}$$

$$c_j(\varphi) = \frac{\phi_j}{\varphi} \quad j \in \{S, M\} \tag{G.11}$$

$$p_j(\varphi) = \frac{1}{\rho}c_j(\varphi) \quad j \in \{S, M\} \tag{G.12}$$

$$q_S^d(\varphi) = C_S\left(\frac{p_S(\varphi)}{P_S}\right)^{-\sigma} \tag{G.13}$$

$$q_M^d(\varphi) = C_M^D\left(\frac{p_M(\varphi)}{P_M^D}\right)^{-\sigma} \tag{G.14}$$

$$q_M^x(\varphi) = A\left(p_M(\varphi)\right)^{-\sigma} \tag{G.15}$$

$$\pi_j^d(\varphi) = \Big[p_j(\varphi) - c_j(\varphi)\Big]q_j^d(\varphi) - \phi_j f_j^d \quad j \in \{S, M\} \tag{G.16}$$

$$\pi_M^x(\varphi) = \Big[p_M(\varphi) - c_M(\varphi)\Big]q_M^x(\varphi) - \phi_M f_M^x \tag{G.17}$$

$$k_j^d(\varphi) = \alpha_j\frac{\phi_j}{r^k}\left[\frac{q_j^d(\varphi)}{\varphi} + f_j^d\right] \quad j \in \{S, M\} \tag{G.18}$$

$$k_M^x(\varphi) = \alpha_M\frac{\phi_M}{r^k}\left[\frac{q_M^x(\varphi)}{\varphi} + f_M^x\right] \tag{G.19}$$

$$l_j^d(\varphi) = (1-\alpha_j)\frac{\phi_j}{w}\left[\frac{q_j^d(\varphi)}{\varphi} + f_j^d\right] \quad j \in \{S, M\} \tag{G.20}$$

$$l_M^x(\varphi) = (1-\alpha_M)\frac{\phi_M}{w}\left[\frac{q_M^x(\varphi)}{\varphi} + f_M^x\right] \tag{G.21}$$

Appendix D.2.2 Value Functions and Cut-Offs

$$V_S(\varphi) = \max\left\{0, \frac{\pi_S^d(\varphi)}{1-\beta(1-\delta)}\right\} \tag{G.22}$$

$$V_M(\varphi) = \max\left\{V_M^d(\varphi), V_M^x(\varphi)\right\} \tag{G.23}$$

$$V_M^d(\varphi) = \max\left\{0, \frac{\pi_M^d(\varphi)}{1-\beta(1-\delta)}\right\} \tag{G.24}$$

$$V_M^x(\varphi) = \max\left\{0, \frac{\pi_M^d(\varphi) + \pi_M^x(\varphi)}{1-\beta(1-\delta)}\right\} \tag{G.25}$$

$$V_S(\varphi_S^d) = 0 \tag{G.26}$$

$$V_M^d(\varphi_M^d) = 0 \tag{G.27}$$

$$V_M^x(\varphi_M^x) = 0 \quad \Leftrightarrow \quad \pi_M^x(\varphi_M^x) = 0 \tag{G.28}$$

Appendix D.2.3 Stationary distribution, mass of firms, and free-entry condition

$$\mu_j(\varphi) = \begin{cases} \frac{g(\varphi)}{1-G(\varphi_j^d)} & \text{if} \quad \varphi \geq \varphi_j^d \\ 0 & \text{otherwise} \end{cases} \qquad j \in \{S, M\} \tag{G.29}$$

$$\delta M_j = \left[1 - G(\varphi_j^d)\right] M_j^e \qquad j \in \{S, M\} \tag{G.30}$$

$$\int_{\varphi_j^d}^{\infty} V_j(\varphi) g(\varphi) d\varphi = \phi_j \left[f_j^e + \xi \left(\exp\left(\frac{M_j^e - \overline{M}_j^e}{\overline{M}_j^e} \right) - 1 \right) \right] \qquad j \in \{S, M\} \tag{G.31}$$

Appendix D.2.4 Aggregation

$$L_S^{prod} = M_S \int_{\varphi_S^d}^{\infty} l_S^d(\varphi) \mu_S(\varphi) d\varphi$$

$$L_M^{prod} = M_M \int_{\varphi_M^d}^{\infty} l_M^d(\varphi) \mu_M(\varphi) d\varphi + M_M \int_{\varphi_M^x}^{\infty} l_M^x(\varphi) \mu_M(\varphi) d\varphi$$

$$L_j^{entry} = M_j^e \cdot \nu(1-\alpha_{1j}) \cdot \frac{\phi_j}{w} \left[f_j^e + \xi \left(\exp\left(\frac{M_j^e - \overline{M}_j^e}{\overline{M}_j^e} \right) - 1 \right) \right] \qquad j \in \{S, M\}$$

$$L_j = L_j^{prod} + L_j^{entry} \qquad j \in \{S, M\}$$

$$\overline{L} = L_M + L_S \tag{G.32}$$

$$K_S^{prod} = M_S \in_{\varphi_S^d}^{\infty} k_S^d(\varphi) \mu_S(\varphi) d\varphi$$

$$K_M^{prod} = M_M \int_{\varphi_M^d}^{\infty} k_M^d(\varphi) \mu_M(\varphi) d\varphi + M_M \int_{\varphi_M^x}^{\infty} k_M^x(\varphi) \mu_M(\varphi) d\varphi$$

$$K_j^{entry} = M_j^e \cdot \nu \alpha_{1j} \cdot \frac{\phi_j}{r^k} \left[f_j^e + \xi \left(\exp\left(\frac{M_j^e - \overline{M}_j^e}{\overline{M}_j^e} \right) - 1 \right) \right] \qquad j \in \{S, M\}$$

$$K_j = K_j^{prod} + K_j^{entry} \qquad j \in \{S, M\}$$

$$K = K_M + K_S \tag{G.33}$$

Appendix D.3 Markets Clear

$$P_S C_S = M_S \int_{\varphi_S^d}^{\infty} p_S(\varphi) q_S^d(\varphi) \mu_S(\varphi) d\varphi \tag{G.34}$$

$$P_M^D C_M^D = M_M \int_{\varphi_M^d}^{\infty} p_M(\varphi) q_M^d(\varphi) \mu_M(\varphi) d\varphi \tag{G.35}$$

$$X_M = M_M \int_{\varphi_M^x}^{\infty} p_M(\varphi) q_M^x(\varphi) \mu_M(\varphi) d\varphi \tag{G.36}$$

$$B = -\frac{TB}{(r-\tau)} \tag{G.37}$$

$$TB = X_M - C_M^F - \delta^k K \tag{G.38}$$

$$TBY \equiv TB/Y \tag{G.39}$$

$$Y \equiv PC + \delta K + TB = P_S C_S + P_M^D C_M^D + X_M \tag{G.40}$$

Appendix E Dynamic System

$$
\begin{aligned}
Endogenous(42) &= \{P, P_S, P_M, P_M^D, w, r^k, r, \Lambda, \lambda, \phi_j\} = 10 \\
&= \{C, C_S, C_M, C_M^D, C_M^F, B, TB, K, X_M, Y, TBY\} = 11 \\
&= \{M_j, M_j^e, \varphi_S^d, \varphi_M^d, \varphi_M^x\} = 5 \\
&= \{c_j(\varphi), p_j(\varphi), q_S^d(\varphi), q_M^d(\varphi), q_M^x(\varphi), \pi_j^d(\varphi), \pi_M^x(\varphi), V_S(\varphi), V_M(\varphi), V_M^d(\varphi), V_M^x(\varphi), \mu_j(\varphi)\} = 12 \\
&= \{k_j^d(\varphi), k_M^x(\varphi), l_j^d(\varphi), l_M^x(\varphi)\} = 4
\end{aligned}
$$

Appendix E.1 Household

$$P_{Mt} = \left[\theta_D (P_{Mt}^D)^{1-\eta_M} + \theta_F (P_{Mt}^F = 1)^{1-\eta_M}\right]^{\frac{1}{1-\eta_M}} \tag{G.1}$$

$$P_t = \left[\theta_M P_{Mt}^{1-\eta} C_t^{e_M - 1} + \theta_S P_{St}^{1-\eta} C_t^{e_S - 1}\right]^{\frac{1}{1-\eta}} \tag{G.2}$$

$$C_{St} = \left(\frac{P_{St}}{P_t}\right)^{-\eta} \theta_S C_t^{e_S} \tag{G.3}$$

$$C_{Mt} = \left(\frac{P_{Mt}}{P_t}\right)^{-\eta} \theta_M C_t^{e_M} \tag{G.4}$$

$$C_{Mt}^D = \left(\frac{P_{Mt}^D}{P_{Mt}}\right)^{-\eta_M} \theta_D C_{Mt} \tag{G.5}$$

$$C_{Mt}^F = \left(\frac{P_{Mt}^F = 1}{P_{Mt}}\right)^{-\eta_M} \theta_F C_{Mt} \tag{G.6}$$

$$\lambda_t = \frac{C_t^{-\gamma}}{P_t} \left[\frac{1-\eta}{\epsilon_M \theta_M^{\frac{1}{\eta}} C_t^{\frac{\epsilon_M - \eta}{\eta}} C_{Mt}^{\frac{\eta-1}{\eta}} + \epsilon_S \theta_S^{\frac{1}{\eta}} C_t^{\frac{\epsilon_S - \eta}{\eta}} C_{St}^{\frac{\eta-1}{\eta}} - \eta}\right] \tag{G.7}$$

$$\Lambda_{t,t+1} = \beta \frac{\lambda_{t+1}}{\lambda_t} \tag{G.8}$$

$$1 = \Lambda_{t,t+1}(1 - \delta^k + r_{t+1}^k) \tag{G.9}$$

$$1 = \Lambda_{t,t+1}\left(1 + r_{t+1} - \psi \cdot B_{t+1} \cdot e^{-B_{t+1}}\right) \tag{G.10}$$

$$r_{t+1} = r^* + \psi(e^{-B_{t+1}} - 1) + \tau \tag{G.11}$$

Appendix E.2 Production

Appendix E.2.1 Composite price, costs, prices, demands, profits, inputs demands

$$\phi_{jt} = \left(\frac{r_t^k}{\alpha_j}\right)^{\alpha_j}\left(\frac{w_t}{1-\alpha_j}\right)^{(1-\alpha_j)} \qquad j \in \{S, M\} \tag{G.12}$$

$$c_{jt}(\varphi) = \frac{\phi_{jt}}{\varphi} \quad j \in \{S, M\} \tag{G.13}$$

$$p_{jt}(\varphi) = \frac{1}{\rho} c_{jt}(\varphi) \quad j \in \{S, M\} \tag{G.14}$$

$$q_{St}^d(\varphi) = C_{St}\left(\frac{p_{St}(\varphi)}{P_{St}}\right)^{-\sigma} \tag{G.15}$$

$$q_{Mt}^d(\varphi) = C_{Mt}^D\left(\frac{p_{Mt}(\varphi)}{P_{Mt}^D}\right)^{-\sigma} \tag{G.16}$$

$$q_{Mt}^x(\varphi) = A\left(p_{Mt}(\varphi)\right)^{-\sigma} \tag{G.17}$$

$$\pi_{jt}^d(\varphi) = \Big[p_{jt}(\varphi) - c_{jt}(\varphi)\Big] q_{jt}^d(\varphi) - \phi_{jt} f_j^d \quad j \in \{S, M\} \tag{G.18}$$

$$\pi_{Mt}^x(\varphi) = \Big[p_{Mt}(\varphi) - c_{Mt}(\varphi)\Big] q_{Mt}^x(\varphi) - \phi_{Mt} f_M^x \tag{G.19}$$

$$k_{jt}^d(\varphi) = \alpha_j \frac{\phi_{jt}}{r_t^k}\left[\frac{q_{jt}^d(\varphi)}{\varphi} + f_j^d\right] \quad j \in \{S, M\} \tag{G.20}$$

$$k_{Mt}^x(\varphi) = \alpha_M \frac{\phi_{Mt}}{r_t^k}\left[\frac{q_{Mt}^x(\varphi)}{\varphi} + f_M^x\right] \tag{G.21}$$

$$l_{jt}^d(\varphi) = (1-\alpha_j)\frac{\phi_{jt}}{w_t}\left[\frac{q_{jt}^d(\varphi)}{\varphi} + f_j^d\right] \quad j \in \{S, M\} \tag{G.22}$$

$$l_{Mt}^x(\varphi) = (1-\alpha_M)\frac{\phi_{Mt}}{w_t}\left[\frac{q_{Mt}^x(\varphi)}{\varphi} + f_M^x\right] \tag{G.23}$$

Appendix E.2.2 Value Functions and Cut-Offs

$$V_{St}(\varphi) = \max\left\{0, \pi_{St}^d(\varphi) + (1-\delta)\Lambda_{t,t+1} V_{S,t+1}(\varphi)\right\} \tag{G.24}$$

$$V_{Mt}(\varphi) = \max\left\{V_{Mt}^d(\varphi), V_{Mt}^x(\varphi)\right\} \tag{G.25}$$

$$V_{Mt}^d(\varphi) = \max\left\{0, \pi_{Mt}^d(\varphi) + (1-\delta)\Lambda_{t,t+1} V_{M,t+1}(\varphi)\right\} \tag{G.26}$$

$$V_{Mt}^{x}(\varphi) = \max\left\{0, \pi_{Mt}^{d}(\varphi) + \pi_{Mt}^{x}(\varphi) + (1-\delta)\Lambda_{t,t+1}V_{M,t+1}(\varphi)\right\} \tag{G.27}$$

$$V_{St}(\varphi_{St}^{d}) = 0 \tag{G.28}$$

$$V_{Mt}^{d}(\varphi_{Mt}^{d}) = 0 \tag{G.29}$$

$$V_{Mt}^{x}(\varphi_{Mt}^{x}) = 0 \quad \Leftrightarrow \quad \pi_{Mt}^{x}(\varphi_{Mt}^{x}) = 0 \tag{G.30}$$

Appendix E.2.3 Stationary distribution, mass of firms, and free-entry condition

$$M_{j,t+1}\mu_{j,t+1}(\varphi) = \begin{cases} (1-\delta)M_{jt}\mu_{jt}(\varphi) + M_{j,t+1}^{e}g(\varphi) & \text{if} \quad \varphi \geq \varphi_{j,t+1}^{d} \\ 0 & \text{otherwise} \end{cases} \qquad j \in \{S, M\} \tag{G.31}$$

$$M_{j,t+1} = (1-\delta)M_{jt}\int_{\varphi_{j,t+1}^{d}}^{\infty}\mu_{jt}(\varphi)d\varphi + M_{j,t+1}^{e}\int_{\varphi_{j,t+1}^{d}}^{\infty}g(\varphi)d\varphi \qquad j \in \{S, M\} \tag{G.32}$$

$$\int_{\varphi_{jt}^{d}}^{\infty}V_{jt}(\varphi)g(\varphi)d\varphi = \phi_{jt}\left[f_{j}^{e} + \xi\left(\exp\left(\frac{M_{jt}^{e} - \overline{M}_{j}^{e}}{\overline{M}_{j}^{e}}\right) - 1\right)\right] \qquad j \in \{S, M\} \tag{G.33}$$

Appendix E.2.4 Aggregation

$$L_{St}^{prod} = M_{St}\int_{\varphi_{St}^{d}}^{\infty}l_{St}^{d}(\varphi)\mu_{St}(\varphi)d\varphi$$

$$L_{Mt}^{prod} = M_{Mt}\int_{\varphi_{Mt}^{d}}^{\infty}l_{Mt}^{d}(\varphi)\mu_{Mt}(\varphi)d\varphi + M_{Mt}\int_{\varphi_{Mt}^{x}}^{\infty}l_{Mt}^{x}(\varphi)\mu_{Mt}(\varphi)d\varphi$$

$$L_{jt}^{entry} = M_{jt}^{e}\cdot(1-\alpha_{j})\cdot\frac{\phi_{jt}}{w_{t}}\left[f_{j}^{e} + \xi\left(\exp\left(\frac{M_{jt}^{e} - \overline{M}_{j}^{e}}{\overline{M}_{j}^{e}}\right) - 1\right)\right] \qquad j \in \{S, M\}$$

$$L_{jt} = L_{jt}^{prod} + L_{jt}^{entry} \qquad j \in \{S, M\}$$

$$\overline{L} = L_{Mt} + L_{St} \tag{G.34}$$

$$K_{St}^{prod} = M_{St}\int_{\varphi_{St}^{d}}^{\infty}k_{St}^{d}(\varphi)\mu_{St}(\varphi)d\varphi$$

$$K_{Mt}^{prod} = M_{Mt}\int_{\varphi_{Mt}^{d}}^{\infty}k_{Mt}^{d}(\varphi)\mu_{Mt}(\varphi)d\varphi + M_{Mt}\int_{\varphi_{Mt}^{x}}^{\infty}k_{Mt}^{x}(\varphi)\mu_{Mt}(\varphi)d\varphi$$

$$K_{jt}^{entry} = M_{jt}^{e} \cdot \alpha_j \cdot \frac{\phi_{jt}}{r_t^k} \left[f_j^e + \xi \left(\exp\left(\frac{M_{jt}^e - \overline{M}_j^e}{\overline{M}_j^e} \right) - 1 \right) \right] \qquad j \in \{S, M\}$$

$$K_{jt} = K_{jt}^{prod} + K_{jt}^{entry} \qquad j \in \{S, M\}$$

$$K_t = K_{Mt} + K_{St} \tag{G.35}$$

Appendix E.3 Markets Clear

$$P_{St} C_{St} = M_{St} \int_{\varphi_{St}^d}^{\infty} p_{St}(\varphi) q_{St}^d(\varphi) \mu_{St}(\varphi) d\varphi \tag{G.36}$$

$$P_{Mt}^D C_{Mt}^D = M_{Mt} \int_{\varphi_{Mt}^d}^{\infty} p_{Mt}(\varphi) q_{Mt}^d(\varphi) \mu_{Mt}(\varphi) d\varphi \tag{G.37}$$

$$X_{Mt} = M_{Mt} \int_{\varphi_{Mt}^x}^{\infty} p_{Mt}(\varphi) q_{Mt}^x(\varphi) \mu_{Mt}(\varphi) d\varphi \tag{G.38}$$

$$B_{t+1} = (1 + r_t - \tau) B_t + TB_t \tag{G.39}$$

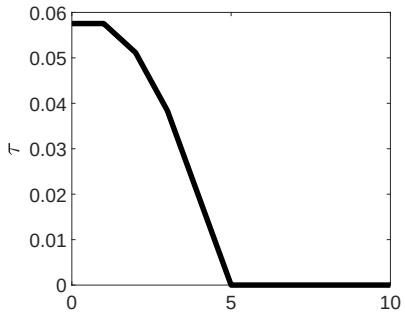
$$TB_t = X_{Mt} - C_{Mt}^F - (K_{t+1} - (1 - \delta^k) K_t) \tag{G.40}$$

$$TBY_t \equiv TB_t / Y_t \tag{G.41}$$

$$Y_t \equiv P_t C_t + (K_{t+1} - (1 - \delta^k) K_t) + TB_t = P_{St} C_{St} + P_{Mt}^D C_{Mt}^D + X_{Mt} \tag{G.42}$$

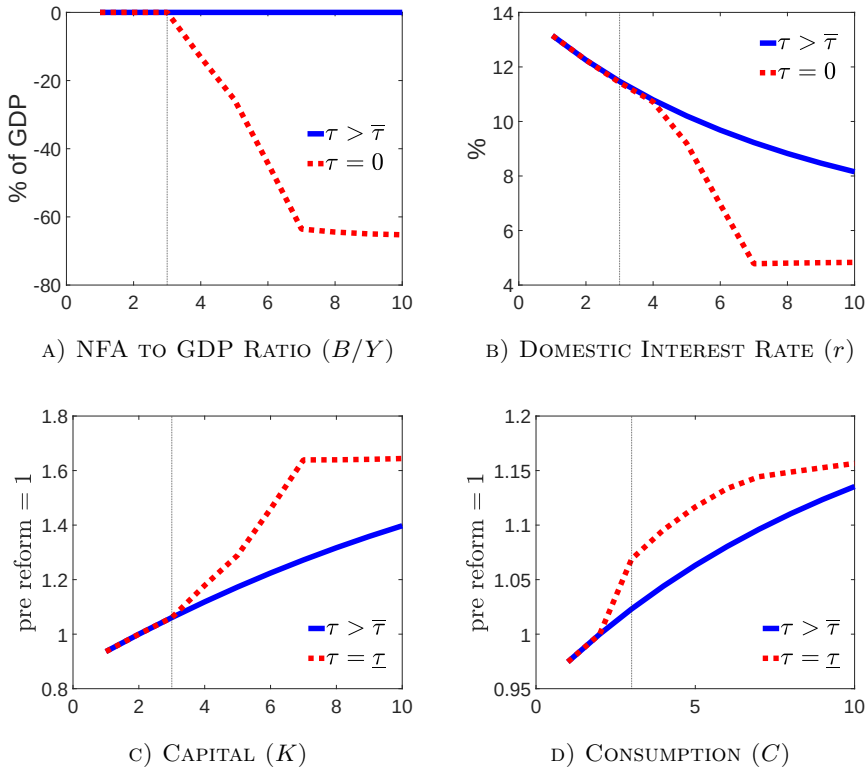
Appendix F Sequential Liberalization

We consider an alternative form of financial liberalization where the capital control tax τ is reduced to 0 sequentially over 3 periods, in contrast to a one-time reduction as in the main text. The path of the capital control tax τ is depicted in Figure C.11, which is revealed to the agents in the economy unexpectedly when the initial shock arrives (period 3 in the figure).



A) τ Schedule

Figure C.11: Schedule of τ Reduction



A) NFA to GDP Ratio (B/Y)

B) Domestic Interest Rate (r)

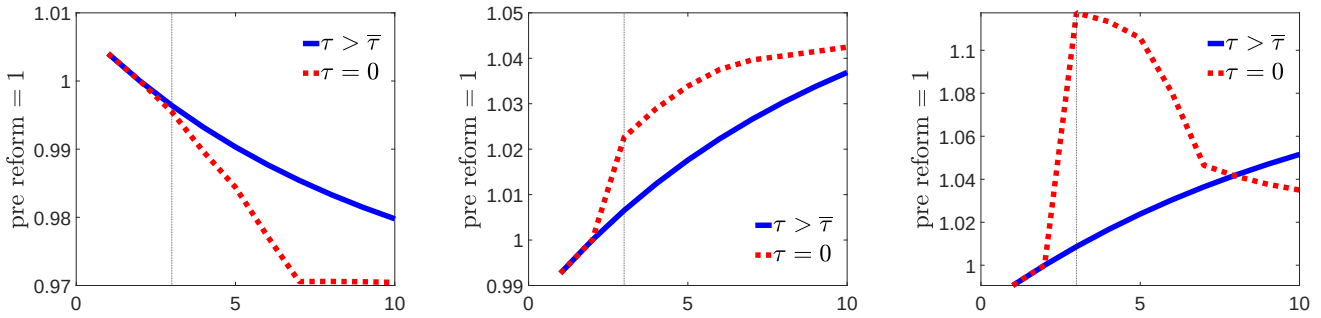
C) Capital (K)

D) Consumption (C)

Figure C.12: Relative Input-Cost and Consumption Channels in the short term

Note: This figure shows the dynamics of the domestic interest rate (top left), the net foreign asset position over GDP (top right), the consumption level (left bottom), and the capital level (right bottom). The blue and solid line corresponds to an economy in financial autarky and the red and dashed line corresponds to a financially open economy.

In a sequential liberalization, the economy accumulates foreign debt more slowly relative to a one-time liberalization, reaching the peak of borrowing 4 periods after the initial shock (Figure C.12a). As a result, the adjustment of the interest rate is more sluggish (Figure C.12b). Compared to a one-time liberalization episode, capital accumulation is spread out over multiple periods (Figure C.12c) and so is the increase in aggregate consumption (Figure C.12d).

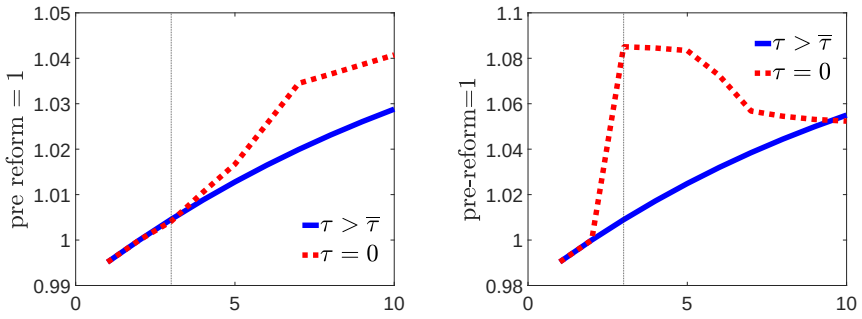


A) Relative Cost Ratio ($\frac{\phi_M}{\phi_S}$) B) Consumption share of Services $\left(\frac{P^S \times C^S}{P \times C}\right)$ C) Production share of Services $\left(\frac{P^S \times C^S}{P^S \times C^S + P_D^M \times C_M^D + XM}\right)$

Figure C.13: Reallocation across Sectors in the short term

Note: This figure shows the dynamics of the relative cost ratio (left), the consumption share of services (middle) and the production share of services (right). The blue and solid line corresponds to an economy in financial autarky and the red and dashed line corresponds to a financially open economy.

Mirroring the gradual decline in the rental rate of capital, the marginal cost in manufacturing relative to services also decreases gradually in the periods following the liberalization shock (Figure C.13a). As aggregate consumption increases with capital inflows, the consumption share of services goods increase due to non-homotheticity in household preference (Figure C.13b). A decline in manufacturing exports and increase in demand for consumption good due to liberalization raise the production share of services at the onset of liberalization, which then slowly reverts as the economy increases manufacturing exports to services interest on foreign debt (Figure C.13c).

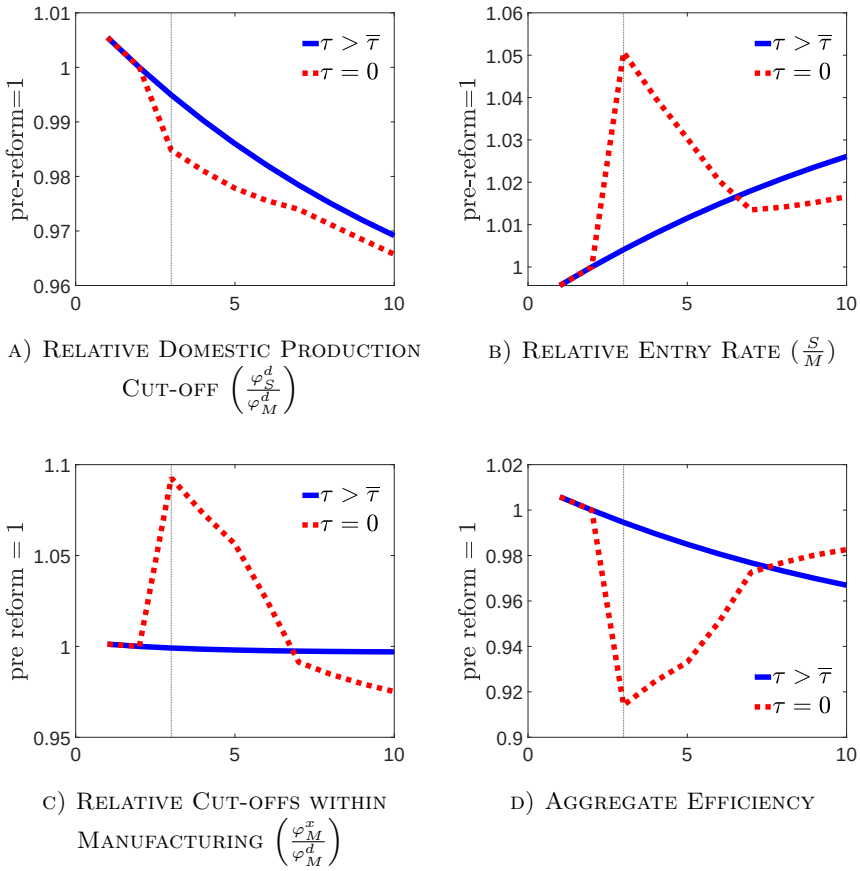


A) Relative Price ($\frac{P_S}{P_M^D}$) B) Ideal Price Index (K)

Figure C.14: Relative Price and Ideal Price Index in the short term

Note: This figure shows the dynamics of the relative price of service-to-manufacturing goods (left) and the ideal price index (right). The blue and solid line corresponds to an economy in financial autarky and the red and dashed line corresponds to a financially open economy.

Again, as in the case of the one-time liberalization, there is a increased in the relative price index of the services sector and an increase in the aggregate price index following liberalization, but the adjustment is more sluggish with sequential reduction in τ (Figure C.14a, C.14b).



A) Relative Domestic Production Cut-off $\left(\frac{\varphi_S^d}{\varphi_M^d}\right)$

B) Relative Entry Rate $\left(\frac{S}{M}\right)$

C) Relative Cut-offs within Manufacturing $\left(\frac{\varphi_M^x}{\varphi_M^d}\right)$

D) Aggregate Efficiency

Figure C.15: Reallocation Within Sectors in the short term

Note: This figure shows the dynamics of the relative domestic production cut-offs (left), the relative entry rate (right), the relative cut-offs in the manufacturing sector (bottom left), and the aggregate productivity of the economy (bottom right). The blue and solid line corresponds to an economy in financial autarky and the red and dashed line corresponds to a financially open economy.

Following liberalization, the economy experiences an increase in the entry rate in the services sector relative to the manufacturing sector, which is sustained over multiple periods in contrast with the one-time liberalization case (Figure C.15b). Similar to the one-time liberalization, capital inflow is associated with is a reduction in aggregate TFP, yet the reduction is sustained over a longer period in the case of sequential liberalization (Figure C.15d).