Federal Reserve Bank of Dallas

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Working Paper 2527 **August 2025**

Research Department

https://doi.org/10.24149/wp2527

The Micro and Macro Dynamics of Capital Flows[*]

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July 4, 2025

Abstract

We study empirically and theoretically the effects of international financial flows on resource allocation. Using the universe of firms in Hungary, we show that removing capital controls lowers firms' cost of capital and increases household consumption, with the latter playing a dominant role. The consumption channel leads to reallocation of resources toward high expenditure elasticity activities—such as services—promoting both the expansion of incumbents and firm entry. A multi-sector heterogeneous firm model replicates these dynamics. Our model shows that non-homotheticity in consumption can quantitatively account for the reallocation of resources towards services and successfully replicates the dynamics of aggregate productivity following episodes of financial openness.

JEL Classification: F15, F41, F43, F63

Keywords: firm dynamics, financial liberalization, reallocation, capital flows, TFP, non-homothetic preferences.

[*] We thank Jose Mota Aquino, Rodrigo Heresi, Alejandra Martinez, Eugene Oue, and Makoto Tanaka for excellent research assistance. We are grateful to Aimee Chin, Andres Drenik, Sebastian Fanelli, Pierre-Olivier Gourinchas, Fadi Hassan, Dirk Jenter, Sebnem Kalemli-Ozcan, Loukas Karabarbounis, Marti Mestieri, Dmitry Mukhin, Veronica Rappoport, Hélène Rey, Andres Rodriguez-Clare, Eugenio Rojas and Bent Sorensen, as well as participants at several seminars and conferences for helpful comments. The views expressed here are those of the authors and do not necessarily represent those of the Federal Reserve Bank of Dallas or the Federal Reserve System. This work was funded by UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee [grant number EP/X020916/1].

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1 Introduction

Over the past decades, capital flows across countries have increased substantially, deepening international financial integration. Macroeconomic theory tells us that the impact of such integration works through two fundamental mechanisms. One mechanism focuses on the supply side, and specifically on how capital inflows affect firms' cost of capital and capital accumulation. The second mechanism focuses on demand, and specifically on the impact of capital inflows on current consumption and consumption smoothing. While these two mechanisms are the building blocks of any macroeconomic models, there is little understanding on how they operate *together*, both empirically and theoretically, in a world with heterogeneous firms and expenditure elasticities of demand. In this paper, we assess these two forces empirically and study theoretically their impact on the allocation of resources and aggregate productivity.

This paper shows that capital inflows lower firms' cost of capital and increase in household consumption, with the latter playing a dominant role. We first document the cost of capital and consumption channels employing detailed data on the population of Hungarian firms across all economic sectors—agriculture, manufacturing and services—and exploiting a deregulation of capital controls that led to large cross-border financial inflows. We employ heterogeneous capital elasticities of firms' production technology to identify the cost-of-capital channel (thereafter input-cost channel), and heterogeneous expenditures elasticities with respect to income to identify the demand channel (thereafter consumption channel), such that firms are differentially affected by both supply and demand forces. We show that a stronger consumption channel drives the expansion along both the intensive and extensive margins, leading on the aggregate to a reallocation of resources towards high-expenditure-elasticity activities, which are mainly in services.

We then develop and calibrate a multi-sector, heterogeneous firm, dynamic open economy model, and employ it to study the input-cost and consumption channels following an unexpected financial liberalization. Our model is able to replicate the non-targeted increase in consumption and capital accumulation, the real exchange rate dynamics, and the reallocation of resources across and within sectors. We use our model to decompose the channels driving the reallocation of production and consumption towards services and to show that differences in consumption expenditures elasticities (modeled with non-homothetic preferences) are key to quantitatively explain this reallocation. Additionally, a counterfactual exercise shows that non-homothetic preferences, embedded in a heterogeneous agents model, can account for the changes in aggregate productivity observed in data.

Our paper makes two contributions to the literature studying the impact of capital flows. First, our empirical analysis provides firm-level evidence for the micro-mechanisms underpinning the expansion of services during surges in capital inflows, as previously documented in cross-country studies. Our model shows that non-homothetic preferences are key to quantitatively explaining this reallocation towards services, as existing (two-sectors neoclassical) models underestimate the observed reallocation by a factor of ten. Second, different from a neoclassical model predicting that reallocation of production towards the non-tradable service sector would lead to a decrease in aggregate productivity, our model shows that instead aggregate productivity can increase. Our model therefore accounts for the increase in aggregate productivity following the financial liberalization in Hungary and documented in cross-country studies for capital-scarce economies.

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 deregulation of capital controls that liberalized *only* financial flows. Second, our firm-level data is unique as it provides information on balance sheets for the universe of firms in all economic activities for more than fifteen years (1992-2008), which we are able to complement with credit registry data to control for access to credit. Finally, this extensive dataset allows us to dissect movements in the extensive margin, as it reports firms' creation and destruction. We can then study—for the first time—the impact of capital inflows on all firms—including entrants—and all economic sectors by building from census, administrative firm-level data to aggregate outcomes.

We first document that Hungary experienced the traditional outcomes following the financial liberalization: capital inflows, decreases in the cost of capital, and higher consumption. Five years after the reform, the net capital flows had increased by a factor of three, the net international investment position had dropped 17 percentage points of GDP, and firms' borrowing interest rate fell by 3 percentage points after controlling for pre-trends. Consumption expenditure increased and, pointing to the differential impact of capital inflows across sectors, the share of consumption in sectors producing goods with high expenditure elasticity (in total consumption) increased by 3pp in real terms.

To motivate our empirical strategy, we develop a simple version of our quantitative model and use it to identify the relative input-cost and consumption channels through two structural parameters of the model, the capital and expenditure elasticities. The model's structural relationships allow us to construct a difference-in-difference estimator and exploit three sources of variation to identify the impact of capital inflows: before and after the reform (time), and heterogeneity in capital and expenditure elasticities across industries (cross section). We use capital elasticities and expenditures elasticities estimated for Hungary at four- and two-digit industries, respectively.

At the intensive margin, our empirical results provide evidence for the relative input-cost channel, as firms in sectors with a higher capital elasticity increased their real value-added and capital by more. The estimated coefficients imply that one standard deviation increase in capital elasticity—such as moving from hotels and restaurants to metal production—leads to an increase in real value added by 4.2%. Our results also point to the presence of a consumption channel, as firms in higher-expenditure-elasticity industries increase their real value added by more. In particular, one standard deviation increase in expenditure elasticity—such as moving from machinery and equipment to computers—raises value added by 8.2%. Standardized beta coefficients confirm that the expansion in high expenditure elasticity activities is larger, suggesting that the consumption channel is stronger at the intensive margin.

Leveraging that the Hungarian data covers the entire population of firms in the economy, we study changes in the extensive margin. We document a significant expansion of net entry in high expenditure elasticity sectors following liberalization, driven by increased entry. A one standard deviation rise in expenditure elasticity is associated with 15% higher net entry and 19% higher entry. Post-reform entrants in these sectors are typically less productive, small domestic firms employing an average of three workers.

Building from our micro data to aggregate outcomes, we show that the share of real value added and employment of high expenditure elasticity sectors increases, even after controlling for pre-trends. As such, the consumption channel dominates in the short term and leads to reallocation of resources towards industries with high expenditure elasticities. Because activities with high expenditure elasticities are chiefly in the services sector, we consistently document a short term reallocation of resources towards services.

We evaluate the validity of our empirical results by assessing two alternative mechanisms. First, we show that the differential expansion in sectors with high-expenditure elasticity could not be fully account by sectors' non-tradability, as our results remain robust to controlling for, and using different definitions of non-tradable sectors and also sectoral consumer imports. Second, we also show that our results are robust to controlling for financial frictions. We merge census, firm-level, credit registry data and use all the debt variables included in firms' balance sheet. After controlling for all types of credit (including credit with owners, trade credit and credit with financial institutions) and for different measures of dependence on external finance, we show that the larger expansion of high-expenditure-elasticity sectors remains true.[1]

We conclude our empirical analysis by conducting a large set of robustness tests. We first show that firms' growth before the liberalization did not correlate with sectors' capital and expenditure elasticities and, hence, firms shared similar growth trends prior to the reform. We next show that our results are robust to controlling for export status, foreign ownership, to using different methods to estimate the capital and the expenditure elasticities, and to controlling for firms' intermediate imports. Finally, the general context around the liberalization minimizes reverse causality concerns, as it was part of a general program of fourteen transi-

[1] These results are in line with Cingano and Hassan (2020), who, using bank-firm level data, show that increased capital inflows do not lead banks to expand their credit supply to service firms.

tion 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, and trade and foreign direct investment (FDI) remained constant around the reform. We also show that the other assessing countries to the EU did not experience the consumption boom and reallocation patterns observed in Hungary.

We then build a dynamic, heterogeneous firms, small open economy model to rationalize our empirical findings and to assess the micro and macro dynamics of capital inflows and their impact on aggregate productivity. In our model, there are two sectors, manufacturing and services, that differ in the capital elasticity of their production technology and the expenditure elasticity of demand. Another difference is that only manufactured goods can be traded (exported and imported). 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 (2003). 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.

We calibrate the model to match annual micro and macroeconomic data from Hungary. Initially, the level of capital controls is sufficiently high that the economy is in financial autarky—trade is balanced—and is transitioning to its long-run financial autarky steady state. We then investigate how the unexpected decrease in capital controls affects the within and cross sector allocation of resources.

We show that the model matches well twelve non-targeted moments of the Hungarian post-liberalized economy spanning from aggregate consumption and capital accumulation to reallocation across and within sectors. In particular, the model closely matches the reallocation towards services, accounting for 70% of the increase in the value-added share of services observed in Hungary. It also follows closely the reallocation within sectors by quantitatively accounting for 74% of the decrease in the operational cut-off of service firms relative to manufacturing firms, and 98% of the increase in the export cut-off. It reproduces well the higher entry rates in services and manufacturing, the differential entry rate between these two sectors and the decrease in the relative size of entrants of service firms. Importantly, the model accounts for two-thirds of the real exchange rate (RER) appreciation observed in Hungary.

We then conduct several counterfactual exercises to unpack the forces driving the reallocation towards services and its impact on aggregate productivity after the financial liberalization. We first build a neoclassical model with representative firms in the service (non-tradable) and the manufacturing (tradable) sectors. The model features homothetic preferences and equal capital elasticities across sectors. We show that this neoclassical framework (i) fails to quantitatively account for the reallocation of consumption and production towards services, underestimating them by a factor of ten (0.4 versus 4 percentage points for production, and 0.4

versus 3.9 for consumption); (ii) generates a counterfactual real exchange rate depreciation; and (iii) predicts a decline in aggregate productivity, which contrasts with the increase observed in Hungary—a pattern commonly seen in capital-scarce economies following episodes of financial liberalization (Bekaert, Harvey, and Lundblad 2011, Bonfiglioli 2008, among others). We then assess the input-cost channel only, by shutting down the consumption channel and imposing homothetic preferences and equal expenditure elasticities across sectors. The input-cost channel only underestimates the reallocation towards services by a factor of 3.5 and produces a counterfactual larger decline in the operational cut-off in the manufacturing sector. Lastly, we evaluate the consumption channel only—by shutting down the input-cost channel and letting both sectors have equal capital elasticity—and show that non-homothetic preferences are key to quantitatively explain the reallocation of production and consumption towards services and the larger decline in the operational cut-off of services observed in Hungary.

Next, we evaluate the forces driving the increase in aggregate productivity in Hungary by decomposing it into a *composition effect* and a *mass of firms effect*. The *composition effect* holds the mass of firms fixed at the level of the closed economy transition, isolating the impact of the liberalization on the reallocation of resources. The *mass of firms effect*, by contrast, allows the firm mass to respond to financial liberalization, while holding constant the cutoffs and productivity distributions from the closed economy transition. This effect captures changes at the extensive margin through firm entry. Our exercise shows that the composition effect is consistently negative and depresses aggregate productivity, as the liberalization reallocates resources towards service firms, which are typically less productive. This negative composition effect is present in the neoclassical model and accounts for its prediction of declining aggregate productivity. Importantly, in our heterogeneous firm model, this composition effect is dominated by the mass of firms effect. Financial liberalization promotes consumption and encourages entry, especially in services. This surge in entry generates a love-of-variety effect that raises aggregate productivity. It is the mass of firms effect that drives the post-liberalization productivity gains. These findings confirm the importance of the extensive margin adjustments that we document that in our empirical section for Hungary and highlight their relevance for understanding changes in aggregate productivity.

Lastly, we show that non-homothetic preferences amplify these effects on aggregate productivity and lead to higher productivity gains in capital-scarce economies. In particular, economies that open to capital flows with lower levels of capital stock experience larger consumption booms that trigger higher entry and, thus, larger mass of firms effects. Compared with a model with homothetic preferences, capital-scarce economies that liberalize with 25% of capital relative to the open economy steady state have 22% higher productivity gains than economies liberalizing with 70% of capital.

Related Literature. Our paper contributes to international finance literature that document cross-country that financial inflows often trigger short-run reallocation of resources from tradable to non-tradable sectors, particularly services (e.g., Tornell and Westermann 2005; Reis 2013; Benigno, Converse, and Fornaro 2015; Benigno, Fornaro, and Wolf 2025).[2] It also relates to studies showing that the removal of capital controls and stock market liberalizations associate with increases in aggregate productivity in capital-scarce economies (e.g., Bonfiglioli 2008; Bekaert, Harvey, and Lundblad 2011; and Varela 2018) and to the literature relating financial flows to credit and consumption booms (e.g., Schularick and Taylor 2012, Kaminsky and Reinhart 1999, Jeanne and Korinek 2019).[3] We contribute to this literature by (1) focusing on the removal of capital controls that deregulated only cross-border financial shows; (2) exploiting a quasi-natural experiment in Hungary with census-level firm data, including entry and exit across agriculture, manufacturing, and services; (3) identifying and quantifying the input-cost and consumption channels activated by capital inflows, with the latter playing a dominant role; (4) showing that non-homothetic preferences, when embedded in a heterogeneous firm framework, help explaining the observed productivity gains in capital-scarce economies following financial liberalization episodes; and (5) combining rich administrative data on exports, imports, and all forms of credit (bank, supplier, owner) to control for alternative mechanisms.

Our work also relates to the literature on heterogeneous expenditure elasticities in trade and structural transformation. High-income households tend to shift consumption toward services following trade liberalization, driving sectoral reallocation and distributional effects (e.g., Cravino and Levchenko 2017; Cravino and Sotelo 2019; Borusyak and Jaravel 2018; Fieler 2011; Hubmer 2018). We extend this analysis to a dynamic open-economy setting with heterogeneous firms and endogenous entry. Our work also relates to papers showing that differences in sectoral income elasticities drive long-run sectoral dynamics and macroeconomic outcomes (e.g., Ngai and Pissarides 2007; Herrendorf, Rogerson, and Valentinyi 2013; Boppart 2014; Comin, Lashkari, and Mestieri 2021; and Sposi, Yi, and Zhang 2024). Our model complements this work by highlighting the short-run, demand-driven reallocation effects following capital account liberalization and its impact on productivity and extensive margin dynamics.

The paper is organized as follows. Sections 2 and 3 review the financial liberalization and the data. Section 4 presents the identification strategy and empirical results. Section 5 lays out the model and Section 6 presents the quantitative analysis. Section 7 concludes.

[2]Our mechanism—reallocation driven by love for variety and non-homothetic preferences—complements existing literature based on financial frictions (e.g., Gopinath, Kalemli-Ozcan, Karabarbounis, and Villegas-Sanchez 2017; Cingano and Hassan 2020) or endogenous growth (e.g., Benigno, Fornaro, and Wolf 2025).

[3]Gyongyosi, Rariga, and Verner (2023) document that Hungarian households significantly expanded consumption in the run-up to the Global Financial Crisis, which resulted in a sharp contraction when the forint depreciated in 2008. This pattern, also highlighted in Rojas and Saffie (2022), illustrates how non-homothetic preferences can amplify macro-financial fragility in the presence of external liabilities.

2 Financial Liberalization in Hungary

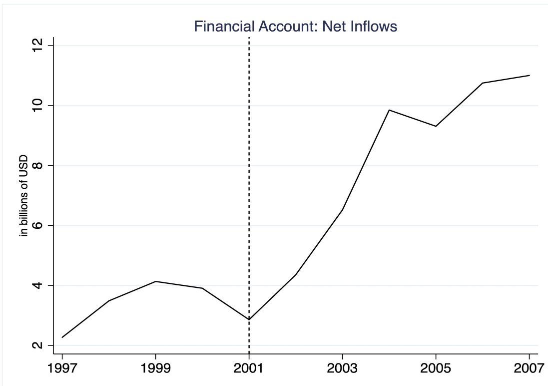
This section presents the capital controls in place in Hungary until 2001, and describes their deregulation and aggregate implications.

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).

In 2001, the Act XCIII removed these regulations and allowed banks to intermediate international financial flows freely.[4] The reform had a large impact on cross-border financial flows as shown in Figure 1. In 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 8.4 billions of USD per year. The net foreign asset position of Hungary deteriorated and dropped by 17.5 percentage points of GDP between 1995-2000 and 2001-2008 (Figures 1 and C.1 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.2 in Appendix C). These inflows translated into an expansion of the local credit supply and a decrease in the domestic lending rate. The credit-to-GDP ratio increased from 24.6% to 43.2% and the domestic lending rate drop from 22% to 10% between 1995-2000 and 2001-2008. While there was already a decreasing trend in the domestic rate in Hungary since the nineties, after controlling from this pre-trend, the real interest rate dropped by 3.5 percentage points in the years following the reform (see Table 5). Capital inflows associated an increased in consumption, shown by the raise of consumption expenditure over GDP. This increased consumption was heterogeneous across sectors. In particular, OCDE consumption

[4]This reform was triggered by the accession to the EU. 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 of capital, the only missing requirement in Hungary. The reform completed the deregulation of international financial flows. Importantly, this reform was not associated with trade or FDI deregulation (see Section 4.1). As shown in Figures C.4 and C.5 in Appendix C, neither trade with the EU or FDI increase after 2001. Table C.4 in Appendix C shows that the expansion in Hungary coincides with the financial liberalization and not with the EU accession. Tables C.2 and C.3 in Appendix C show that the other accessing countries to the EU do not experience similar pattern of reallocation and consumption boom than Hungary.

expenditure of household data for Hungary indicates that consumption rose more in sectors with high expenditure elasticity, defined as sectors whose expenditure elasticity is above the median. The share in real consumption of these sectors increased by 3.1 percentage points after the liberalization (Table 1).[5]



	Before 1995-2000	After 2001-2008
	(1)	(2)
Financial account (net)*	2.5	8.4
NFA/GDP	-65.8	-83.3
Credit/GDP	24.6	43.2
Lending interest rate	21.7	10.1
Consumption/GDP	74.6	76.2
Share of consumption in high expenditure sectors	48.6	51.7

Note: in %. *In billions of USD dollars. Year averages. Source: NBH, World Bank, OECD, IMF.

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 for Hungary. The dataset—APEH (Nemzeti Adó és Vámhivatal 2011)—contains panel data on balance sheets reported to the National Tax and Customs Authority, for all firms subject to capital taxation in agriculture, manufacture and services activities. It reports information on firms' value added, sales, output, employment, wages, materials and liabilities, among others. To obtain real values, we use price indexes at four-digit NACE industries for materials, investment, value added and production production. We construct the capital series using the perpetual inventory method and use four-digit NACE industries price index to obtain the real values. When we control for access to credit, we use the credit registry data, which reports information on all corporate loans with financial institutions in Hungary from 2005 (KHR- Credit Registry data, Magyar Nemzeti Bank 2011). We also merge our data with census information on export and imports at the firm level to conduct additional exercises.

Our database covers the population of Hungarian firms between 1992 and 2008. We exclude firms in education, health and public administration activities, as in Hungary these are mostly public activities. Because small firms are subject to measurement error problems, we keep in our main regressions firms that have three or more employees. To analyze the extensive margin, we consider all firms (including those with less than three employees). Our analysis

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

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 (van Ark and Jäger 2017).[6] To better isolate the impact of the reform, we restrict the analysis to the period 1995-2008.

To identify the input-cost channel, we estimate the capital elasticity at four-digit NACE industries using the Petrin and Levinsohn (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. 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 identify the consumption channel, we employ the expenditure elasticities estimated by Seale, Regmi, and Bernstein (2003) for the U.S. Department of Agriculture—thereafter USDA—at two-digit industries using consumption and expenditure data for Hungary in 1996. These elasticities are estimated prior to the financial liberalization, which alleviates endogeneity concerns that could arise from the liberalization affecting consumption patterns heterogeneously across sectors. Furthermore, they are computed following international standards for a large set of countries and, thus, are comparable across countries. As a robustness, we reestimate all our exercises using the expenditure elasticities estimated by Bils, Klenow, and Malin (2013), who estimate product-level elasticities from the U.S. Consumer Expenditure Survey for 70 categories between 1982-2010. Note that Bils, Klenow, and Malin (2013) map the expenditure elasticities estimated for consumers to producers using input-output tables and EU-KLEMS data. We employ this map to assign to each two-digit sector an expenditure elasticity. It is worth noting that, as shown by Comin, Lashkari, and Mestieri (2021), the expenditure elasticities do not change with a country's income level and, hence, the expenditure elasticities computed for the U.S. are good proxies for those of Hungary. Due to data limitations, we are unable to estimate expenditure elasticities using micro-level household data for Hungary. Tables C.5 and C.6 in Appendix C reports these elasticities.

Table C.7 in Appendix C presents the summary statistics of the capital and expenditure elasticities. The mean capital elasticity is 0.20, whereas the mean expenditure elasticities are 1.20 and 1.07 for the USDA and Bils, Klenow, and Malin (2013) estimations, respectively. Importantly, although capital and expenditure elasticities are negatively correlated, this correlation is small and reaches only 2.1% and 1.4% for the Seale, Regmi, and Bernstein (2003) and Bils, Klenow, and Malin (2013) elasticities, respectively (Figure C.9 in Appendix C). This small

[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).

correlation indicates that these elasticities are not significantly collinear and there is enough variation among them to identify separately the input-cost and consumption channels. To visualize how capital and expenditure elasticities vary across broadly-defined sectors—agriculture, manufacturing and services—, we plot in Figure C.10 in Appendix C these elasticities by sectors. The blue circles show that agriculture activities have the lowest expenditure elasticities, and service activities the highest. Sectors with high capital elasticity tend to be in manufacturing, but there are spread out across the three sectors.

Firms' size varies according with sectors' capital and expenditure elasticities. As we show in Table C.8 in Appendix C, firms in sectors with higher capital elasticity were—on average—larger (value added, capital, employment) and older prior to the reform (1995-2000). Inversely, firms in sectors with higher expenditure elasticity tend to be smaller and younger.

4 Empirics

4.1 Identification Strategy

To illustrate our empirical analysis, we start by sketching key features of our model. We then present our identification strategy for our firm-level analysis and discuss possible concerns, such as the parallel trend assumption, sample selection and reverse causality.

-Sketch of a Model

We identify the consumption and relative input-cost channels 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 produces a final good C, which is composed by multiple sectors j that differ in e_j, the parameter that determines the expenditure elasticity.[7] The representative household maximizes its inter-temporal utility and has non-homothetic preferences à la Comin, Lashkari, and Mestieri (2021), 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 j and θ_j is constant weight parameter. Within each sector j, there are monopolistically competitive firms that produce an infinite number of differentiated varieties with an elasticity of substitution across varieties σ. These intermediate firms are heterogeneous in productivity à la Melitz (2003) and produce using a Cobb-Douglas

[7]The expenditure elasticity of sector j is given by $\eta + (1-\eta)\frac{e_j-\eta}{\bar{e}-\eta}$. $\bar{e}$ is weighted average of e_j, where the weight is the expenditure share of sector j. For expositional simplicity, sometimes we loose call e_j the expenditure elasticity of sector j.

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-cost bundle and $1/\rho$ is the markup. In equilibrium, the optimal production of each firm—$q_{jt}(\varphi)$—is given by

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

Replacing the sectoral price level P_{jt} and applying logs, we can write a firm's optimal production as[8]

$$\log(q_{jt}(\varphi)) = -\alpha_j\eta\log(r_t^k/w_t) + e_j\log(C_t) + (\eta-\sigma)\tilde{\varphi}_{jt} - (\alpha_j+\beta_j)\eta\log(w_t) + \eta\log(P_t) + D_{\varphi j}, \tag{2}$$

where $\tilde{\varphi}_{jt} \equiv \frac{1}{\sigma-1}\log\left[\int_{\varphi_{jt}^*}\varphi^{\sigma-1}\mu(\varphi)d\varphi\right]$ reflects the weighted average of firms' productivity levels in each sector j, and $D_{\varphi j}$ is a constant term with sector and firm level parameters.

Equation (2) illustrates how the relative input-cost and consumption channels impact a firm's production. Other things equal, a decrease in the relative price of capital (r^k/w and, thus, $\phi_{j,t}$) lowers the input-cost 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 expenditure elasticity (higher e_j). Formally, the partial effects are given by $\frac{\partial log(q_{jt}(\varphi))}{\partial log(r_t^k/w_t)} = -\alpha_j\eta < 0$ and $\frac{\partial log(q_{jt}(\varphi))}{\partial log(C_t)} = e_j > 0$. 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.

It is worth noting that the level of industry aggregation used in the empirical analysis is different than in the model. To better identify the effect of the reform, the empirical analysis exploits differences across two- and four-digit industries, whereas the quantitative model—presented in Section 5— focuses its analysis on differences across manufacturing and services due to computational reasons. In particular, the expenditure, capital and η elasticities are considered at disaggregated industries in the empirics, whereas they correspond to the manufacturing and service sectors in the quantitative model. Finally, note that, in the empirical analysis, η and σ should be closer in size given that our identification is based on highly disaggregated industries.

[8] Appendix B presents a full derivation of this equation. Note that the log of the sector price level is given by $\log(P_{jt}) = \frac{1}{1-\sigma}\log\left[\int_{\varphi_{jt}^*} p_{jt(\varphi)}^{1-\sigma}\mu(\varphi)d\varphi\right]$, which can be re-written as $\log(P_{jt}) = \log\phi_{jt} + \log\left(\frac{1}{\rho}\right) - \tilde{\varphi}_{jt}$.

-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 expenditure elasticities across sectors as sources of cross-sectional variation. We evaluate the relative input-cost and consumption channels sequentially and, next, together in the same regression. We estimate our main regressions in first differences, so that all constant firm and industry characteristics are differenced out. Following equation (2), we include the weighted average of firms' productivity levels at four-digit industries to control for industries' time-variant trends. Alternatively, as a robustness, we control for the four-digit industry price index. To show that our results are not an artefact of first differencing, we estimate panel regressions at the firm level and show that our results remain valid under this specification in which firm fixed effects are included.

A critical assumption of the empirical strategy is that firms across capital and expenditure elasticities shared similar growth trends before the reform. To assess the parallel trend assumption, we compute firms' yearly growth rates in the main variables analyzed—value added, capital and employment—during the pre-liberalization period (1995-2000) and regress them on the capital and expenditure elasticities. We include sector-fixed effects—defined at two-digit and one-digit levels for capital and expenditure elasticities, respectively—to control for sector-time invariant characteristics. Table C.9 in Appendix C shows that neither the capital or expenditure elasticity correlates with higher growth before the reform.

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 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] The Hungarian

[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.5 in Appendix C). 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.6 in Appendix C).

[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

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 in Appendix C). It is worth mentioning that the other nine countries joining the EU in 2004 did not experience the similar patterns of GDP and consumption growth nor reallocation of production observed in Hungary after 2001 (or after the accession vote) (Tables C.2 and C.3 in Appendix C). The patterns of GDP growth, consumption growth or reallocation on observed in Hungary cannot be attributed to the joining of the EU, as the timing does not coincide with the accession (Table C.4 in Appendix C). Furthermore, other similar candidates with already deregulated financial accounts do not show the pattern of capital inflows observed in Hungary (Figure C.7 in Appendix C). 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 employ 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 with their capital and expenditure elasticities.

Consider equation (2) that indicates a firm's optimal production. We can write this equation in a difference-in-difference estimator as follows

$$\log(q_{ijt}) = \gamma_0 \mathrm{FL}_t + \gamma_1(\alpha_j \times \mathrm{FL}_t) + \gamma_2(e_m \times \mathrm{FL}_t) + \gamma_3\tilde{\varphi}_{jt} + \gamma_4((\alpha_j + \beta_j) \times \mathrm{FL}_t) + \mu_i + \varepsilon_{it}, \quad (3)$$

where i, j, t denote firm, four-digit industry and time, and q_{ijt} is the real value added of the firm. FL_t is a dummy variable equal to one for the post-reform period ($\mathrm{FL}_t = 1$ if year ≥ 2001, 0 otherwise). We denote the expenditure elasticity with the subscript m to highlight that this elasticity varies at two-digit industry level, while j denotes four-digit industry level. μ_i are firm-fixed effects that absorb all firm and industry time-invariant characteristics.[12]

Each term of regression (3) has a direct mapping in equation (2). γ_0 captures time-varying trends that affect all sectors equally and absorbs the evolution of the aggregate price level $\eta \log(P_t)$. γ_1 captures the input-cost channel expressed in the term $\eta \log(r_t^k/w_t)$. γ_2 captures

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, cost-income ratio nor number of credit institutions. See Varela (2018) more for details about the financial liberalization in Hungary.

[12] The term $(\alpha_j + \beta_j)$ is multiplied by the financial liberalization dummy because it includes the effect of the instrument α_j. The term $\tilde{\varphi}_{jt}$ is estimated at four-digit industries and is not multiplied by this dummy because the instrument is not involved in the expression.

the effect of expenditure channel given by the evolution of aggregate consumption, $\log(C_t)$. γ_3 absorbs changes in the sectoral average productivity. It is worth noting that this variable is constructed using firm-level data and, hence, changes in firms' productivity are accounted for in this variable. γ_4 controls for the heterogeneous evolution according to the returns to scale of the sector, given by $\eta \log(w_t)$. The firm-fixed effects μ_i capture the constant parameters of the term $D_{\varphi j}$.

A potential concern about regression (3), estimated with yearly firm-level data, is that residuals could be serially correlated—across time within firms and across firms within sectors for a given year. Serial correlation in the error term might understate the OLS standard errors and induce a type II error, i.e. rejecting the null hypothesis when this is true. To account for this source of bias of the OLS standard errors, we use one of the solutions proposed by Bertrand, Duflo, and Mullainathan (2004) and remove the time series dimension of the data. More precisely, we aggregate the data into pre- and post-reform periods and compute growth rates as the average value of these periods. That is,

$$\Delta q_{ij} = \log\left(\frac{1}{8}\sum_{2001}^{2008} q_{ijt}\right) - \log\left(\frac{1}{6}\sum_{1995}^{2000} q_{ijt}\right).$$

We then estimate equation (3) in first differences, which is given by

$$\Delta q_{ij} = \gamma_0 + \gamma_1 \alpha_j + \gamma_2 e_m + \gamma_3 \Delta\tilde{\varphi}_j + \gamma_4(\alpha_j + \beta_j) + \Delta\varepsilon_i, \tag{4}$$

where γ_1 and γ_2 capture the effect of financial liberalization across sectors with different capital and expenditure elasticities, respectively. Given that the financial liberalization decreased the relative price of capital and increased consumption, we expect both to be positive, e.g. $\gamma_1, \gamma_2 > 0$. Note that this difference-in-difference approach reports changes in relative terms and does not inform about absolute changes. For example, a larger expansion in sectors with higher expenditure elasticity is relative to sectors with lower expenditure elasticity, and similarly for sectors with higher versus lower capital elasticity. We cluster the OLS standard errors at the four-digit NACE level to take into account the correlation across firms within sectors. Similarly, we express firms' real capital and labor demands as a function of the structural parameters of the model, and obtain an equivalent expression to equation (4) (see Appendix B).

4.2.1 Empirical Results

The estimated coefficients of equation (4) are presented in Table 1. Columns 1-4 present the estimations using Seale, Regmi, and Bernstein (2003) (USDA)'s expenditure elasticities for Hungary, and columns 5-7 reproduce the analysis employing Bils, Klenow, and Malin (2013) elasticities. Column 1 in Panel A shows the results on the cross-section of capital elasticities on firms' real value added. The estimated coefficient is positive and statistically significant, indicating that firms producing in industries with higher capital elasticity increase their real value added relatively more after the financial liberalization. Column 2 reports the coefficient for the consumption channel and shows that firms in industries with higher expenditure elasticity experience a differential expansion in their real value added. In column 3, we include both capital and expenditure elasticities and show that the coefficients remain similar in magnitude and statistically significant when jointly included in the regression, thereby controlling for each of these channels. In column 4, we further add average sectoral productivity and returns to scale controls, and show that results remain unchanged. The estimated coefficient for capital elasticity implies that one standard deviation increase in this elasticity (0.045)—such as moving from hotels and restaurants to metal production—associates with 4.2% higher expansion in real value added. The coefficient of the expenditure elasticity is higher and indicates that one standard deviation increase in this elasticity (0.223)—such as moving from machinery and equipment to computers—associates with 8.4% higher expansion in real value added.

Columns 5-7 show that the coefficients remain positive and statistically significant when using Bils, Klenow, and Malin (2013)'s expenditure elasticities. In particular, once all controls are included in column 7, the estimated coefficient for the expenditure elasticity indicates that one standard deviation increase in this elasticity (0.414) associates with a 4% increase in real value added.

The estimated coefficients in Table 1 suggest that the expansion in firms' real value added is larger in sectors with high expenditure elasticity than in sectors with high capital elasticity. To assess this comparison econometrically, we estimate the standardized beta coefficients of columns 4 and 7 and report them in Table C.10 in Appendix C. This analysis confirms that firms expanded more in accordance with their expenditure elasticity than with their capital elasticity. As we discuss over the next sections, this result provides support to our aggregate analysis that indicates that the consumption channel dominates and resources reallocate relatively more towards sectors with high expenditure elasticity.

Panel B presents the results for capital, showing that the coefficient on capital elasticity is statistically significant across all specifications. As expected, firms with higher capital elasticity benefit more from the reduction in the cost of capital and expand disproportionately following financial liberalization. The coefficient indicates that a one standard deviation increase in capital elasticity is associated with a 4.4% increase in firm-level capital. Firms do not change their capital stock in accordance with the expenditure elasticity (columns 1-4). Panel C reports the results for employment and indicates that firms producing goods with higher expenditure elasticity increase their employment to a greater extent. The coefficient based on USDA elasticities implies a 9.3% greater increase in employment for a one standard deviation rise in expenditure elasticity (or 5.9% when using the elasticities from Bils, Klenow, and Malin 2013).

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

	Panel A. Δ Real Value Added						
	USDA				Bils, Klenow, and Malin (2013)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Capital elasticity	0.689*		0.954**	0.878**		0.691*	0.643*
	(0.416)		(0.416)	(0.378)		(0.401)	(0.368)
Expenditure elasticity		0.325***	0.357***	0.376***	0.098**	0.098**	0.096**
		(0.081)	(0.087)	(0.087)	(0.048)	(0.046)	(0.048)
Average sectoral productivity				0.047			0.061
				(0.045)			(0.042)
Returns to scale				-0.271			-0.055
				(0.174)			(0.193)
R^2	0.001	0.005	0.006	0.008	0.001	0.002	0.003
N	53,309	53,309	53,309	53,309	53,246	53,246	53,246
	Panel B. Δ Capital						
Capital elasticity	0.779*		0.883**	0.931**		0.779*	0.851**
	(0.412)		(0.384)	(0.397)		(0.420)	(0.405)
Expenditure elasticity		0.101	0.132	0.114	-0.022	-0.020	-0.014
		(0.092)	(0.098)	(0.098)	(0.075)	(0.071)	(0.065)
Average sectoral productivity				-0.031			-0.027
				(0.037)			(0.036)
Returns to scale				0.211			0.266
				(0.216)			(0.224)
R^2	0.001	0.000	0.001	0.002	0.000	0.001	0.001
N	50,878	50,878	50,878	50,878	50,817	50,817	50,817
	Panel C. Δ Employment						
Capital elasticity	0.516		0.842***	0.832***		0.525	0.554
	(0.405)		(0.312)	(0.312)		(0.374)	(0.347)
Expenditure elasticity		0.374***	0.406***	0.415***	0.141***	0.141***	0.142***
		(0.083)	(0.086)	(0.088)	(0.046)	(0.044)	(0.043)
Average sectoral productivity				0.000			0.014
				(0.027)			(0.034)
Returns to scale				-0.078			0.154
				(0.138)			(0.183)
R^2	0.001	0.009	0.011	0.011	0.004	0.005	0.005
N	47,710	47,710	47,710	47,710	47,656	47,656	47,656

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticities come from Seale, Regmi, and Bernstein 2003 (USDA)'s computation for Hungary and Bils, Klenow, and Malin (2013) at two-digit NACE industries. Source: APEH.

4.2.2 Alternative Mechanisms and Robustness Tests

We next evaluate the validity of our results in two steps. In a first set of exercises, we assess two mechanisms that could potentially confound our results: non-tradability and relaxation of financial frictions. In a second set of exercises, we conduct a full set of robustness tests that include re-estimating our regressions using continuous measures of financial openness, estimating panel regressions with unbalanced panel of firms, controlling for exporters, foreign firms and the housing program, using different methodologies to estimate the capital and expenditure elasticities.

Alternative Mechanisms

(1) Non-Tradability. As shown theoretically by Benigno and Fornaro (2013), capital inflows can boost consumption and lead to the expansion of non-tradable production. Since tradable goods can be imported, resources shift towards the production of non-tradable goods to meet the increased domestic demand. The consumption channel studied in this paper builds on this mechanism and adds that the increased in demand can be heterogeneous across (disaggregated) industries. Industries with higher expenditure elasticities would experience a larger increase in their demand, which in case of tradable goods could partly be satisfied with domestic production and/or imports depending on the elasticity of substitution with imported tradable goods, whilst for non-tradable goods could be satisfied only with higher domestic production.

To assess that our estimates capture differences in expenditure elasticities and not only differences in sectors' tradability, we reestimate our regressions controlling for non-tradability. In particular, we employ (i) two definitions for non-tradable industries and (ii) control for imports of household consumption in Hungary. (i) We first use Broadbent, Di Pace, Drechsel, Harrison, and Tenreyro (2024) categorization of non-tradable industries, who define tradable and non-tradable industries at the two-digit industry level. We then consider a broader definition for non-tradable and let the service sector be non-tradable, whilst agriculture and manufacturing sectors be tradable. (ii) Alternatively, we control for the share of imports of household consumption at two-digit level before the reform (i.e., average share between 1995 and 2000) that we obtain from the OECD for Hungary. Additionally, we also control for the change in the share of import of household consumption before and after the reform.

Table 2 presents the results. In column 1, we replace the expenditure elasticities with a dummy for non-tradable industries, using the definitions of Broadbent, Di Pace, Drechsel, Harrison, and Tenreyro (2024). Confirming Benigno and Fornaro (2013), the dummy for non-tradable is positive and statistically significant, indicating that non-tradable industries increase their real value added by more. In column 2, we add to the specification the expenditure elasticity. Statistically significant and similar in size to our baseline estimation, the expenditure

Table 2: Non-Tradability

	Δ Real Value Added				
	(1)	(2)	(3)	(4)	(5)
Capital elasticity	0.648*	0.872**	0.858**	0.829**	0.829**
	(0.375)	(0.371)	(0.384)	(0.377)	(0.377)
Expenditure elasticity		0.363***	0.424***	0.301***	0.297**
		(0.091)	(0.087)	(0.096)	(0.124)
Non-tradable industry	0.098**	0.011	-0.044		
	(0.039)	(0.037)	(0.036)		
Share of imports of household consumption before FL				-0.697***	-0.706**
				(0.247)	(0.312)
Δ Share of imports of household consumption					-0.081
					(1.026)
Average sectoral productivity	0.060	0.048	0.046	0.047	0.047
	(0.044)	(0.045)	(0.044)	(0.045)	(0.045)
Returns to scale	-0.186	-0.276	-0.247	-0.279	-0.279
	(0.187)	(0.176)	(0.181)	(0.173)	(0.173)
Definition of non-tradable sector	Broadbent et al (2019)	Broadbent et al (2019)	Services		
R^2	0.004	0.008	0.008	0.009	0.009
N	53,309	53,309	53,309	53,309	53,309

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticity comes from Seale, Regmi, and Bernstein (2003) (USDA) computations for Hungary at two-digit NACE industries. Source: APEH.

elasticity overpowers the non-tradable dummy, which becomes statistically non-significant and smaller in size. In column 3, we confirm the relevance of the heterogeneous expenditure elasticities, when using the broader (only services) definition for non-tradable sectors. In column 4, we show that, as predicted by the theory, industries producing goods where households' consumption of imported good was low increased their real value added by more. Importantly, the estimated coefficient for the expenditure elasticity remain positive and statistically significant. In column 5, we additionally control for the change in imports of household consumption before and after the liberalization, and confirm our results.

These results indicate that, while firms in non-tradable industries expand after the liberalization, non-homotheticities in consumption lead to a further increase in production. This is consistent with our findings in Section 6.3 showing that, while a model with homothetic preferences delivers reallocation of production towards the non-tradable sector, it cannot quantitatively explain the reallocation of production observed in Hungary. It is also aligns with our findings in Appendix E, where we develop a four-sectors model with a tradable and a non-tradable sectors composed by two industries with high and low expenditure elasticities, and show that, even after accounting for non-tradability, industries producing goods with high-expenditure elasticity grow relatively more.

(2) Financial frictions. Research has linked capital inflows to a relaxation of financial frictions (Reis 2013; Gopinath, Kalemli-Ozcan, Karabarbounis, and Villegas-Sanchez 2017; Cingano and Hassan 2020). If the ease of financial frictions was correlated with the capital or expenditure elasticities, it could create omitted variable bias and challenge our results.[13] To assess this possibility, we conduct exercises based on different measures of industry dependence on external finance, and on firms' debt obligations around the time of the reform.

(i) Industry measures. Previous studies have shown that industries differ in characteristics that could imply heterogeneous needs for external finance and, hence, exposure to financial frictions. To measure them, they created proxies that capture needs for external finance arising from heterogeneous requirement for investment or liquidity across sectors. Focusing on investment needs, Rajan and Zingales (1998) create an index on dependence on external finance that measures the amount of investment that cannot be financed through internal cash flows. Centering on liquidity needs, Raddatz (2006) builds two alternative proxies to measure dependence on external finance: inventories to sales—that captures the fraction of inventory investment that can be financed with sales—and cash conversion cycle—that estimates the length in days between the moment a firm pays for its raw materials and the moment it obtain the receivables from its sales. To assess whether our results could be capturing the effect of a relaxation of financial frictions instead of the input-cost and consumption channels, we employ these three measures as proxies for sectors' *technological* needs for external finance.[14] We re-estimate equation (4) and add these three measures as controls. Table C.11 in Appendix C shows that neither of these financial dependent measures of affect our results. In general, these indices are not

[13] It is important to remark that any variable not correlated with the capital or expenditure elasticities would not bias the estimated coefficients. Econometrically, for the coefficient to be biased, the covariance between the omitted variable and the corresponding elasticity needs to be different than zero. See for example Varela (2017) for heterogeneous access to credit across sectors in emerging markets.

[14] We follow the literature and estimate these three indexes at four-digit NACE industries for the U.S. using Compustat data. As in the literature, we use the U.S. as a benchmark because capital markets are largely advanced in the U.S. and listed firms are less likely to be credit constrained and, hence, these indexes could be considered to capture the *technical* needs for external finance in a sector. Furthermore, using indexes estimated for U.S. firms avoids endogeneity concerns that could arise from financial frictions in Hungary. The Rajan and Zingales (1998) index is constructed as the median ratio of capital expenditure minus sales over capital expenditure in each four-digit NACE industry. The inventories to sales ratio is the median ratio of total inventories to annual sales in each industry. The cash conversion cycle is defined as the median inventories *365/cost of goods sold + account receivables *365/ total sales- account payables *365/cost goods sold, in each industry. Note that, for the three measures, the higher the index, the higher the industry's reliance on external finance. The correlation of the Rajan and Zingales (1998) index and the capital elasticity is positive but small reaching 8%, and it is -5.7% with the expenditure elasticity. The correlation of the inventories to sales is 7.9% and -49% with the capital and expenditure elasticities, respectively. The correlation of the cash conversion cycle is 11% and -13% with the capital and expenditure elasticities.

statistically significant and, most importantly, the coefficients for both capital and expenditure elasticities remain statistically significant and similar in size than in our main specification.

These results show that standard measures of industry dependence on external finance do not affect our estimates of capital and expenditure elasticities. However, such measures may not fully capture financial frictions or could be omitting some firm/sector characteristics that imply heterogeneous access to external finance across sectors. For example, small firms—despite requiring less investment or having short cash cycles—may still face constraints such as earnings-based collateral requirements.[15] If smaller firms are concentrated in sectors correlated with our elasticities, this could bias our estimates. Section 3 shows that firms in high-expenditure elasticity sectors are indeed smaller and, thus, could be more affected by these frictions. To verify that the observed effects reflect the consumption channel rather than easing of financial constraints, we conduct additional exercises using firm-level debt data.

(ii) Firms' debt obligations. In these exercises, we employ credit registry and balance sheet data to remove from our sample firms that have any type of obligations with financial institutions in Hungary, trade credit or debt with owners at any point in time over the period 1995-2008. In this way, our estimates for the expenditure elasticity are based on firms that do not ever report any type of credit and, hence, cannot be attributed to an ease of financial frictions after the financial liberalization. We conduct seven empirical exercises that we report in Table C.12 in Appendix C.

In our first exercise, we employ credit registry data that provides information on each loan agreement (on a monthly basis) with financial institutions in Hungary since 2005.[16] We use this data to remove firms that report any type of loan since 2005 and re-estimate equation (4) only for firms without credit. Column 1 in Panel A shows that the coefficient for the expenditure elasticity on real value added remains statistically significant after we remove these firms.

Firms might take debt obligations with agents other than financial institutions, as suppliers or owners. Hence, if credit conditions improved for these agents and they were to provide more credit to firms in high-expenditure elasticity sectors, one could be confounding the consumption channel with this ease of financing conditions. To address this, we use firms' balance sheet data submitted to tax authorities, which includes all financial obligations regardless of creditor type. This comprehensive dataset, available from 1995 to 2008, allows us to exclude firms with any such obligations and to analyze the data by obligation type and maturity. In column 2, we focus on firms that do not report long-term obligations in their balance sheets and show

[15] See Lian and Ma (2020), Ivashina, Laeven, and Moral-Benito (2020), Drechsel (2020), among others.

[16] This data reports information on loans with banks, investment firms, banks' subsidiaries, bank cooperatives and other financial firms. Unfortunately, the credit registry data only exists since 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).

that the coefficient for the expenditure elasticity remains positive and statistically significant.[17] Columns 3-6 focus on short-term obligations. Column 3 removes firms that report debt with owners, column 4 removes firms that have trade credit, column 5 removes firms that report short-term loans with banks, and column 6 removes firms that have any type of these short-term obligations. All across specifications in columns 3-6, the coefficient for the expenditure elasticity remains positive and statistically significant. Finally, in column 7, we combine these exercises and remove firms that do not report any type of loan contract in the credit registry data and/or any short/long term obligation in their balance sheet. Importantly, the coefficient on the expenditure elasticity remains positive and is highly statistically significant.[18]

Robustness Tests

We now turn to conduct a six robustness tests for Table 1. First, when transforming equation (2) in to a difference-in-difference estimator, we implicitly assumed changes in relative input-cost and consumption channels by replacing the terms $\log(r_t^k/w_t)$, $\log(C_t)$ and $\log(w_t)$ with a financial liberalization dummy. Instead, one could compute these changes by doing the first difference of these variables and replace them in equation (4). We undertook this exercise and show in Table C.13 in Appendix C that our results hold true when using continuous measures for the treatment variables.[19]

Second, our regression in first differences implicitly estimated the impact of the reform for firms present before and after the liberalization. To show that our results are robust to an unbalanced panel of firms, we estimate a panel regression of equation (3) for all firms in the sample. Table C.14 in Appendix C confirms our findings. Additionally, our results are robust to considering continuing firms only, which we define as firms existing all along the period 1995 to 2008 (Table C.15 in Appendix C).

Third, to check that the our results are not driven by exporters or foreign-owned firms, we exclude them from the analysis. Columns 1-3 and 4-6 in Table C.16 in Appendix C present the results for non-exporters and domestically-owned firms, respectively, and show that the estimated coefficients remain statistically significant and similar in size to our main estimation. Together these results indicate that the expansion upon the financial liberalization is mainly

[17]Unfortunately, long-term obligations are not disaggregated by counterparty (owners, trade credit, banks).

[18]In Table C.12 in Appendix C, we also present results for the estimated coefficient on the capital elasticity. The effects on value-added and on capital continue to be largely positive, although few coefficients are statistically significant. However, these weaker estimates should not be interpreted as evidence against the input-cost channel. Within the set of financially unconstrained firms, as long as they are more likely to borrow the higher the capital elasticity, then removing such firms from the analysis will necessarily weaken our results for the input-cost channel. Firms with higher capital elasticity will have a greater increase in demand for capital for a given reduction in the cost of capital, all else equal, so the increased likelihood of borrowing is plausible.

[19]For easy of the comparison, when estimating the regressions with the continuous measure, we multiply the coefficient on the input-cost channel by -1 to have the same sign as the main specification.

driven by non-exporters and domestic firms. Table C.17 in Appendix C shows that our results are robust to controlling for changes in firms' imports.

Fourth, equation (4) could also be estimated using the sectoral price index instead of the average productivity of the sector. In Table C.18 in Appendix C, we report the results of this exercise and show that the estimated coefficients remain statistically significant when using the sectoral price index.

Fifth, we show that our results are robust to estimating the capital elasticities using Olley and Pakes (1996) method (Table C.19 in Appendix C).

Lastly, it is worth mentioning that the larger expansion in sectors producing goods with high expenditure elasticity is robust to controlling for the housing program of early 2000s. Verner and Gyongyosi (2020) show that subsidized local currency mortgages were primarily driven by regional banks. To test for this, we add county fixed effects and show that, within counties (i.e. after considering each county's specific trend), firms in high-expenditure elasticities sectors expanded relatively more (column 1 Table C.20 in Appendix C). Our results are also robust to control for the county's real value added growth and real investment growth during different periods, as shown in columns 2-7.[20]

4.3 Industry-Level Analysis and Extensive Margin

We turn now to assess the impact of the financial liberalization at the industry level and on the extensive margin. With this end, we estimate the following regression:

$$\Delta y_j = \gamma_0 + \gamma_1 \alpha_j + \gamma_2 e_m + \Delta \varepsilon_j, \tag{5}$$

where $y_j = \{\text{net entrants and entrants}\}$, where *net entrants* and *entrant* is the number of net entry (entry-exit) and entrants within each four-digit industry. We cluster the standard errors at four-digit NACE industries.

Table 3 presents the results. Column 1 shows that the financial liberalization in Hungary associates with an increase in net entry in sectors with high expenditure elasticity. The estimated coefficient is not only statistically, but also economically significant. It implies that a one standard deviation increase in the expenditure elasticity correlates with a 15% increase in the number of net entrants. Column 2 shows that this expansion in net entry is mainly explained by an increase in entrants. To evaluate the characteristics of new entrants, we restrict our analysis to entrant firms and test whether—upon the financial liberalization—they differ in

[20]As described by Kornfield (2006), the housing program was temporary and limited to first time buyers. During the first two years of the program, there was practically no increase in banks' housing loans (Kornfield 2006, Bethlendi and Kiss 2005 and Verner and Gyongyosi 2020). It was the large influx of capital triggered by the liberalization that allow banks to increase their credit supply, including that of mortgages. Fuelling foreign funds, the financial liberalization was then a key element that permitted the expansion of the housing program.

observable characteristics, such as RTFP and value added. Columns 3 and 4 in Table 3 show that, in sectors with high expenditure elasticity, entrants were less productive and smaller.

Table 3: Industry-Level Analysis and Extensive Margin

	Industry-Level Analysis		Entrants	
	Δ Net Entrants	Δ Entrants	Log RTFP	Log Real VA
	(1)	(2)	(3)	(4)
Capital elasticity	-0.284 (0.779)	0.055 (0.642)		
Expenditure elasticity	0.686*** (0.195)	0.854*** (0.141)		
FL*Capital Elasticity			0.659* (0.399)	0.273 (0.222)
FL*Expenditure Elasticity			-0.229** (0.104)	-0.362*** (0.058)
Year FE			Yes	Yes
Sector FE			Yes	Yes
R^2	0.049	0.091	0.113	0.134
N	315	315	92,739	169,384

Notes: *, **, *** significant at 10, 5, and 1 percent. Standard errors are clustered at four-digit industries in columns 1 and 2, and at time and four-digit industries in columns 3 and 4. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary at two-digit NACE industries. Source: APEH.

To illustrate the expansion of entry as a function of the industry's expenditure elasticity, we compute the number of net entrants and entrants per year in each industry before and after the reform. In particular, we estimate a regression: $y_{m,t} = \gamma_1(e_m \text{ x } \mathrm{FL}_t) + \gamma_2 e_m + \gamma_3(\alpha_m \text{ x } \mathrm{FL}_t) + \gamma_4\alpha_m + \varepsilon_{m,t}$, where $y_{m,t}$ is net entry or entry, and plot the predicted values for these variables before and after the reform.[21] These values capture the relationship between entrants and expenditure elasticity, once capital elasticity is controlled for. Figure 2 shows that the number of net entrants and entrants is highly and positively related with sector's expenditure elasticity after the financial liberalization, in contrasts with the pre-liberalization period. After the reform, an industry with an expenditure elasticity of 1.375 (in the USDA categorization)—such as recreation—had on average more than 15,603 new firms created per year, which is 9,464 more firms than an industry with low expenditure elasticity (such as agriculture).

This figure confirms that the financial liberalization in Hungary associates with higher entry in sectors producing goods with high-expenditure elasticity and, hence, that experienced the highest increase in demand. Table C.22 in Appendix C reports the top 15 four-digit NACE industries that experienced the highest number of net entrants in post-liberalization. Column 1 shows that all these sectors are in services and dominated by real estate, construction, restau-

[21] FL_t is a dummy variable that equals to 1 for the post-reform period ($\mathrm{FL}_t \geq 2001$) and 0 otherwise. Therefore, the coefficient γ_1 captures the relationship in the post-liberalization period, and γ_2 captures the relationship in the pre-liberalization period (i.e. when $\mathrm{FL}_t = 0$).

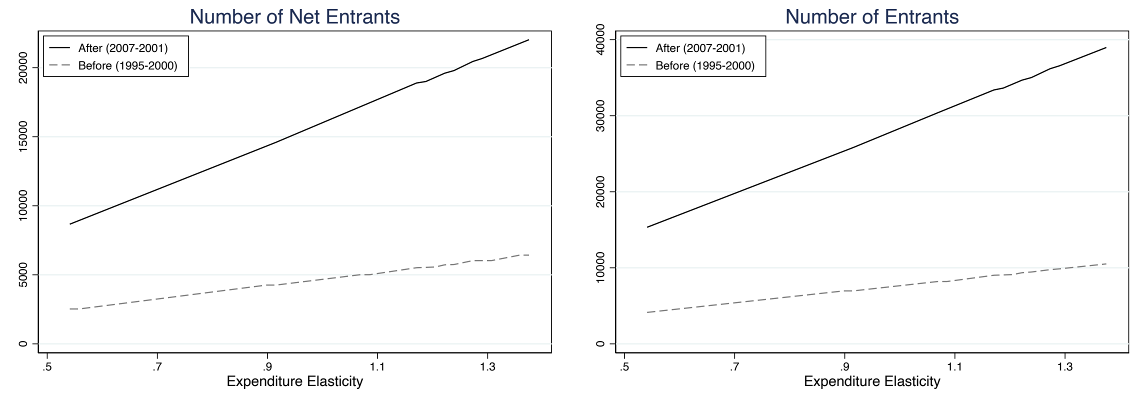


Figure 2: Net Entrants

rants, bars, retail trade, transport and business activities. The industries that saw more net entrants are: buying and selling own real state, construction, other business activities, consultancy and restaurants, which are sectors that have high expenditure elasticity (columns 4-6). Importantly, entering firms are small and do not exceed four employees on average (column 7). The importance of new entrants in aggregate employment is not negligible, as the 15 sectors with higher entry accounted for almost 1% of aggregate employment in the year of entry. 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.12 in Appendix C).

4.4 Aggregate Analysis

The previous sections reported that, upon the financial liberalization, firms expanded more their real value added as a function of sectors' expenditure elasticity and an increase in the extensive margin in those sectors. These changes suggest the presence of reallocation forces across sectors and, in particular, towards sectors with high-expenditure elasticity.

To assess this, we define sectors below and above the median of the expenditure elasticity across industries and check whether there is reallocation towards them. More precisely, we sum the value added of sectors with above median expenditure elasticity and compute the share of high expenditure elasticity sectors on the economy. We then regress these shares on a time trend and dummy variables for the years following the financial liberalization, as follows

$$\text{share}_t = \sum_{t=2001}^{2008} \beta_t D_t + \text{Time}_t + \varepsilon_t, \tag{6}$$

where $D_t = 1$ if year $= t$ and 0 otherwise. The β_t coefficients capture whether the share of sectors with high expenditure elasticities 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 value added in sectors with high expenditure elasticity increases and is statistically different from the pre-liberalization trend. The same pattern is valid for employment.[22]

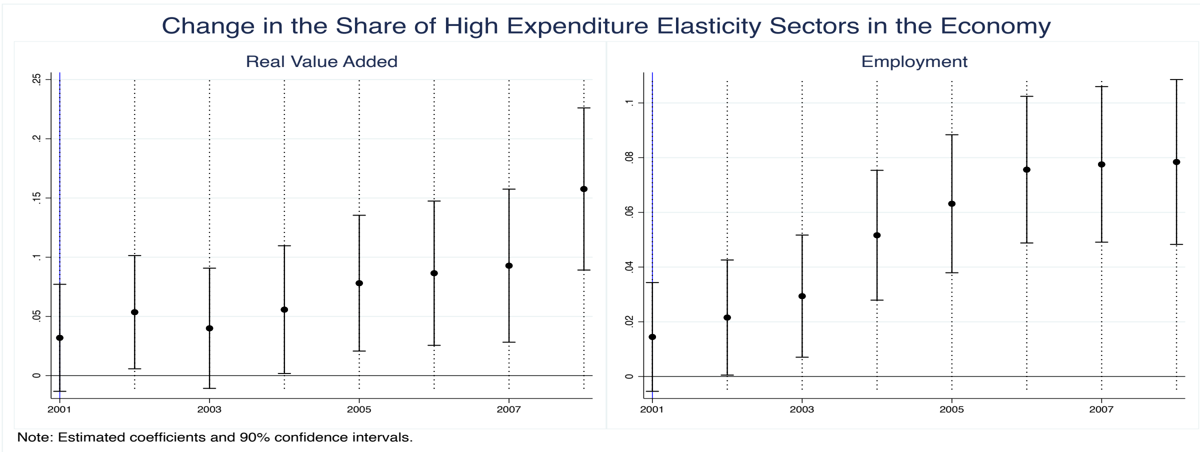


Figure 3: Reallocation across sectors: High Expenditure Elasticities

This confirms that the larger expansion in the intensive and extensive margins associates with reallocaation towards sectors with hi-expenditure elasticities on the aggregate. In the next section, we build a heterogeneous firm dynamics model that rationalizes these findings.[23]

5 Model

This section develops a small open economy model to analyze the macroeconomic and microeconomic effects of capital account liberalization. The economy comprises two sectors—manufacturing and services—each populated by heterogeneous firms following the framework of Melitz (2003). Firms employ capital and labor as inputs. The manufacturing good is tradable internationally, whereas services are non-tradable. Capital controls restrict domestic households from fully accessing international financial markets. We model financial liberalization as an unanticipated removal of these capital controls during the transition to the economy's steady state. The model is used to examine how financial liberalization affects resource reallocation

[22] In an additional exercise, we analyze the aggregate implication of these forces for broadly-defined sectors. As discussed in Section 3, our estimations for capital and expenditure elasticities imply that the manufacturing sector is capital intensive and has lower expenditure elasticity, while the service sector is labor intensive and has high expenditure elasticity. We re-estimate equation (6) for the share of services and show in Figure C.11 in Appendix C that upon the liberalization, the share of services in value added and employment increases and is statistically different from the pre-liberalization trend.

[23] Appendix A presents cross-country evidence that financial liberalization is associated with the expansion of service sectors characterized by high expenditure elasticities.

both within and across sectors, and how it influences aggregate productivity. In Section Appendix E, we extend the model to include four industries: two in the tradable manufacturing sector and two in the non-tradable service sector, each differentiated by expenditure and production elasticities. This richer structure allows us to demonstrate that, consistent with our empirical findings, expenditure elasticities play an important role even within sectors.

5.1 *Representative Household*

The domestic household has the following intertemporal preferences:

$$U = \sum_{t=0}^{\infty} \beta^t \frac{(C_t^{1-\gamma} - 1)}{1-\gamma}, \tag{7}$$

where $\beta \in (0,1)$ is the discount factor and γ determines the elasticity of intertemporal substitution. C_t represents an aggregate consumption bundle, composed of manufacturing C_{Mt} and services C_{St} goods, which is defined implicitly by the following aggregator:

$$1 = \left[\theta_M^{\frac{1}{\eta}} C_t^{\frac{e_M - \eta}{\eta}} C_{Mt}^{\frac{\eta-1}{\eta}} + \theta_S^{\frac{1}{\eta}} C_t^{\frac{e_S - \eta}{\eta}} C_{St}^{\frac{\eta-1}{\eta}} \right], \tag{8}$$

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 determines the (constant) aggregate consumption elasticity of demand for sectoral good C_{jt}. The above functional form draw from Comin, Lashkari, and Mestieri (2021), and is a non-homothetic generalization of the CES aggregator. Equation (8) implies that, when aggregate consumption C_t increases keeping sectoral prices fixed, 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 when $e_j = 1$.[24]

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:

$$C_{Mt} = \left[(\theta_D)^{\frac{1}{\eta_M}} \left(C_{Mt}^D \right)^{\frac{\eta_M - 1}{\eta_M}} + (\theta_F)^{\frac{1}{\eta_M}} \left(C_{Mt}^F \right)^{\frac{\eta_M - 1}{\eta_M}} \right]^{\frac{\eta_M}{\eta_M - 1}}, \tag{9}$$

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 home bias in manufacturing. Finally, C_{St} and C_{Mt}^D are each a CES aggregate of a continuum

[24] In Appendix D, we show that the model's mechanisms and predictions remain valid under an alternative non-homothetic demand system (Boppart, 2014).

of differentiated varieties:

$$C_{St} = \left[\int_{\omega\in\Omega_{St}} q^d_{St}(\omega)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \qquad \text{and} \qquad C^D_{Mt} = \left[\int_{\omega\in\Omega_{Mt}} q^d_{Mt}(\omega)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \tag{10}$$

where Ω_{jt} is the (endogenous) time-varying set of individual varieties sold in the domestic market for sector j 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 net foreign debt. Importantly, the domestic interest rate includes capital controls that impose a tax τ per unit of foreign bond borrowing. Revenue from the capital control tax is then redistributed lump-sum to households via T_t.

The household maximizes her utility in equation (7) subject to the following budget constraint:

$$P^D_{Mt}C^D_{Mt} + C^F_{Mt} + P_{St}C_{St} + K_{t+1} - (1-\delta^k)K_t + B_{t+1} = w_t L + r^k_t K_t + (1+r_t)B_t + \Pi_t + T_t, \tag{11}$$

where w_t and r^k_t are the wage and rental rate of capital, L denotes the country's labor endowment, which is supplied inelastically, and Π_t are economy-wide profits redistributed to households. The domestic interest rate r_t is determined by the foreign interest rate (r^*), and the level of capital controls:

$$r_t = r^* + \tau\{B_t < 0\} - \tau\{B_t > 0\}. \tag{12}$$

Note that, there is a level of capital control $\bar{\tau} > 0$ such that when $\tau \geq \bar{\tau}$, the economy is in financial autarky along the transition, i.e. $B_t = 0$ and trade must be balanced.[25] We impose symmetric discounting between national and foreigners, i.e., $r^* = \frac{1}{\beta} - 1$. Thus, a non-zero level of capital control τ, could trigger financial flows—current account and trade imbalances—during the transition to the long-run steady state, but only $\tau = 0$ can support long-run debt and trade imbalances. Following Gourinchas and Jeanne (2006), we focus on the case in which a capital scarce economy initially in financial autarky ($\tau = \bar{\tau}$) fully eliminates the capital controls tax, thereby receiving capital inflows $B_t < 0$ and accumulating long-run debt. We will also explore how the degree of capital scarcity at the moment of this liberalization impact the short- and

[25]The specific level of $\bar{\tau}$ depends on the capital stock at each point in time. As capital increases, $\bar{\tau}$ decreases.

long-run effects of the policy.

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

$$C_{S,t} = \left(\frac{P_{S,t}}{P_t}\right)^{-\eta} \theta_S C_t^{e_S} \quad \text{and} \quad C_{M,t} = \left(\frac{P_{M,t}}{P_t}\right)^{-\eta} \theta_M C_t^{e_M}, \tag{13}$$

$$C_{M,t}^D = \left(\frac{P_{M,t}^D}{P_{Mt}}\right)^{-\eta_M} \theta_D C_{Mt} \quad \text{and} \quad C_{M,t}^F = \left(\frac{1}{P_{Mt}}\right)^{-\eta_M} \theta_F C_{Mt}, \tag{14}$$

and the demands for individual varieties are given by:

$$q_{St}^d(\omega) = C_{St}\left(\frac{p_{St}(\omega)}{P_{St}}\right)^{-\sigma} \quad \text{and} \quad q_{Mt}^d(\omega) = C_{Mt}^D\left(\frac{p_{Mt}(\omega)}{P_{Mt}^D}\right)^{-\sigma}, \tag{15}$$

where P_t, P_{jt}, and $p_{jt}(\omega)$ are the price of the aggregate consumption bundle, the sectoral consumption bundles, and the prices of individual varieties.[26] The household's maximization problem gives the following Euler equations:

$$1 = \Lambda_{t,t+1}(1 - \delta^k + r_{t+1}^k) \quad \text{and} \quad 1 = \Lambda_{t,t+1}\left(1 + r_{t+1}\right), \tag{16}$$

where the discount factor is given by $\Lambda_{t,t+1} = \beta\frac{\lambda_{t+1}}{\lambda_t}$.

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 export subject to paying an additional fixed exporting cost (f_M^x). The foreign demand is given by $q_{Mt}^x(\varphi) = A p_{Mt}(\varphi)^{-\sigma}$, where A is a constant foreign demand shifter. For simplicity, we assume that foreign consumers have the same price elasticity as domestic consumers. Note that this elasticity being finite implies that export price decreases with the quantity exported.

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

[26] Where $P_t = \left[\theta_M P_{Mt}^{1-\eta} C_t^{e_M - 1} + \theta_S P_{St}^{1-\eta} C_t^{e_S - 1}\right]^{\frac{1}{1-\eta}}$, $P_{Mt} = \left[\theta_D (P_{Mt}^D)^{1-\eta_M} + \theta_F\right]^{\frac{1}{1-\eta_M}}$, $P_{St} = \left[\int_{\omega \in \Omega_{St}} p_{St}(\omega)^{1-\sigma} d\omega\right]^{\frac{1}{1-\sigma}}$, and $P_{Mt}^D = \left[\int_{\omega \in \Omega_{Mt}} p_{Mt}(\omega)^{1-\sigma} d\omega\right]^{\frac{1}{1-\sigma}}$.

optimal price given the household demands in (15) 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 functions of type-φ firms operating in services and in manufacturing are respectively:

$$V_{St}(\varphi) = \max\left\{0, \pi^d_{St}(\varphi) + (1-\delta)\Lambda_{t,t+1}V_{S,t+1}(\varphi)\right\} \quad \text{and} \quad V_{Mt}(\varphi) = \max\left\{V^d_{Mt}(\varphi), V^x_{Mt}(\varphi)\right\}, \tag{17}$$

where $V^d_{Mt}(\varphi) = \max\left\{0, \pi^d_{Mt}(\varphi) + (1-\delta)\Lambda_{t,t+1}V_{M,t+1}(\varphi)\right\}$ and $V^x_{Mt}(\varphi) = \max\left\{0, \pi^d_{Mt}(\varphi) + \pi^x_{Mt}(\varphi) + (1-\delta)\Lambda_{t,t+1}V_{M,t+1}(\varphi)\right\}$. Domestic profits are defined by $\pi^d_{jt}(\varphi) = \left[p_{jt}(\varphi) - c_{jt}(\varphi)\right]q^d_{jt}(\varphi) - \phi_{jt}f^d_j$ for $j \in \{S, M\}$. Exporting profits for manufacturing firms are defined by $\pi^x_{Mt}(\varphi) = \left[p_{Mt}(\varphi) - c_{Mt}(\varphi)\right]q^x_{Mt}(\varphi) - \phi_{Mt}f^x_M$. Therefore, total profits for manufacturing firms are $\pi_{Mt}(\varphi) = \pi^d_{Mt}(\varphi) + \pi^x_{Mt}(\varphi)$. δ is the exogenous exit rate. The continuation value for service and manufacturing firms takes into account endogenous exit decisions:

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

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.[27] 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 entry 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

[27] 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). Importantly, it does not affect the model's qualitative results and helps avoiding corner solutions and excess volatility in the entry margin.

that the expected value of a firm in sector j should equal the sunk cost of entry in the sector $\int_{\varphi^d_{jt}}^{\infty} V_{jt}(\varphi)g_j(\varphi)d\varphi = \phi_{jt}\left[f^e_j + \xi\left(e^{M^e_{jt}-\overline{M}^e_j} - 1\right)\right]$ for $j \in \{S, M\}$. 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,

$$M_{j,t+1}\mu_{j,t+1}(\varphi) = \begin{cases} (1-\delta)M_{jt}\mu_{jt}(\varphi) + M^e_{j,t+1}g_j(\varphi) & \text{if} \quad \varphi \geq \varphi^d_{j,t+1} \\ 0 & \text{otherwise} \end{cases} \qquad j \in \{S, M\} \tag{18}$$

The law of motion that characterizes the mass of producers in sector j and time $t+1$ is $M_{j,t+1} = (1-\delta)M_{jt}\int_{\varphi^d_{j,t+1}}^{\infty} \mu_{jt}(\varphi)d\varphi + M^e_{j,t+1}\int_{\varphi^d_{j,t+1}}^{\infty} g_j(\varphi)d\varphi$ for $j \in \{S, M\}$.

We solve the multisector heterogeneous firm model globally, allowing for an endogenous current account and trade balance, using a procedure similar to Benguria, Saffie, and Urzua (2024). Endogenous international borrowing decisions and intertemporal consumption smoothing are essential for quantifying the demand channel during episodes of financial liberalization.[28]

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 $L_{jt} = L^{prod}_{jt} + L^{entry}_{jt}$ and $j \in \{S, M\}$. Similarly, the equilibrium condition in the capital market is given by $K_t = K_{St} + K_{Mt}$, where $K_{jt} = K^{prod}_{jt} + K^{entry}_{jt}$ 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 services and manufacturing as $P_{St}C_{St} = M_{St}\int_{\varphi^d_{St}}^{\infty} p_{St}(\varphi)q^d_{St}(\varphi)\mu_{St}(\varphi)d\varphi$ and $P^D_{Mt}C^D_{Mt} = M_{Mt}\int_{\varphi^d_{Mt}}^{\infty} p_{Mt}(\varphi)q^d_{Mt}(\varphi)\mu_{Mt}(\varphi)d\varphi$.

Balance of Payments. The small open economy's net foreign assets position evolves according to:[29]

$$B_{t+1} = (1 + r_t - \tau)B_t + TB_t, \tag{19}$$

where the trade balance (TB_t) can be written as manufacturing exports (X_{Mt}) minus imports

[28] The complete set of equilibrium conditions can be found in Appendix H.
[29] Assuming $B_t \leq 0$ for all t.

of final consumption goods (C^F_{Mt}) minus imports of new capital goods:

$$TB_t = X_{Mt} - C^F_{Mt} - (K_{t+1} - (1-\delta^k)K_t). \tag{20}$$

6 Quantitative Analysis

This section employs our quantitative model to study how the relative input-cost and consumption channels shape the micro and macro dynamics of financial liberalization. In Section 6.1, we discuss the calibration. In Section 6.2, we study the model's non-targeted performance with respect to consumption, capital accumulation and reallocation of resources within and across sectors observed in Hungary after its financial liberalization. In Section 6.3, we conduct four counterfactual exercises to assess the role of the input-cost and consumption channels and to compare them with a neoclassical model featuring identical capital elasticities and homothetic preferences. In Section 6.4, we study the model's implications on aggregate productivity.

6.1 Calibration

We calibrate the model at an annual frequency to Hungarian data. We assume that Hungary reaches a financially open steady state characterized by $\tau = 0$ in the year 2008, and use that year to anchor our calibration strategy. The model has 29 parameters that we divide into externally and internally calibrated.

Table 4 presents the first group of 16 externally calibrated parameters. Main parameters are directly pinned down by Hungarian micro and macro data. We calibrate the elasticity of substitution across varieties σ using Broda and Weinstein (2006a), who estimated these elasticities for Hungary at 3-digit industry level. We aggregate these 3-digit-industry elasticities by using the real value added in each industry observed in our Hungarian micro data.[30] We estimate the elasticity of substitution between manufacturing domestically produced goods and manufacturing imports η_M using the model's equation. In particular, using equation (10), we obtain $\log(C^D_M/C^F_M) = -\eta_M \log\left(\frac{P^D_M}{P^F_M}\right) + \log(\theta_D/\theta_F)$ and regress: $\log(C^D_M/C^F_M) = \alpha + \eta_M \log\left(\frac{P^D_M}{P^F_M}\right) + \varepsilon$, where C^D_M is total sales minus exports of manufacturing goods reported in the Hungarian micro data, C^F_M imports of household consumption for Hungary from the OECD, P^D_M is the average price index across four-digit industries of manufacturing goods in the Hungarian micro data, P^F_M is the import price index for all commodities for Hungary from the International Financial

[30] Some of the exercises computed in this section require the computing exit. Since the coverage of the datasets ends in 2008 and all firms are reported as exiting in that year, and the year 2008 could be affected by the Global Financial Crisis, we compute our results until 2007. This is without loss of generality, as our results are robust to using 2008.

Statistics of the IMF, and the θ_D/θ_F term is captured by the constant α in the regression. The estimated parameter η_M is -1.93. We calibrate the elasticity of substitution across manufacturing and services, η, using Sposi, Yi, and Zhang (2024), who estimated this elasticity using data from 28 middle and high-income countries, one of which was Hungary. We take the risk aversion parameter γ from Corsetti, Dedola, and Leduc (2008) and set the discount factor β to 0.95 so that the international interest rate ($r^* = \frac{1}{\beta} - 1$) is set to 5%.

We set the capital intensity of each sector (α_S, α_M) to the average elasticity estimated at the industry level using the Hungarian data.[31] The exogenous exit rates of each sector (δ_S, δ_M) are set to the firm-level sectoral exit rate observed in the Hungarian micro data. We compute the average depreciation of capital δ^k using the depreciation reported by Hungarian firms in the micro data and their capital stock. The scale of foreign demand for each variety (A) is normalized to unity.[32] We normalize the fixed entry costs parameters in each sector (f^e_S, f^e_M) to unity, so that the operating cost is a ratio relative to the entry cost. We set the parameter governing the variable entry cost (ξ) to 1 in order to avoid corner solutions (without significant impact on model dynamics).[33] Consistent with a fully open economy calibration, we set the capital controls (τ) to zero.

In Table 5, we report the 13 internally calibrated parameters used to match particular targets of the Hungarian economy and their corresponding empirical moments. The parameters governing the non-homotheticity of the preferences (ϵ_S, ϵ_M) are used to target the average expenditure elasticity for services and manufacturing estimated by Seale, Regmi, and Bernstein (2003) (USDA) for Hungary, which we also use in our empirical section.[34] We compute θ_S using the share of consumption in services over total consumption, where we obtain consumption in services using final consumption expenditure of households reported by the OCDE for Hungary.

[31] As mentioned in Section 3, we estimate the capital elasticities at four-digit NACE industries using the Petrin and Levinsohn (2012) and Wooldridge (2009) methodologies to estimate the production function. We compute the capital elasticities for manufacturing and services, as the weighted average of the elasticities estimated at four-digit level, where weights are given by the real value added in the industry. Note that, because the model implies constant returns to scale, we normalize the capital and labor elasticities to sum one.

[32] Because we target the fraction of exporters, other values for A just change the level of entry cost into exporting.

[33] The absolute value of the steady state mass of firms is low (see Table 5), so 1 is in fact a small fraction of the entry cost relative to $f^e_j = 1$.

[34] The sectoral expenditure elasticities for manufacturing and services were constructed following a multi-step procedure. We began with the expenditure elasticities estimated by the USDA. To obtain sector-level aggregates, we computed weighted averages, where the weights reflect the share of each detailed consumption category in total household expenditure. Some categories–such as household operations, transportation, and recreation-span both manufacturing and services; these were split proportionally based on their sectoral composition. The consumption shares were derived from the 2016 release of the World Input-Output Database (WIOD), using Hungary's national input-output table for the year 2000. The initial weighted average elasticities were 0.82 for manufacturing and 1.25 for services. Since the model features only two sectors and requires that the consumption-share-weighted average elasticity equal one, we apply a normalization that preserves the relative difference between sectors. After this transformation, the elasticities used in the model are 0.75 for manufacturing and 1.18 for services.

Table 4: Externally Calibrated Parameters

Parameter	Description	Value	Source
σ	Substitution M and S varieties	2.85	Hungarian Micro Data
η	Substitution $C_M - C_S$	0.23	Hungarian Macro Data
η_M	Substitution $C_M^D - C_M^F$	1.93	Hungarian Micro and Macro Data
γ	Risk aversion	2	Corsetti, Dedola, and Leduc (2008)
β	Discount rate	0.95	$r^* = 5\%$
α_S	Capital share S sector	0.282	Hungarian Micro Data
α_M	Capital share M sector	0.346	Hungarian Micro Data
δ_S	Exogenous exit rate M	0.105	Hungarian Micro Data
δ_M	Exogenous exit rate S	0.08	Hungarian Micro Data
δ^k	Depreciation of capital	0.078	Hungarian Micro Data
f_S^e	Fixed entry cost S	1	Normalization
f_M^e	Fixed entry cost M	1	Normalization
ξ	Variable entry cost	1	Normalization
A	Foreign demand for M	1	Normalization
τ	Capital control tax	0	Full liberalization

Similarly, to compute the share of consumption of domestically produced manufacturing goods over the consumption of manufacturing goods, we use: (i) final consumption expenditure of households in manufacturing goods to which we subtract imports of household consumption of manufacturing goods to obtain the numerator, and (ii) final consumption expenditure of households in manufacturing goods to obtain the denominator. All these series are reported by the OCDE for Hungary.

The timing of the liberalization—the level of K_0 when capital controls are eliminated—is pinned down by the decrease in the Hungarian real interest rate reported by the World Bank in the five years that follow the financial liberalization.[35] This is the only transition-related moment used in the calibration strategy. We set the fixed operating costs in the services and manufacturing sectors (f_S^d, f_M^d) to target the difference in the real value added of the p25 and p50 firms between manufacturing and services observed in the Hungarian micro data. We set the fixed exporting cost f_M^x to discipline the fraction of exporters in the manufacturing sector that we find in the Hungarian micro data.

Firm productivity is assumed to follow a Pareto distribution, calibrated separately for the service and manufacturing sectors to match the observed distribution of firm size and exporter participation. The minimum support is normalized to one, and the estimated tail indices exceed two, ensuring finite mean and variance and preserving numerical stability. Note that these last

[35] We estimate the decrease in the lending interest rate following the liberalization by regressing the real interest rate on a liberalization dummy (equal to 1 if year $\geq$ 2001 and 0 otherwise), a time trend and a dummy that controls for the 2004 speculative attack in Hungary. This regression allows us to control for any pre-existing trend in the interest rate.

five moments are directly taken from the Hungarian data. 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 cost ($\overline{M}^e_S, \overline{M}^e_M$) are set internally to the open economy entry levels so that there are no congestion externalities in the long-run absent any capital controls.

Although each parameter affects multiple moments, several strong economic relationships guide the calibration. The weight on services in the consumption basket is disciplined by the observed share of household spending on services, while the domestic manufacturing share informs the weight on locally sourced manufacturing goods. Expenditure elasticities reflect how responsive sectoral consumption is to income, anchoring the strength of demand shifts. Fixed operating costs are chosen to match observed productivity differences across firms, especially between quartiles, while the fixed export cost in manufacturing targets the share of firms that export. The relative number of firms in services and manufacturing disciplines the shape of the sector-specific Pareto distributions. Labor supply is set to normalize steady-state output, and entry congestion parameters are pinned to the long-run values under capital account openness.

Table 5: Internally Calibrated Parameters

Parameter	Description	Micro/Macro	Value	Target	Target	Model
ε_S	Expenditure elasticity S	Hungarian Microdata	2.07	$\eta + (1-\eta)\frac{e_S-\eta}{\bar{e}-\eta}$	1.18	1.18
ε_M	Expenditure elasticity M	Hungarian Microdata	1.22	$\eta + (1-\eta)\frac{e_M-\eta}{\bar{e}-\eta}$	0.75	0.75
θ_S	Share C_S in C	Hungarian Macrodata	0.57	$\frac{P_S \cdot C_S}{P \cdot C}$	0.58	0.58
θ_D	Share C^D_M in C_M	Hungarian Macrodata	0.80	$\frac{P_D \cdot C_D}{P_M \cdot C_M}$	0.72	0.72
K_0	Initial condition K	Hungarian Macrodata	$0.53 \times K_{SS}$	r^k decrease during liberalization	-0.035	-0.035
f^d_S	Fixed operating cost S	Hungarian Microdata	0.08	$\log(VA^{p50}_M) - \log(VA^{p50}_S)$	1.21	1.15
f^d_M	Fixed operating cost M	Hungarian Microdata	0.28	$\log(VA^{p25}_M) - \log(VA^{p25}_S)$	1.08	1.13
f^x_M	Fixed exporting cost M	Hungarian Microdata	2.90	$\frac{1-G(\varphi^x_M)}{1-G(\varphi^d_M)}$	0.12	0.12
ξ_S/ξ_M	Pareto parameters S/M	Hungarian Microdata	0.478 / 0.498	$\frac{M_S}{M_M}$	8.10	8.15
$\bar{M}^e_S$	Convex entry cost S	Hungarian Microdata	0.0392	M^e_S	n.a	n.a
$\bar{M}^e_M$	Convex entry cost M	Hungarian Microdata	0.0468	M^e_M	n.a	n.a
$\bar{L}$	Labor supply	Normalization	0.1840	Nominal GDP Y	1.00	1.00

6.2 Model Fit

In this section, we use the calibrated model to evaluate its capacity to replicate the dynamics triggered by the input-cost and consumption channels in Hungary, and their implications for resource reallocation within and across sectors. We then discuss a validation exercise where we use different preferences to model non-homotheticity in consumption, and a model's extension to a four-sectors setting.

We compare the model's simulated data with the Hungarian post-financial liberalization experience. The model starts with an economy in financial autarky—balanced trade and a zero current account balance—that is transitioning to its steady state. It then implements an unexpected and permanent elimination of capital controls that lowers the tax on foreign borrowing τ to 0. We compute the model's non-targeted moments by comparing the transition path of the financially open economy with that of the economy under financial autarky. To ensure consistency with the empirical estimation, we calculate the average difference between the liberalization and autarky paths over the same periods used in the empirical analysis. To compute the non-targeted moments for the Hungarian data, we regress each 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 $\geq$ 2001 and 0 if 1995 $\geq$ *year* $\geq$ 2000, and T is a time trend. The coefficient of interest is α, which captures the change in the non-targeted moment upon the liberalisation after controlling for the trend.

The model is able to capture the salient features of the Hungarian economy post-financial liberalization. We focus on 12 non-targeted moments in three groups of variables: (i) consumption and capital accumulation; (ii) reallocation across sectors; and (iii) reallocation within sectors.

Without distinguishing sectors, we first assess whether the model can account for (i) the consumption boom and the within-firm increase in investment. These are key dimensions for any financial liberalization model, as a key benefit of liberalizing the financial account is to finance consumption and investment. 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 international borrowing to invest in physical capital, i.e., within-firm capital accumulation increases. 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; in addition, the ability to borrow facilitates consumption smoothing. Columns 2 and 3 of Table 6 show that the model can reproduce well the increase in consumption and within-firm capital accumulation observed in Hungary.

A second group of moments focuses on (ii) the reallocation across sectors. These moments evaluate the degree of production and consumption reallocation, changes in the mass of firms and relative price changes generated by the main forces of the model. Any multi-sector model of a financial liberalization should be evaluated along these dimensions. Interestingly, the Hungarian data shows that, after the liberalization, production is tilted toward the high-expenditure-elasticity service sector, as the (nominal) value-added share of services increased by 3.9 percentage points (column 2 of Table 6). The model matches qualitatively and quantitatively well this reallocation, by accounting for 70% of the increase in the value-added share of

Table 6: Data and Model Comparison

	Data		Model
	Source	Coefficient	
	(1)	(2)	(3)
Consumption and Capital Accumulation			
Household consumption (real) (log)	Hungarian Macrodata	0.058** (0.026)	0.072
Average within capital increase (real)	Hungarian Microdata	0.225*** (0.010)	0.249
Reallocation Across Sectors			
Production			
Share of value added of service	Hungarian Microdata	0.039* (0.019)	0.027
Relative mass of firms (MS/MM) (log)	Hungarian Microdata	0.064*** (0.015)	0.019
Consumption			
Consumption ratio (CS/CM)	Hungarian Macrodata	0.040* (0.021)	0.069
Prices			
Relative price index (PS/PM) (log)	Hungarian Microdata	0.029** (0.010)	0.017
Reallocation Within Sectors			
Entry			
Entry rate in services	Hungarian Microdata	0.108*** (0.027)	0.184
Entry rate in manufacturing	Hungarian Microdata	0.057** (0.021)	0.086
Difference in entry rate S-M	Hungarian Microdata	0.051** (0.011)	0.097
Relative entrant size (S/M) (log)	Hungarian Microdata	-0.027** (0.010)	-0.031
Cut-offs			
Relative operational cut-off (S/M) (log)	Hungarian Microdata	-0.023** (0.010)	-0.017
Relative exporting cut-off (X/D) (log)	Hungarian Microdata	0.046** (0.020)	0.045

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.

services. This expansion was accompanied by a 6.4% increase in the relative mass of services-to-manufacturing firms, a change the model also captures to a significant extent. The increase in aggregate consumption disproportionately benefits the service sector, consistent with the non-homothetic preferences embedded in the model. Hungarian data indicate that the relative consumption ratio of services-to-manufacturing rose by 4 percentage points after liberalization (in line with the patterns shown in Table 1), a pattern also reproduced by the model. Importantly, the model reproduces both qualitatively and quantitatively well changes in relative prices. After the liberalization, the relative price index of services-to-manufacturing increased by 2.9%, which implies a real exchange rate appreciation. The model accounts for 60% of this relative price change.

The last group of moments focuses on (iii) selection within sectors. Models of heterogeneous firms feature strong selection forces determined by the dynamics of the operating and exporting productivity cut-offs. Empirically, we estimate these cut-offs by focusing on the bottom decile of the productivity distribution in each sector. Hungarian data show that, in line with a market size effect, the relative operational cut-off of services-to-manufacturing declined, and the model can reproduce 74% of this decrease. In addition, we study the relative entry rate between services and manufacturing. Consistent with the empirical analysis in Section 4.3, the entry rate increased in both manufacturing and services, with a 5 percentage point larger increase in services, accompanied by a greater decline in the relative size of entrants in that sector. Within manufacturing, we also observe stronger selection into exporting, as the cut-off for entering the international markets rises relative to the cut-off for operating domestically. The model accounts for 98% of this increase in the export cut-off.

The model then is able to replicate the increase in aggregate consumption, within-firm capital accumulation and the reallocation within and across sectors following the Hungarian financial liberalization.

-Model's Validation and Extension

The dynamics presented above are robust to alternative formulations of non-homothetic preferences. In Appendix D, we implement the demand system developed by Boppart (2014) and find that it replicates the key qualitative patterns observed under our baseline model. In particular, this specification yields similar reallocation of production toward services, changes in the relative mass of firms, and adjustments in entry and productivity cut-off thresholds.[36]

In Appendix E, we extend our model to a four-sector setting to analyze the role of non-homotheticity within sectors. Specifically, by introducing two industries within both the manufacturing and services sectors—each with distinct expenditure elasticities—we are able to disentangle the effects of non-homothetic demand from those of tradability. This structure allows us to examine whether the observed reallocation patterns are driven by demand forces rather than by the distinction between tradable and non-tradable goods. We find that the model's predictions continue to hold within each sector, confirming that the consumption-driven reallocation is significantly shaped by expenditure elasticity.

[36] While the qualitative behavior remains consistent, this alternative preference specification produces a stronger consumption response. Particularly, the relative consumption ratio of services increases by nearly three times the observed change in the Hungarian data.

6.3 Drivers of The Reallocation Towards Services

Having validated the model, we now turn to assess the forces that lead to the reallocation toward services. To this end, we compare key moments that characterize this reallocation—namely, the relative consumption ratio, the value-added share of services, relative price changes, and changes in the relative operational cut-off—across our baseline model and four counterfactual exercises. In all cases, we retain the baseline values for all common parameters to ensure comparability. The only recalibrated element is the initial capital stock at the time of liberalization, which is adjusted in each counterfactual so that the resulting decline in the domestic interest rate matches the baseline model's response.

In our first exercise, we consider a neoclassical two-sector model in which each sector is represented by a single, representative firm—i.e., removing any role for firm heterogeneity. As in the baseline, one sector produces a tradable good with exogenous downward-sloping demand, while the other sector produces a non-tradable good consumed only domestically. Both sectors share the same capital elasticity of production, and preferences are homothetic, with identical expenditure elasticities. These elasticities are set to the average values from the baseline calibration, so that neither sector has a relative demand or supply advantage. As shown in column 5 of Table 7, this model generates a small reallocation of production and consumption toward services. Liberalization raises demand for both goods, but since tradable goods can be imported while non-tradable goods must be produced locally, resources shift modestly toward services to meet the increased domestic demand. However, this effect is quantitatively small: the increase in the value-added share and consumption ratio of services is roughly 0.4 percentage points—ten times smaller than the 3.9 and 4 percentage point increases observed in the Hungarian data (column 2 of Table 6). Moreover, the model produces a counterfactual real exchange rate depreciation, contradicting empirical evidence from Hungary and other episodes of capital inflow surges (e.g., Meza and Urrutia 2011, Forbes and Warnock 2012, Benigno, Converse, and Fornaro 2015). This suggests that in this neoclassical model without heterogeneous firms, differences in capital elasticity or non-homothetic preferences cannot account for the magnitude of the observed sectoral reallocation nor the exchange rate dynamics.

In our second exercise, we modify the baseline heterogeneous-firm model by shutting down both the input-cost and consumption channels. We do so by imposing identical capital elasticities across sectors and assuming homothetic preferences with equal expenditure elasticities for both goods. This specification removes any asymmetry in production or demand responses across sectors. As shown in column 4 of Table 7, the model produces only a modest reallocation of production and consumption toward services—similar in magnitude to the neoclassical case—and continues to generate a counterfactual real exchange rate depreciation. Additionally, the model yields counterfactual adjustments in firm selection: the operational cut-off declines

Table 7: Reallocation Towards Services

	Heterogeneous Firms Model				Neoclassical Model
	Baseline	Consumption channel only	Input-cost channel only	Only heterogeneous firms	
		$\varepsilon_S \neq \varepsilon_M$	$\varepsilon_S = \varepsilon_M$	$\varepsilon_S = \varepsilon_M$	$\varepsilon_S = \varepsilon_M$
		$\alpha_S = \alpha_M$	$\alpha_S \neq \alpha_M$	$\alpha_S = \alpha_M$	$\alpha_S = \alpha_M$
	(1)	(2)	(3)	(4)	(5)
Consumption					
Consumption ratio (CS/CM)	0.069	0.079	-0.007	0.001	0.004
Production					
Share of value added in services	0.027	0.026	0.011	0.007	0.004
Prices					
Relative price index (PS/PM) (log)	0.017	-0.011	0.024	-0.002	-0.013
Cut-off					
Relative operational cut-off (S/M) (log)	-0.017	-0.019	0.004	0.003	-

more in manufacturing than in services, contrary to the empirical evidence from Hungary. This reinforces the conclusion that both heterogeneous firms and non-homothetic preferences are necessary to replicate the observed reallocation patterns.

In our third exercise, we allow the manufacturing and service sectors to have different capital elasticities, while assuming homothetic preferences and identical expenditure elasticities across goods. This heterogeneous-firm model, where only the input-cost channel is active, is able to reproduce the increase in the value-added share of services—though it explains only about 30% of the observed change—as well as the real exchange rate appreciation documented in the data (column 3 of Table 7). The real exchange rate appreciation arises from the larger decline in the price of manufacturing goods: since manufacturing has a higher capital elasticity, the decline in the relative cost of capital lowers marginal costs in that sector more sharply (i.e., the input-cost channel).[37] However, this model cannot replicate the increase in service sector consumption or the decline in the relative operational cut-off of service firms observed in the data.

In our fourth exercise, we assume non-homothetic preferences and assign different expenditure elasticities across sectors, while maintaining identical capital elasticities for manufacturing and services. Column 2 of Table 7 shows that non-homothetic preferences are essential to quantitatively replicate the reallocation of production and consumption toward services and the sharper decline in the operational cut-off for service firms. This version of the model accounts for approximately two-thirds of the increase in the value-added share of services and 83%

[37]Following liberalization, the prices of both manufacturing and service goods decline. Although the decrease in the operational cut-off allows less productive firms to enter—exerting upward pressure on prices—a substantial increase in entry lowers the overall price level in each sector. This love-of-variety effect dominates, resulting in a net decline in prices.

of the drop in the relative cut-off, as observed in the Hungarian data (column 2 of Table 6). Interestingly, this exercise fails to generate the real exchange rate appreciation seen in the data, highlighting that differences in capital elasticities—captured by the input-cost channel—are necessary to match relative price dynamics across sectors.

Overall, these exercises demonstrate that (i) non-homothetic preferences embedded in a heterogeneous-firm framework are critical to quantitatively match the observed reallocation of production and consumption toward services, as well as the decline in the operational cut-off in that sector; and (ii) higher capital intensity in manufacturing is required to explain the real exchange rate appreciation following liberalization.

6.4 Effects of Financial Liberalization on Productivity

Reallocation of resources has important implications for aggregate productivity, which has been shown to be the main determinant of differences in income per capita across countries (Klenow and Rodríguez-Clare 1997, Hall and Jones 1999, Caselli 2005, among others). Empirical studies have found that financial liberalization episodes and capital inflows surges associate with increases in aggregate productivity (Bekaert, Harvey, and Lundblad 2011, Bonfiglioli 2008, among others). In this section, we analyze the change in aggregate productivity in Hungary after the liberalization and compare it with our baseline model. We then employ our model to develop a decomposition analysis to evaluate the forces driving changes in aggregate productivity.[38]

Aggregate Productivity in Hungary

We compute the Solow residual using the Hungarian microdata between 1995 and 2008.[39] As above, we regress $y_t = \alpha \mathrm{FL}_t + T_t + \varepsilon_t$, where $\mathrm{FL}_t = 1$ if year ≥ 2001 and 0 otherwise, and report the estimated coefficient α, which captures the deviation from the time trend. Column 2 of Table 8 shows that aggregate productivity increased after the financial liberalization. This increase is economically (11%) and statistically significant and is mainly driven by the increase in services. The relative productivity of services-to-manufacturing increased by 13.8%, while productivity of the service sector rose by 18%. Our model, reported in column 3, can reproduce the increase aggregate productivity and the larger expansion in services (albeit to a lower extend quantitatively).

For comparison, we report the prediction of the neoclassical model with two sectors, homothetic preferences and identical capital elasticities that we used above. As column 4 shows,

[38]Empirical studies find different effects of capital inflows on productivity of the manufacturing sector. While Varela (2018) and Cingano and Hassan (2020) find that productivity in this sector increases in Hungary and in Italy, Gopinath, Kalemli-Ozcan, Karabarbounis, and Villegas-Sanchez (2017) find that it decreases in Spain.

[39]See Appendix F for how we construct the Solow residual in the model counterpart in details.

although this model features exogenous growth, it implies a decline in aggregate productivity. This decline arises from a *composition effect*, as resources shift towards the less productive service sector.[40]

Table 8: Effects on Productivity: Data and Model Comparison

	Data		Model	
	Source	Coefficient	Baseline	Neoclassical Model
	(1)	(2)	(3)	(4)
Aggregate TFP (log)	Hungarian Microdata	0.114* (0.053)	0.023	-0.013
Relative TFP (S/M) (log)	Hungarian Microdata	0.138* (0.072)	0.004	0.000

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 $\geq$ 2001 and 0 otherwise.

The increase in aggregate productivity reported in Table 8 may appear puzzling to some extend, as the liberalization led to a reallocation towards services, a decline in the relative operational cut-off of services-to-manufacturing and a reduction in the relative size of entrant firms (Table 6). Resource shifting towards less productive firms and services could give rise to a negative *composition effect*, potentially lowering TFP. Yet, both the empirical data and the model exhibit an increase in productivity. Even more surprisingly, this increase is more pronounced in the service sector, which is initially the less productive one. Two key questions follow suit is: What explains the increase in aggregate productivity? And why is the productivity gain disproportionally larger in the service sector? In the next section, we employ our model to unpack the channels driving the increase in aggregate productivity.

Decomposing the Increase in Aggregate Productivity

To unpack the forces driving the increase in total factor productivity (TFP), we undertake a decomposition analysis and break down productivity growth due to a *composition effect*, a *mass of firms effect* and an interaction term.

The *composition effect* focuses on the productivity changes that can be attributed to changes in reallocation across firms, while keeping the mass of firms that the economy would have seen in financial autarky. In this way, this composition effects allows for changes in operational

[40]Note that non-homothetic preferences in this neoclassical model would amplify the reallocation towards services, depressing more aggregate productivity.

and exporting cut-offs and the distribution of firms, but it keeps the mass of firms of the counterfactual, financial autarky transition. For example, consider the case of capital in the service sector, which is determined by

$$K_{St} = M_{St}^{cc} \int_{\varphi_{St}^{co}} k_S^{d,co}(\varphi)\mu_S^{co}(\varphi)d\varphi.$$

The composition effect allows μ_S^{co}, φ_{St}^{co} and $k_S^{d,co}(\varphi)$ to have the post-liberalization values, but it restrict M_{St}^{cc} to be the closed economy transition.[41]

The *mass of firms effect* isolates the impact of financial liberalization on the total number of active firms in the economy. It captures a classic *love for variety* mechanism: as liberalization encourages entry, the economy produces a broader range of varieties, which increases consumer utility and aggregate output.[42] To illustrate the love for variety mechanism, consider for example the output in the service sector: $Y_{St} = \left[\int_{\omega\in\Omega_{St}} q_{St}^d(\omega)^{\frac{\sigma-1}{\sigma}} d\omega\right]^{\frac{\sigma}{\sigma-1}}$. If all firms were to produce the same quantity, this expression simplifies to $Y_{St} = M_{St}^{\frac{\sigma}{\sigma-1}} q_{St}^d$. Since $\sigma > 1$, output increases more than proportionally with the number of varieties, enhancing aggregate productivity even when firm-level output remains constant.

In our quantitative framework, we evaluate the *mass of firms effect* by holding fixed the operational and exporting cut-offs and the productivity distribution at their financial autarky levels, while allowing only the mass of firms to evolve as under liberalization. This isolates the pure extensive margin response. For example, capital in the service sector under this experiment is given by

$$K_{St} = M_{St}^{co} \int_{\varphi_{St}^{cc}} k_S^d(\varphi)\mu_S^{cc}(\varphi)d\varphi,$$

where φ_{St}^{cc} and μ_S^{cc} are the productivity cut-off and distribution from the closed-economy transition, while M_{St}^{co} reflects the mass of firms under liberalization.

The *interaction term* captures the joint effects of reallocation, changes in cut-offs, and shifts in the productivity distribution–that is, the non-additive contribution of combining the composition and mass effects.

Table 9 presents the decomposition results. As expected, the composition effect is negative, as resources shift toward the less productive service sector. However, this is more than offset by a larger, positive mass of firms effect (3.5% vs. –1.9%), while the interaction term is small in magnitude.

This mass of firms effect is, thus, what drives the increase in aggregate productivity in

[41]TFP for this experiment is calculated by doing the same procedure for real output and labor. Then we subtract counterfactual capital and labor from the counterfactual real output.

[42]This channel is central to many trade models, beginning with Krugman (1980) and empirically quantified by Broda and Weinstein (2006b), who estimate that new imported varieties accounted for roughly 25% of the gains from trade in the U.S.

Table 9: Aggregate TFP Decomposition

Change in	TFP Decomposition		
Aggregate TFP	Composition Effect	Mass of firms effect	Interaction term
(1)	(2)	(3)	(4)
0.023	-0.019	0.035	0.007

Note: Average TFP changes (relative to financial autarky) during the 7 years after the financial liberalization.

our calibrated model. Our empirical and quantitative exercises above (Tables 3 and 7) have shown that non-homothetic preferences play a key role at explaining movements in the extensive margin. In the next section, we assess how non-homothetic preferences interact with firm heterogeneity to generate the mass of firms effect.

Composition and Mass of Firms Effects For Different Capital Stocks

To study the role of non-homothetic preferences on aggregate TFP changes, we compare economies with different levels of capital stock at the moment of the liberalization.

Recall that our baseline model represents an economy where the liberalization took place when its capital reached 53% of the capital of the open economy steady state. We now compare its productivity gains with those of economies that liberalize financial flows at 25%, 45%, 70% and 90% of capital. We compute the aggregate productivity gains within seven the years after the liberalization for each economy with respect to its financial autarky transition.[43] In particular,

$$\frac{1}{7}\sum_{j=0}^{6}\left\{\log\left(\text{Solow Residuals}^{co}_{it+j}\right)-\log\left(\text{Solow Residuals}^{cc}_{it+j}\right)\right\}.$$

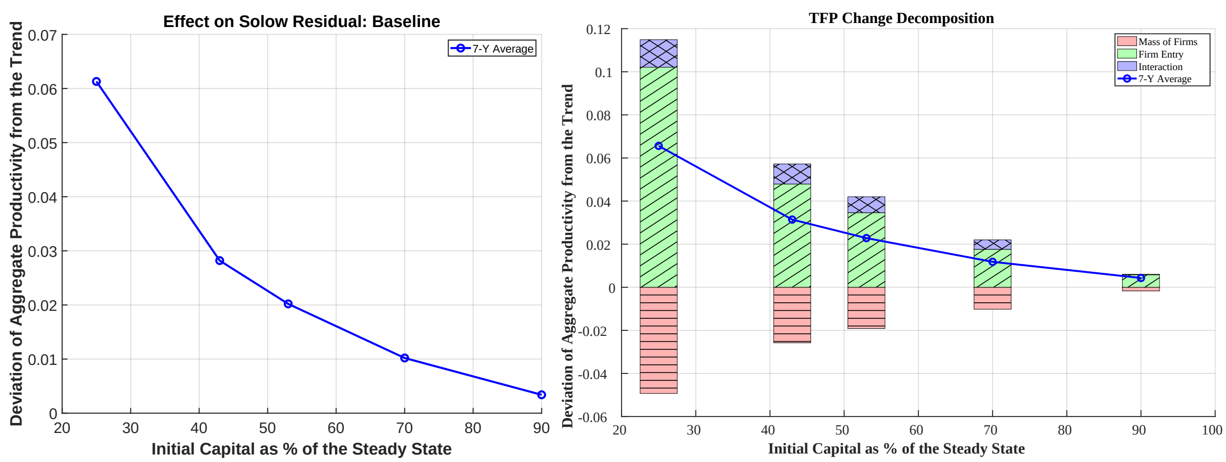
The left panel of Figure 4 shows that the productivity gains increase with the capital-scarcity. For example, a capital-scarce economy that liberalizes with 25% of capital with respect to the financial open steady state would experience a 6% annual increase in aggregate productivity, while a capital-abundant economy that liberalizes at its 70% of capital would see a modest increase of 1%.

In this exogenous growth model, the increase in aggregate productivity arises not from innovation but from reallocation effects across firms and the entry of new firms. Panel B decomposes the TFP gains into three components: a composition effect, a mass of firms effect,

[43]Recall that, since our data ends in 2008 and, hence, due to this restriction all firms exit in 2008, we compute the Solow residual until 2007 to be consistent with the empirical section and fully account for exit.

and an interaction term. Notably, while the composition effect is negative across all levels of initial capital stock, the mass of firms effect is consistently positive. These effects vary with capital scarcity: the composition effect becomes more negative in capital-scarce economies, whereas the mass of firms effect leads to greater TFP gains under such conditions. Crucially, the mass of firms effect increases disproportionately with capital scarcity, suggesting that the love for variety mechanism dominates the losses stemming from reallocation toward less productive service firms. Thus, the more capital-scarce the economy, the larger the increase in entry and the stronger the contribution of the mass of firms effect to aggregate productivity.

Figure 4: TFP Gains for Different Capital Stocks



Note: Average TFP changes (relative to financial autarky) during the 7 years after the financial liberalization.

Non-homothetic preferences amplify the love for variety mechanism by inducing higher entry in the sector with higher expenditure elasticity. To understand the role of non-homotheticity, we conduct a counterfactual exercise in which we shut down non-homothetic preferences by assigning identical expenditure elasticities to the manufacturing and service sectors. The model still features different capital elasticities and heterogeneous firms, so the input-cost channel remains active. We compare this counterfactual—corresponding to column 3 of Table 7—with our baseline economy across different levels of the initial capital stock to assess how non-homothetic demand interacts with the strength of the entry response.

Table 10 shows that non-homothetic preferences amplify the mass-of-firms effect, leading to higher productivity gains upon the financial liberalization. In particular, in our baseline model, a country liberalizing when its economy reaches 25% of capital stock relative to the open economy steady state would experience a 5.5 larger TFP gain than a country liberalizing at its 70% of capital stock. However, under homothetic preferences, the same experiment would lead to 4.5 TFP gains. As the bottom raw shows, this implies 21.9% larger productivity gains under non-homothetic preferences, i.e., the ratio $(TFP_{K_{25}}/TFP_{K_{70}})^{\text{Baseline}}/(TFP_{K_{25}}/TFP_{K_{70}})^{\text{Homothetic}}$.

These TFP gains are explained by a stronger mass of firms effect. In the baseline model, a the capital-scarce economy liberalizing at its 25% of capital stock would experience a 5.7 larger mass-of-firms effect than an economy liberalizing at its 70%. Under homothetic preferences, this increase reaches 4.9 times. Hence, non-homothetic preferences lead to 17.4% stronger mass-of-firms effect.[44]

Table 10: Composition and Mass of Firms Effects for Different Capital Stocks

Model	TFP	Decomposition TFP Change		
	Change	Composition Effect	Mass of firms effect	Interaction term
(1)	(2)	(3)	(4)	(5)
Baseline K_{25}/Baseline K_{75}	5.500	4.900	5.667	3.250
Baseline K_{25}	0.066	-0.049	0.102	0.013
Baseline K_{75}	0.012	-0.010	0.018	0.004
Homothetic K_{25}/Homothetic K_{75}	4.533	5.167	4.895	2.500
Homothetic preferences K_{25}	0.068	-0.031	0.093	0.005
Homothetic preferences K_{75}	0.015	-0.006	0.019	0.002
$(TFP_{K_{25}}/TFP_{K_{70}})^{\text{Baseline}}/(TFP_{K_{25}}/TFP_{K_{70}})^{\text{Homothetic}}$	1.219	0.979	1.174	1.300

Note: Average TFP changes (relative to financial autarky) during the 7 years after the financial liberalization.

These exercises can help explaining the apparent puzzle existing in the literature of financial openness. While empirical studies found aggregate productivity increases upon deregulation episodes, the theoretical neoclassical model would predict a decline in TFP. Our model shows that the force pushing down the aggregate TFP can be associated with a composition effect, as resources reallocate towards the less productive service firms. But the neoclassical, homogeneous firm model does not have a mass of firms effect, which tends to expand aggregate TFP. In our calibration, the mass of firms effect dominates leading to the expansion in aggregate TFP. Non-homothetic preferences amplify this mechanism and lead to larger TFP gains in capital scarce economies, which arise from their larger consumption booms upon the financial liberalization.

It is worth noting that capital abundant economies liberalizing their financial account might not see larger benefits from financial liberalization, as the mass-of-firms effects is small in these economies. Furthermore, our model abstract from financial frictions or endogenous growth that

[44]The heterogeneous-firm model with homothetic preferences also features negative composition effect and positive mass of firms effect. The composition effect arises from the reallocation to less productive firms. The mass of firm effect is characteristic of models with firm heterogeneity and endogenous entry. Interestingly, the TFP gains are slightly higher under homothetic preferences, as non-homothetic preferences augment the composition effect for the same level of capital stock.

could interact with this mechanism and lead to productivity losses as in Gopinath, Kalemli-Ozcan, Karabarbounis, and Villegas-Sanchez (2017) and Benigno, Fornaro, and Wolf (2025).[45]

7 Conclusion

In this paper, we demonstrate empirically and theoretically that the service sector is paramount to understanding the micro and macro responses of an economy following an international financial liberalization. We study Hungary's financial account liberalization in the early 2000s and demonstrate that there are both input-cost channels operating through different capital intensities, as well as a consumption expenditure channel operating through different expenditure elasticities. We show that the expenditure channel is stronger than the input-cost channel, and that high expenditure elasticity sectors see an increase in firm entry driven by smaller and less productive firms.

We then develop and calibrate a dynamic open economy heterogeneous firms model, and use the model to understand the key mechanisms driving our empirical results. We show that the model's implications following a financial liberalization can match several non-targeted moments covering firm-level and aggregate responses, as well as inter-sectoral and intra-sectoral reallocation. With the calibrated model, we first confirm that, in the absence of the input-cost channel and the expenditure channel, the model cannot quantitatively replicate the observed reallocation across or within sectors. We then assess the drivers of the short-term dynamics. Our counterfactual exercises also show that the input-cost channel is key for movements in relative prices, and the expenditure channel is key for reallocation of consumption and production to services.

Our model can reproduce the increase in aggregate productivity observed in Hungary after the financial liberalization and documented by the cross-country literature studying the impact of financial openness in developing economies. Our decomposition exercise shows that movements in the extensive margin embedded with non-homothetic preferences are key to explain this expansion. The liberalization induces entry and triggers a positive, mass-of-firms effect (a "love for variety" effect) that overpowers a negative composition effect driven by the reallocation towards the less productive service firms. To conclude our analysis, we show that the productivity gains from financial openness are larger for capital-scarce economies, as the mass of firm effect increases relatively more with capital scarcity.

[45] Benigno and Fornaro (2013) endogenize sector-level productivity growth by assuming that learning-by-doing occurs in tradables but not in non-tradables. This makes the productivity cost of reallocation explicit. Our model focuses instead on static productivity differences and endogenous firm dynamics, holding average productivity fixed across sectors. A promising avenue for future research would be to combine the compositional and mass-of-firms effects studied here with Benigno and Fornaro (2013)-style differential growth processes across sectors.

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Theoretical and Empirical Appendices

(Not for Publication)

Empirical Appendices

Appendix A Cross-Country Analysis

In this section we assess whether international financial integration associates with sectoral allocation across countries in the short-term. 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 127 countries over 1970 to 2015.[46]

A first glance at the data suggests that financial liberalization episodes correlate with reallocation of resources towards services to the expense of agriculture and manufacturing. Figure A.1 shows that, within the three years before and after a capital account liberalization, there is 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).

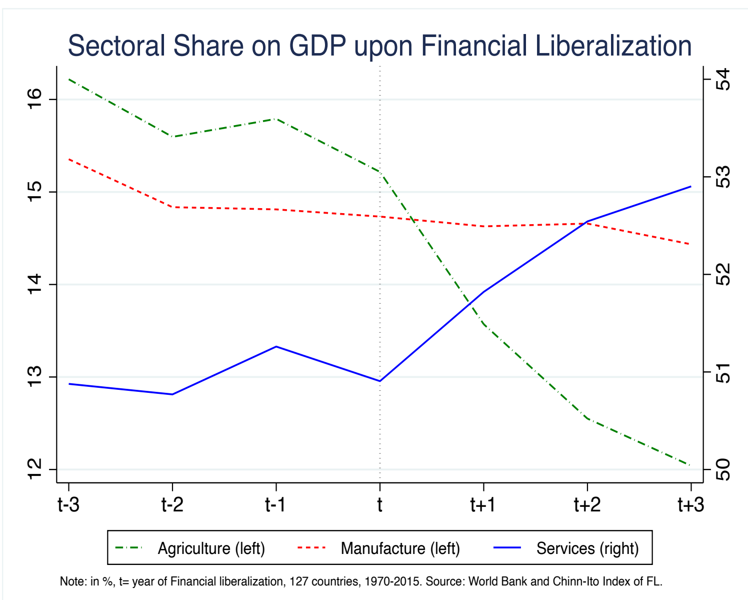


Figure A.1: Financial Liberalization: A Cross-Country Analysis

Yet this correlation could 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

[46]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.

deregulations (see Henry 2007, Bonfiglioli 2008 and Varela 2018 for example). To account for these factors, one could estimate this relationship econometrically by regressing:

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

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.

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 predetermined. 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 A.1: 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**	-0.011	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**			-0.279			0.100***
			(0.143)			(0.255)			(0.022)
Government Size			0.337***			0.282			-0.109***
			(0.127)			(0.225)			(0.019)
Financial Depth			-0.041*			0.025			0.032***
			(0.021)			(0.036)			(0.006)
Financial Crisis			0.034**			-0.054			0.033***
			(0.015)			(0.039)			(0.006)
Lag Dep. Var.	1.006***	0.983***	1.004***	0.877***	0.827***	0.742***	0.817***	0.807***	0.704***
	(0.009)	(0.040)	(0.027)	(0.027)	(0.047)	(0.085)	(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	955	955	360	906	906	356	914	914	342
Countries	169	169	63	166	166	63	163	163	62

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).

Table A.1 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. 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.

Appendix B Empirical Design

-Value Added. To assess the impact of the financial liberalization on firms' i 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, the 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 these equations into the production function, we obtain

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

Re-arranging terms and applying logs, the optimal production of each firm $q_{jt}(\varphi)$ becomes:

$$\log(q_{jt}(\varphi)) = -\alpha_j\sigma\log(r_t^k/w_t) + e_m\log(C_t) + (\sigma-\eta)\log(P_{jt}) \tag{B.1}$$
$$-(\alpha_j+\beta_j)\sigma\log(w_t) + \eta\log(P_t) + \log(\theta_m) + \alpha_j\sigma\log(\alpha_j) + \beta_j\sigma\log(\beta_j) + \sigma\log(\varphi\rho),$$

We can solve for the sectoral price level P_{jt} and replace it into equation (B.1). Recall that the price level is given by

$$\log(P_{jt}) = \frac{1}{1-\sigma}\log\left[\int_{\varphi_{jt}^*} p_{jt(\varphi)}^{1-\sigma}\mu(\varphi)d\varphi\right].$$

After re-arranging terms, sector j's price level becomes

$$\log(P_{jt}) = \log\phi_{jt} + \log\left(\frac{1}{\rho}\right) - \underbrace{\frac{1}{\sigma-1}\log\left[\int_{\varphi_{jt}^*}\left(\frac{1}{\varphi}\right)^{1-\sigma}\mu(\varphi)d\varphi\right]}_{\equiv\tilde{\varphi}_{jt}} \tag{B.2}$$

Replacing equation (B.2) on (B.1), we obtain

$$
\begin{aligned}
\log(q_{jt}(\varphi)) = & -\alpha_j \eta \log\left(\frac{r_t^k}{w_t}\right) + e_m \log(C_t) + (\eta - \sigma)\tilde{\varphi}_{jt} \\
& \underbrace{-(\alpha_j + \beta_j)\eta \log(w_t)}_{\tilde{A}_{jt}\text{:sector time-varying}} + \underbrace{\eta \log(P_t)}_{\tilde{B}_t\text{:agg time-varying}} \\
& + \underbrace{\log(\theta_m) - \alpha_j \eta \log(\alpha_j) - \beta_j \eta \log(\beta_j)}_{\tilde{C}_j\text{:sector time-invariant}} \\
& + \underbrace{\sigma \log(\varphi) - \eta \log(\rho)}_{\tilde{D}_{(\varphi)}\text{:firm time-invariant}}. \qquad \text{(B.3)}
\end{aligned}
$$

From equation (B.3), it is straightforward to see the effect of the input-cost and consumption channels on firm's production. Taking derivatives with respect to the input cost ratio, we obtain $\frac{\partial \log(q_{jt}(\varphi))}{\partial \log(r_t^k/w_t)} = -\alpha_j \eta < 0$, which indicates that a decrease in the relative price of capital leads to an increase in firms' production, particularly in sectors with higher capital elasticity. Similarly, $\frac{\partial \log(q_{jt}(\varphi))}{\partial \log(C_t)} = e_m > 0$, indicating that an increase in aggregate consumption leads to a higher increase in firms' production for sectors with higher expenditure elasticity.

We can express equation (B.3) in a difference-in-difference estimator. Define FL_t a dummy variable equal one for the post-reform period, and 0 otherwise. The effect of the policy could be estimated as

$$\log(q_{(\varphi)jt}) = \gamma_0 \text{FL}_t + \gamma_1(\alpha_j \times \text{FL}_t) + \gamma_2(e_m \times \text{FL}_t) + \gamma_3 \tilde{\varphi}_{jt} + \gamma_4((\alpha_j + \beta_j) \times \text{FL}_t) + \mu_{(\varphi)} + \varepsilon_{\varphi t}, \quad \text{(B.4)}$$

where γ_0 captures time-varying general trends of the economy that affect all sectors homogeneously and, in particular, the term $\tilde{B}_t$ of equation (B.3). γ_1 captures the effect of the input-cost channel, that is, how $-\eta \log(r_t^k/w_t)$ affects sectors differentially according to their capital elasticity. γ_2 captures the effect of expenditure channel and how aggregate consumption—$\log(C_t)$—affects sector heterogeneously according with their expenditure elasticity e_m. γ_3 captures changes in the sectoral average productivity by $(\sigma - \eta)\tilde{\varphi}_{jt}$. γ_4 controls for how aggregate trends affect sectors differently according to their returns to scale of the sector, which are driven by the term $\tilde{A}_{jt}$. $\mu_{(\varphi)}$ captures firms' and sectors' time-invariant characteristics given by $\tilde{C}_j$ and $\tilde{D}_{(\varphi)}$ in equation (B.3).

To obtain a first-difference estimator, consider that in period $t = 1$, the effect of the financial liberalization would be

$$\log(q_{(\varphi)j1}) = \gamma_0 \text{FL}_1 + \gamma_1(\alpha_j \times \text{FL}_1) + \gamma_2(e_m \times \text{FL}_1) + \gamma_3 \tilde{\varphi}_{j1} + \gamma_4((\alpha_j + \beta_j) \times \text{FL}_1) + \mu_{(\varphi)} + \varepsilon_{\varphi 1}. \quad \text{(B.5)}$$

In $t = 0$ when $\text{FL}_t = 0$, equation (B.4) becomes

$$\log(q_{j0}(\varphi)) = \gamma_3\tilde{\varphi}_{j0} + \mu_{(\varphi)} + \varepsilon_{\varphi 0} \tag{B.6}$$

Subtracting equation (B.6) to (B.5), we obtain the difference-in-difference estimator

$$\Delta q_j(\varphi) = \gamma_0\text{FL}_1 + \gamma_1(\alpha_j \times \text{FL}_1) + \gamma_2(e_m \times \text{FL}_1) + \gamma_3\Delta\tilde{\varphi}_j + \gamma_4((\alpha_j + \beta_j) \times \text{FL}_1) + \Delta\varepsilon_\varphi,$$

which is equivalent to write

$$\Delta q_j(\varphi) = \gamma_0 + \gamma_1\alpha_j + \gamma_2 e_m + \gamma_3\Delta\tilde{\varphi}_j + \gamma_4(\alpha_j + \beta_j) + \Delta\varepsilon_\varphi. \tag{B.7}$$

-Capital. A firm's optimal capital demand for domestic variable production is given by $k_{jt}(\varphi) = \alpha_j \frac{\phi_{jt}}{r_t^k}\frac{q_{jt}(\varphi)}{\varphi}$. Applying logs we obtain

$$\log(k_{jt}(\varphi)) = \log(\alpha_j) + \log(\phi_{jt}) - \log(r_t^k) + \log(q_{jt}(\varphi)) - \log(\varphi). \tag{B.8}$$

Replacing equation (B.3) and considering that $\log(\phi_{jt}) = \alpha_j \log(r_t^k/w_t) + (\alpha_j + \beta_j)\log(w_t) - \alpha_j\log(\alpha_j) - \beta_j\log(\beta_j)$, we can rewrite equation (B.8) as

$$\log(k_{jt}(\varphi)) = -\alpha_j(\eta-1)\log(r_t^k/w_t) + e_m\log(C_t) - (\eta-1)(\alpha_j+\beta_j)\log(w_t) - \log r_t^k + \eta\log P_t + (\eta-\sigma)\tilde{\varphi}_{jt} + \tilde{D}'_{\varphi j}, \tag{B.9}$$

where $\tilde{D}'_{\varphi_j}$ captures parameters at the firm and sector level. We can take partial derivatives in equation (B.9) to assess the effect of the input-cost and consumption channels on firm's capital. Formally, $\frac{\partial\log(k_{ijt})}{\partial\log(r_t^k/w_t)} = -\alpha_j(\eta-1) < 0$, which (if $\eta > 1$) indicates that a decrease in the relative price of capital leads to an increase in firms' capital demand, particularly in sectors with higher capital elasticity. Similarly, $\frac{\partial\log(k_{ijt})}{\partial\log(C_t)} = e_m > 0$, indicating that an increase in aggregate consumption leads to a higher increase in firms' capital demand for sectors with higher expenditure elasticity.

In a difference-in-difference estimator, equation (B.9) becomes

$$\Delta k(\varphi)_j = \gamma_0 + \gamma_1\alpha_j + \gamma_2 e_m + \gamma_3\Delta\tilde{\varphi}_j + \gamma_4(\alpha_j + \beta_j) + \Delta\tilde{\varepsilon}_i, \tag{B.10}$$

-Labor: A firm's optimal labor demand for local variable production is given by $l_{jt}(\varphi) =$

$\beta_j \frac{\phi_{jt}}{w_t} \frac{q_{jt}(\varphi)}{\varphi}$. Applying logs we obtain

$$\log(l_{jt}(\varphi)) = \log(\beta_j) + \log(\phi_{jt}) - \log(w_t) + \log(q_{jt}(\varphi)) - \log(\varphi). \tag{B.11}$$

Replacing equation (B.3) and considering that $\log(\phi_{jt}) = \alpha_j \log(r_t^k / w_t) + (\alpha_j + \beta_j) \log(w_t) - \alpha_j \log(\alpha_j) - \beta_j \log(\beta_j)$, we can rewrite equation (B.11) as

$$\log(l_{jt}(\varphi)) = -\alpha_j(\eta-1)\log(r_t^k/w_t) + e_m \log(C_t) + (\eta-\sigma)\tilde{\varphi}_{jt} - (\eta-1)(\alpha_j+\beta_j)\log(w_t) - \log(w_t) + \eta \log P_t + \tilde{D}''_{\varphi j}, \tag{B.12}$$

where $\tilde{D}''_{\varphi_j}$ captures parameters at the firm and sector level. Taking partial derivatives in equation (B.12) to assess the effect of the input-cost and consumption channels on firm's optimal labor demand. Formally, $\frac{\partial \log(l_{ijt})}{\partial \log(r_t^k/w_t)} = -\alpha_j(\eta-1) < 0$, which (if $\eta > 1$) indicates that a decrease in the relative price of capital leads to an increase in firms' labor demand, particularly in sectors with higher capital elasticity. In a difference-in-difference estimator, this equation becomes

$$\Delta l_{(\varphi)j} = \bar{\gamma}_0 + \bar{\gamma}_1 \alpha_j + \bar{\gamma}_2 e_m + \bar{\gamma}_3 \Delta\bar{\varphi}_j + \bar{\gamma}_4(\alpha_j + \beta_j) + \Delta\bar{\varepsilon}_{\varphi}, \tag{B.13}$$

Appendix C Additional Figures and Tables

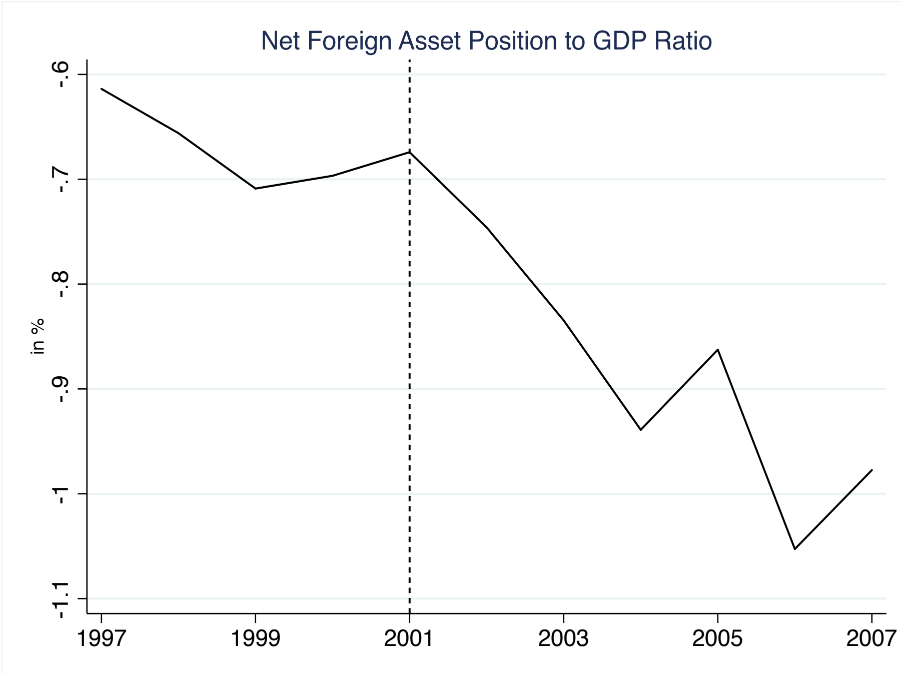


Figure C.1: Hungary: Evolution of Net Foreign Asset Position over GDP

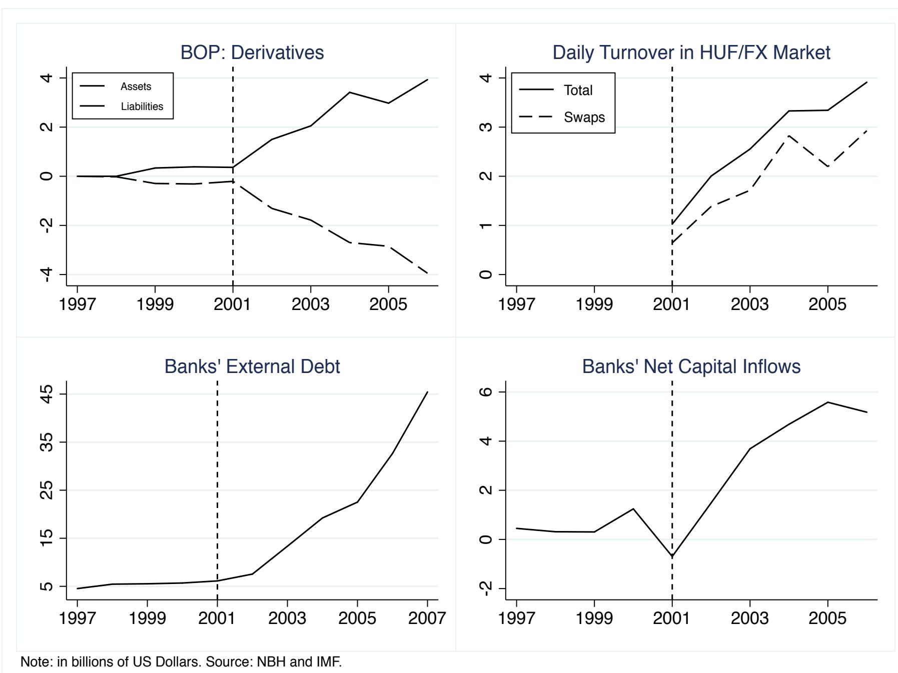


Figure C.2: Capital Flows and Financial Liberalization in Hungary

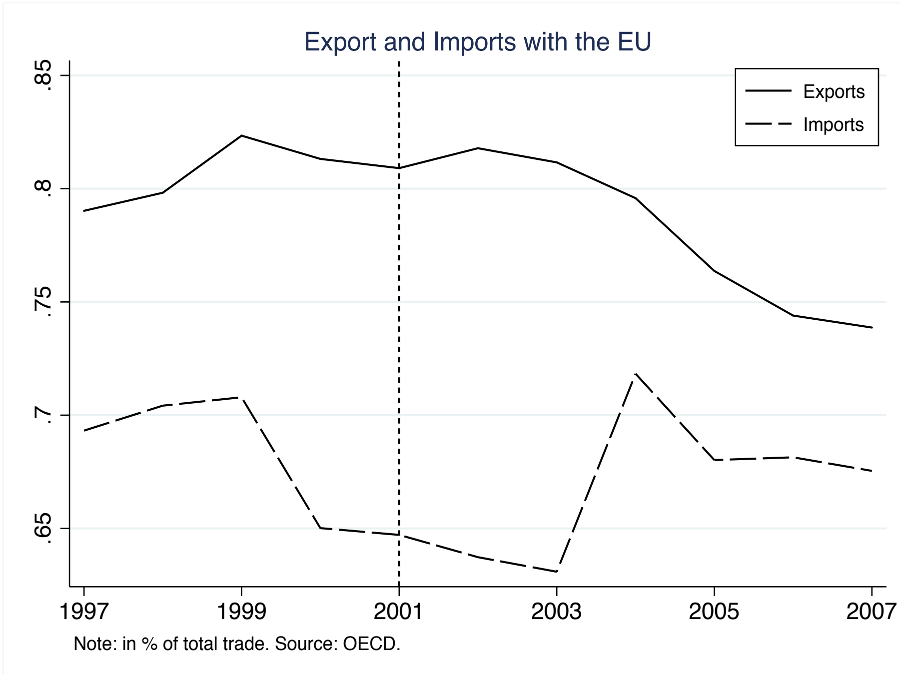


Figure C.3: Hungary: Total Exports and Imports with the EU

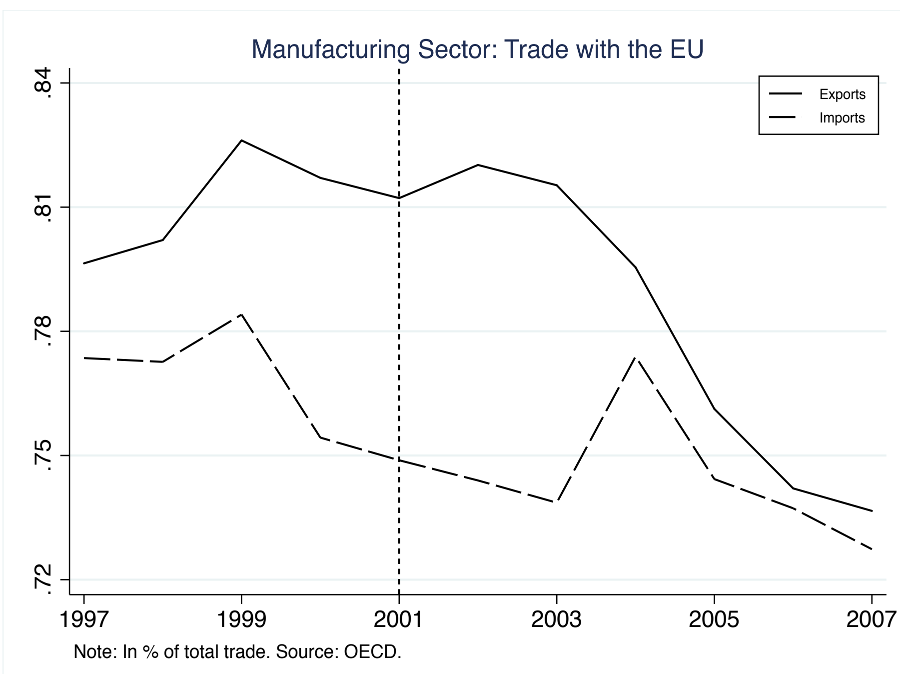


Figure C.4: Hungary: Manufacturing Trade and Exports with the EU

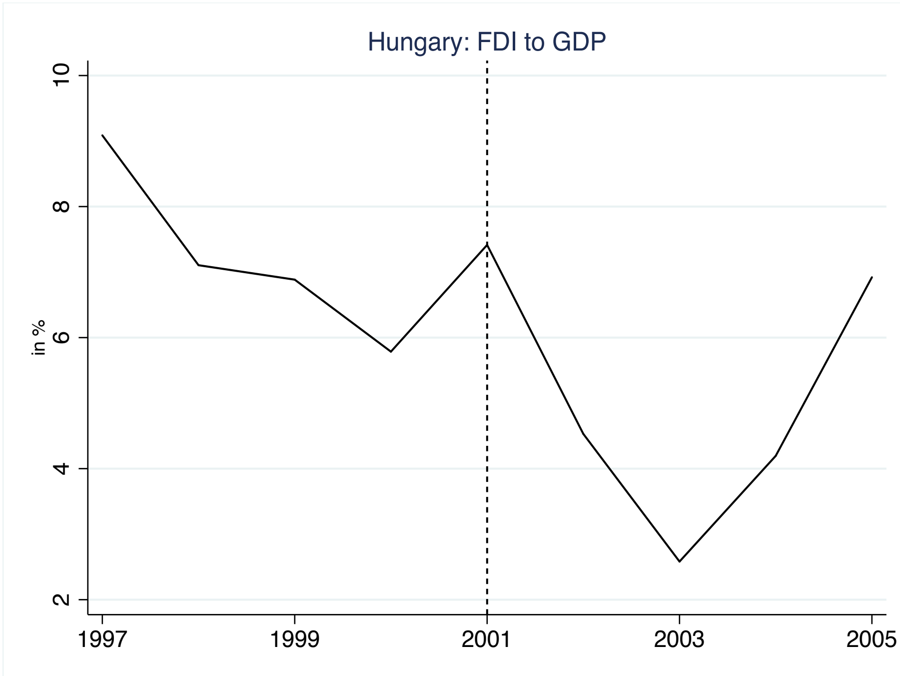


Figure C.5: Hungary: Evolution of Foreign Direct Investment

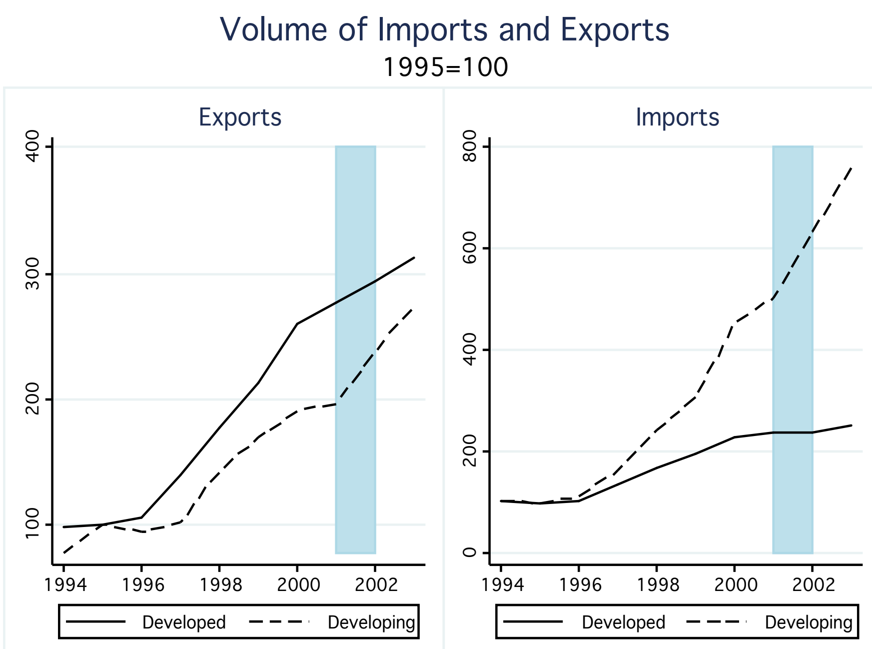


Figure C.6: Hungary: Volume of Trade

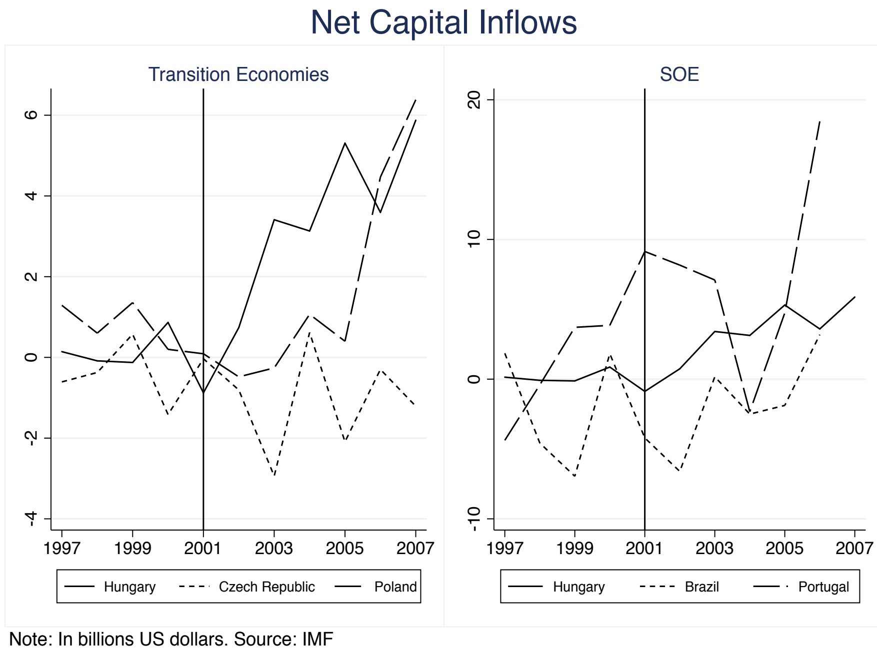


Figure C.7: Net Capital Inflows to Transition and Small Open Economies

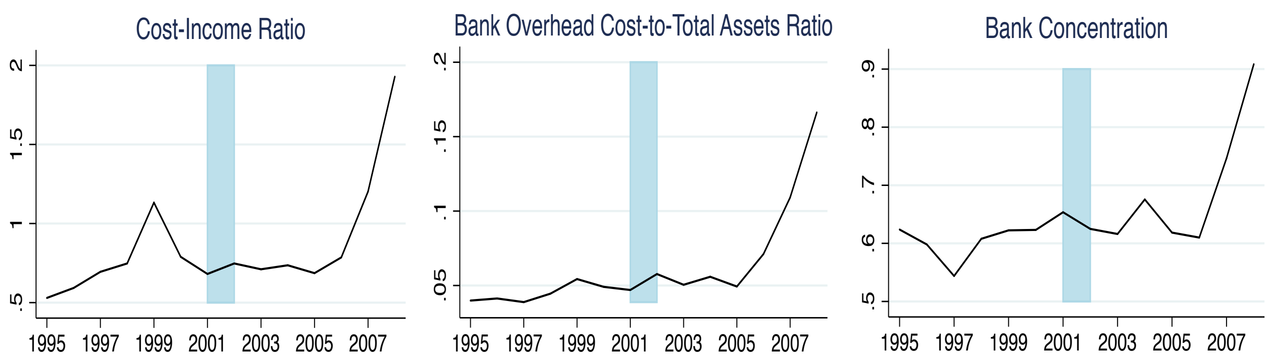


Figure C.8: Evolution of the Financial Sector in Hungary

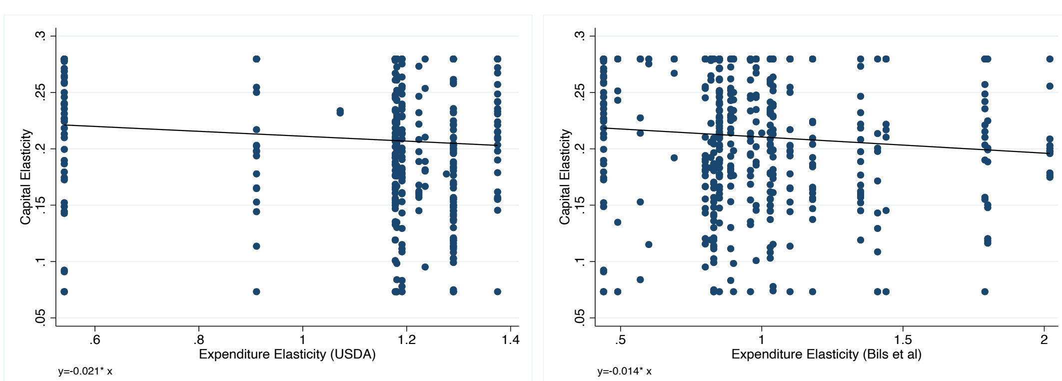


Figure C.9: Correlation between Capital and Expenditure Elasticities (Seale, Regmi, and Bernstein 2003 and Bils, Klenow, and Malin 2013)

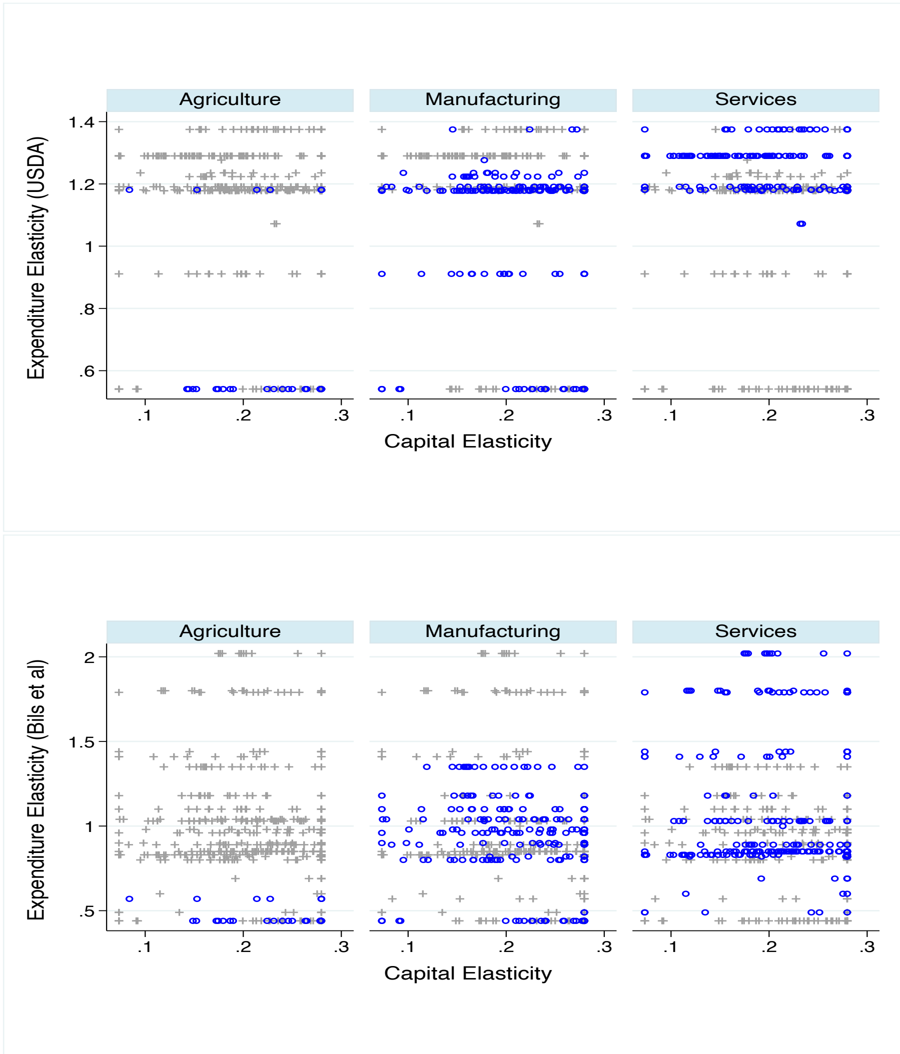


Figure C.10: Capital and Expenditure Elasticities (Seale, Regmi, and Bernstein 2003 and Bils, Klenow, and Malin 2013) across broadly-defined sectors

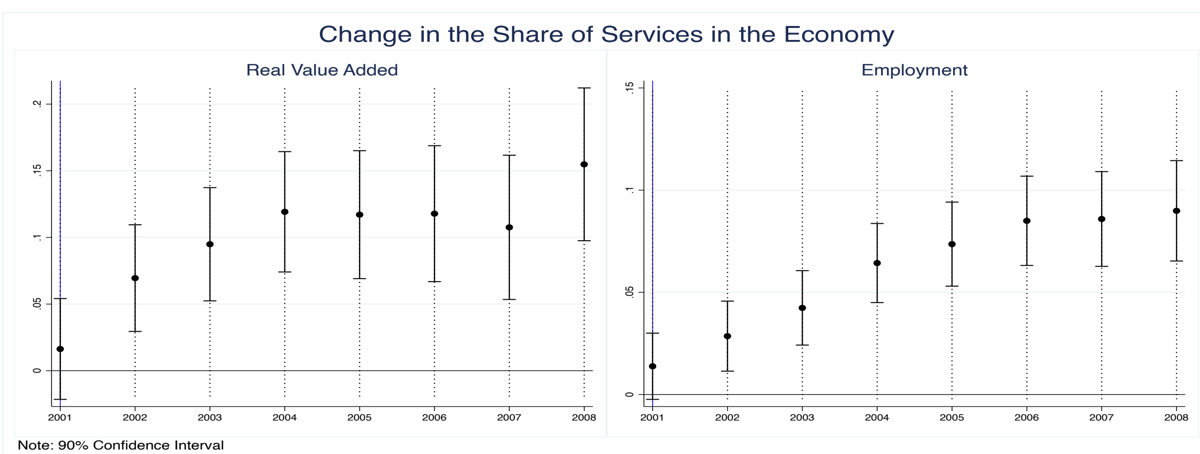


Figure C.11: Reallocation across sectors: Services

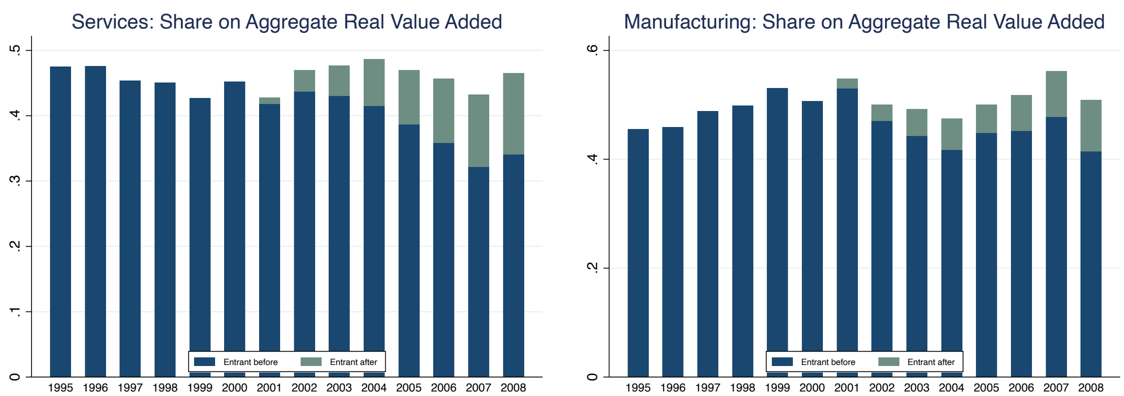


Figure C.12: Entrants Before and After the Financial Liberalization

Table C.1: Financial Liberalization and Net Capital Inflows

	Before 1995-2000	**After 2001-2008**	Before 1995-1998	Before 1998-2000	After 2001-2004	After 2005-2008
	(1)	(2)	(3)	(4)	(5)	(6)
Financial account (net)*	2.5	8.4	1.1	3.8	5.9	10.9
NFA/GDP	-65.8	-83.3	-62.0	-69.5	-72.0	-93.2
Credit-to-GDP ratio	24.6	43.2	22.2	26.9	35.6	50.5
Lending interest rate	21.7	10.1	27.2	16.1	11.2	6.9
Consumption/GDP	74.6	76.2	74.7	74.4	76.8	73.1
Share of consumption in high expenditure sectors	48.6	51.7	48.1	49.0	50.8	52.5

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

Table C.2: Comparison Hungary and Other Accession Countries (2001)

	Hungary	9 Accessing countries									
		All 9	Cyprus	Czech Republic	Estonia	Latvia	Lithuania	Malta	Poland	Slovakia	Slovenia
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Panel A- Log Real GDP (PPP)										
$R_{=1 \text{ if year} \geq 2001}$	0.065**	-0.039	-0.036	-0.036	-0.020	0.036	0.019	-0.063	-0.124***	-0.068	-0.055*
	(0.030)	(0.026)	(0.056)	(0.063)	(0.085)	(0.067)	(0.056)	(0.068)	(0.039)	(0.070)	(0.030)
t	0.026***	0.043***	0.041***	0.026***	0.060***	0.040***	0.049***	0.046***	0.053***	0.038***	0.035***
	(0.003)	(0.003)	(0.006)	(0.007)	(0.009)	(0.007)	(0.006)	(0.007)	(0.004)	(0.008)	(0.003)
Country FE	No	Yes	No	No	No	No	No	No	No	No	No
R^2	0.969	0.997	0.925	0.778	0.925	0.915	0.957	0.901	0.969	0.845	0.965
N	16	144	16	16	16	16	16	16	16	16	16
	Panel B- Log Real Consumption										
$R_{=1 \text{ if year} \geq 2001}$	0.112***	-0.029	-0.090**	0.009	-0.027	0.000	-0.006	-0.046	-0.067*	-0.005	-0.033
	(0.033)	(0.026)	(0.041)	(0.046)	(0.064)	(0.072)	(0.051)	(0.056)	(0.038)	(0.061)	(0.026)
t	0.021***	0.045***	0.067***	0.018***	0.052***	0.047***	0.054***	0.052***	0.054***	0.033***	0.028***
	(0.004)	(0.003)	(0.004)	(0.005)	(0.007)	(0.008)	(0.006)	(0.006)	(0.004)	(0.007)	(0.003)
Country FE	No	Yes	No	No	No	No	No	No	No	No	No
R^2	0.962	0.996	0.982	0.820	0.940	0.918	0.967	0.950	0.977	0.885	0.960
N	16	144	16	16	16	16	16	16	16	16	16
	Panel C- Share of Household Consumption										
$R_{=1 \text{ if year} \geq 2001}$	0.032*	-0.006	-0.055	-0.011	0.005	-0.035	-0.006	0.017	0.018	0.014	-0.006
	(0.018)	(0.012)	(0.034)	(0.021)	(0.023)	(0.020)	(0.024)	(0.037)	(0.016)	(0.012)	(0.012)
t	-0.001	0.007***	0.019***	0.004	0.004*	0.017***	0.014***	-0.003	0.004**	0.003*	-0.002
	(0.002)	(0.001)	(0.004)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.002)	(0.001)	(0.001)
Country FE	No	Yes	No	No	No	No	No	No	No	No	No
R^2	0.352	0.774	0.812	0.283	0.547	0.925	0.896	0.032	0.762	0.753	0.604
N	16	144	16	16	16	16	16	16	16	16	16
	Panel D- Share of Value Added in Services										
$R_{=1 \text{ if year} \geq 2001}$	1.665***	-0.125	-0.935	1.200	-0.950	1.807	1.888	-6.761	3.398	1.045	1.264**
	(0.534)	(0.973)	(1.424)	(1.120)	(1.877)	(1.526)	(1.601)	(5.016)	(2.241)	(1.390)	(0.471)
t	0.204***	0.440***	-0.052	0.188	0.299	0.654***	0.271	1.780***	0.088	-0.130	0.184***
	(0.066)	(0.115)	(0.175)	(0.122)	(0.230)	(0.187)	(0.197)	(0.544)	(0.275)	(0.171)	(0.058)
Country FE	No	Yes	No	No	No	No	No	No	No	No	No
R^2	0.926	0.768	0.230	0.666	0.220	0.878	0.679	0.602	0.529	0.053	0.917
N	14	130	14	16	14	14	14	16	14	14	14

Notes: *, **, *** significant at 10, 5, and 1 percent. This table reports the coefficient of the regression: $Y_{it} = \alpha R_t + t + \varepsilon_{it}$, where Y_{it} is log real GDP (PPP), log real consumption, share of household consumption, share of value added in services for country i in year t. R_t is a dummy variable equal to 1 from 2001 and 0 otherwise, t is a time trend to capture the evolution of these variables over time. We analyze this evolution between 1993 and 2008 for the 10 accessing countries: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia. Panel D reports less observations because the some countries only report share of value added in services since 1995. Source: Penn World Tables (Panels A,B and C) and the World Bank (Panel D).

Table C.3: Accession to the EU- After EU Vote

	Cyprus	Czech Republic	Estonia	Latvia	Lithuania	Malta	Poland	Slovakia	Slovenia
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Panel A- Log Real GDP in PPP								
$R_{=1 \text{ if year} \geq 2003}$	-0.097*	0.076	0.130*	0.083	0.091*	-0.112*	-0.118***	0.029	0.006
	(0.046)	(0.056)	(0.073)	(0.060)	(0.047)	(0.059)	(0.036)	(0.068)	(0.031)
t	0.046***	0.016**	0.047***	0.036***	0.043***	0.050***	0.052***	0.029***	0.030***
	(0.005)	(0.006)	(0.008)	(0.006)	(0.005)	(0.006)	(0.004)	(0.007)	(0.003)
R^2	0.942	0.800	0.940	0.925	0.966	0.918	0.969	0.836	0.956
N	16	16	16	16	16	16	16	16	16
	Panel B- Log Real Consumption								
$R_{=1 \text{ if year} \geq 2003}$	0.011	-0.037*	-0.011	-0.012	0.014	0.018	-0.021	0.005	-0.009
	(0.035)	(0.017)	(0.021)	(0.021)	(0.023)	(0.035)	(0.015)	(0.012)	(0.011)
t	0.012***	0.006***	0.006**	0.015***	0.013***	-0.003	0.007***	0.003**	-0.002
	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.001)	(0.001)
R^2	0.776	0.454	0.554	0.910	0.898	0.037	0.776	0.728	0.614
N	16	16	16	16	16	16	16	16	16
	Panel C- Share of Household Consumption								
$R_{=1 \text{ if year} \geq 2003}$	0.011	-0.037*	-0.011	-0.012	0.014	0.018	-0.021	0.005	-0.009
	(0.035)	(0.017)	(0.021)	(0.021)	(0.023)	(0.035)	(0.015)	(0.012)	(0.011)
t	0.012***	0.006***	0.006**	0.015***	0.013***	-0.003	0.007***	0.003**	-0.002
	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.001)	(0.001)
R^2	0.776	0.454	0.554	0.910	0.898	0.037	0.776	0.728	0.614
N	16	16	16	16	16	16	16	16	16
	Panel D- Share of Value Added in Services								
$R_{=1 \text{ if year} \geq 2003}$	-3.267**	-1.143	-2.963	-1.548	-2.849*	-7.183	-4.218*	-2.070	0.331
	(1.066)	(1.060)	(1.675)	(1.552)	(1.467)	(4.661)	(2.111)	(1.281)	(0.597)
t	0.194	0.402***	0.511**	1.008***	0.771***	1.777***	0.891***	0.199	0.282***
	(0.131)	(0.111)	(0.206)	(0.191)	(0.180)	(0.489)	(0.259)	(0.157)	(0.073)
R^2	0.568	0.667	0.378	0.874	0.731	0.617	0.582	0.195	0.867
N	14	16	14	14	14	16	14	14	14

Notes: *, **, *** significant at 10, 5, and 1 percent. This table reports the coefficient of the regression: $Y_{it} = \alpha EU_t + t + \varepsilon_{it}$, where Y_{it} is log real GDP (PPP), log real consumption, share of household consumption, share of value added in services for country i in year t. EU_t is a dummy variable equal to 1 from 2003 and 0 otherwise, t is a time trend to capture the evolution of these variables over time. We analyze this evolution between 1993 and 2008 for the 10 accessing countries: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia. Panel D reports less observations because the some countries only report share of value added in services since 1995. Source: Penn World Tables (Panels A,B and C) and the World Bank (Panel D).

Table C.4: Hungary: Accession to the EU (2004)

	Log Real GDP (PPP)		Log Real Consumption		Share of Household Consumption		Share of Value Added in Services	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$EU_{=1 \text{ if year} \geq 2004}$	0.033	0.038	0.027	0.035	0.009	0.011	-1.313**	-0.984*
	(0.030)	(0.026)	(0.040)	(0.029)	(0.018)	(0.016)	(0.574)	(0.453)
$R_{=1 \text{ if year} \geq 2001}$		0.069**		0.115***		0.033*		1.411**
		(0.029)		(0.032)		(0.018)		(0.476)
t	0.030***	0.023***	0.029***	0.018***	0.001	-0.002	0.510***	0.328***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.068)	(0.080)
R^2	0.961	0.973	0.930	0.967	0.198	0.376	0.906	0.950
N	16	16	16	16	16	16	14	14

Notes: *, **, *** significant at 10, 5, and 1 percent. Source: Penn World Tables (Panels A,B and C) and the World Bank (Panel D).

Table C.5: Expenditure Elasticity (Seale, Regmi, and Bernstein 2003)

Sector	Description	USDA sector	Expenditure Elasticity
01	Agriculture, hunting and related service activities	Food, beverage and tobacco	0.541
02	Forestry, logging and related service activities	Food, beverage and tobacco	0.541
05	Fishing, fish farming and related service activities	Food, beverage and tobacco	0.541
10	Mining of coal and lignite, extraction of peat	Gross rent, fuel and power	1.181
11	Extraction of crude petroleum and natural gas	Gross rent, fuel and power	1.181
12	Mining of uranium and thorium ores	Gross rent, fuel and power	1.181
13	Mining of metal ores	Gross rent, fuel and power	1.181
14	Other mining and quarrying	Gross rent, fuel and power	1.181
15	Manufacture of food products and beverages	Food, beverage and tobacco	0.541
16	Manufacture of tobacco products	Food, beverage and tobacco	0.541
17	Manufacture of textiles	Clothing and footwear	0.911
18	Manufacture of wearing apparel, dressing and dyeing of fur	Clothing and footwear	0.911
19	Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear	Clothing and footwear	0.911
20	Manufacture of wood & wood products & cork and straw & plaiting mater	Gross rent, fuel and power	1.181
21	Manufacture of pulp, paper and paper products	Household operations	1.178
22	Publishing, printing and reproduction of recorded media	Education and recreation	1.224
23	Manufacture of coke, refined petroleum products and nuclear fuel	Gross rent, fuel and power	1.181
24	Manufacture of chemicals and chemical products	Gross rent, fuel and power	1.181
25	Manufacture of rubber and plastic products	Transport and Communications, recreation and house operations	1.236
26	Manufacture of other non-metallic mineral products		
27	Manufacture of basic metals		
28	Manufacture of fabricated metal products, except machinery and equipment	Transport and communications	1.191
29	Manufacture of machinery and equipment n.e.c.	Household operations	1.178
30	Manufacture of office machinery and computers	Recreation and house operations	1.277
31	Manufacture of electrical machinery and apparatus n.e.c.	Household operations	1.178
32	Manufacture of radio, television and communication equipment and apparatus	Recreation	1.375
33	Manufacture of medical, precision and optical instruments, watches and clocks	Household operations	1.178
34	Manufacture of motor vehicles, trailers and semi-trailers	Transport and communications	1.191
35	Manufacture of other transport equipment	Transport and communications	1.191
36	Manufacture of furniture, manufacturing n.e.c.	Household operations	1.178
37	Recycling		
40	Electricity, gas, steam and hot water supply	Gross rent, fuel and power	1.181
41	Collection, purification and distribution of water	Gross rent, fuel and power	1.181
45	Construction	Gross rent, fuel and power	1.181
50	Sale, maintenance & repair of motor vehicles and motorcycles, retail sale of automotive fuel	Transport and communications	1.191
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles		
52	Retail trade, except of motor vehicles and motorcycles, repair of personal and household goods	Others	
55	Hotels and restaurants	Others	1.290
60	Land transport, transport via pipelines	Transport and communication	1.191
61	Water transport	Transport and communication	1.191
62	Air transport	Transport and communication	1.191
63	Supporting and auxiliary transport activities, activities of travel agencies	Transport and communication	1.191
64	Post and telecommunications	Transport and communication	1.191
65	Financial intermediation, except insurance and pension funding	Others	1.290
66	Insurance and pension funding, except compulsory social security	Others	1.290
67	Activities auxiliary to financial intermediation	Others	1.290
70	Real estate activities	Others	1.181
71	Renting of machinery & equipment without operator & of personal & household goods	Household operations	1.178
72	Computer and related activities	Recreation	1.375
73	Research and development	Education	1.072
74	Other business activities	Others	1.290
75	Public administration and defence, compulsory social security	Ignore	
80	Education	Education	1.072
85	Health and social work	Medical care	1.299
90	Sewage and refuse disposal, sanitation and similar activities	House operations	1.178
91	Activities of membership organizations n.e.c.	Recreation	1.375
92	Recreational, cultural and sporting activities	Recreation	1.375
93	Other service activities	Others	1.290
95	Activities of households as employers of domestic staff	House operations	1.178
96	Undifferentiated goods producing activities of private households for own use	House operations	1.178
97	Undifferentiated services producing activities of private households for own use	House operations	1.178

Notes: expenditure elasticity from Seale, Regmi, and Bernstein (2003) for Hungary.

Table C.6: Expenditure Elasticity (Bils, Klenow, and Malin 2013)

Sector	Description	Expenditure 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	1.10
18	Manufacture of wearing apparel; dressing and dyeing of fur	1.10
19	Tanning & dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	1.10
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	0.90
25	Manufacture of rubber and plastic products	0.80
26	Manufacture of other non-metallic mineral products	0.80
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	1.80
60	Land transport; transport via pipelines	2.02
61	Water transport	1.00
62	Air transport	1.41
63	Supporting & auxiliary transport activities; activities of travel agencies	1.41
64	Post and telecommunications	0.60
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	1.03
73	Research and development	1.03
74	Other business activities	1.03
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: expenditure elasticity from Bils, Klenow, and Malin (2013).

Table C.7: Summary Statistics Capital and Expenditure Elasticities

	Capital Elasticity	Income Elasticity (USDA)	Income Elasticity (Bils, Klenow, and Malin 2013)
	(1)	(2)	(3)
Mean	0.20	1.20	1.07
Median	0.20	1.29	0.89
Standard Deviation	0.04	0.22	0.41
p25	0.17	1.18	0.85
p50	0.20	1.29	0.89

Notes: the capital elasticity was estimated at four-digit NACE industries following Wooldridge (2009) and Petrin and Levinsohn (2012) methodology and winsorized at 1 and 95 percentiles. Expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 and Bils, Klenow, and Malin (2013).

Table C.8: Firms' Characteristics across Sectors

	Mean	Capital Elasticity	Expenditure Elasticity (Bils, Klenow, and Malin 2013)	Expenditure Elasticity (USDA)
	(1)	(2)	(3)	(4)
Log real value added	8.078	3.426***	-0.412***	-1.051***
		(0.172)	(0.020)	(0.037)
Log capital	61,009	5.080***	-0.130***	-1.911***
		(0.191)	(0.021)	(0.040)
Log employment	2.244	1.413***	-0.315***	-0.986***
		(0.111)	(0.014)	(0.024)
Log age	1.473	0.808***	-0.194***	-0.306***
		(0.059)	(0.006)	(0.012)
Log export share	0.041	0.232***	-0.001	-0.032***
		(0.011)	(0.001)	(0.002)

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 expenditure elasticities for the pre-reform period (1995-2000). The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods at four-digit NACE industries, and the expenditure elasticities come from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary and Bils, Klenow, and Malin (2013) at two-digit NACE industries. Source: APEH.

Table C.9: Growth Rate in the Pre-Reform Period

	Capital Elasticity			Expenditure Elasticity (USDA)			Expenditure Elasticity (Bils, Klenow, and Malin 2013)		
	Real Value Added Growth	Capital Growth	Employment Growth	Real Value Added Growth	Capital Growth	Employment Growth	Real Value Added Growth	Capital Growth	Employment Growth
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Capital elasticity	-0.195	0.161	-0.084						
	(0.186)	(0.131)	(0.078)						
Expenditure elasticity				0.083	-0.136*	-0.052	-0.007	-0.005	-0.019**
				(0.101)	(0.063)	(0.039)	(0.012)	(0.039)	(0.006)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.003	0.001	0.002	0.002	0.000	0.001	0.002	0.000	0.001
N	232659	219286	205613	234839	221081	206883	235093	221326	207116

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 expenditure elasticities for the pre-reform period (1995-2000). The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods at four-digit NACE industries, and the expenditure elasticities come from Seale, Regmi, and Bernstein 2003 (USDA)'s computation for Hungary and Bils, Klenow, and Malin (2013) at two-digit NACE industries. Source: APEH.

Table C.10: Robustness: Standardized Beta Coefficient

	Expenditure Elasticity					
	USDA			Bils, Klenow, and Malin 2013		
	Δ Real Value Added	Δ Capital	Δ Employment	Δ Real Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)	(4)	(5)	(6)
Capital elasticity	0.042**	0.033**	0.044***	0.031*	0.030**	0.029
	(0.018)	(0.014)	(0.016)	(0.017)	(0.014)	(0.018)
Expenditure elasticity	0.086***	0.020	0.104***	0.042**	-0.005	0.068***
	(0.020)	(0.017)	(0.022)	(0.021)	(0.021)	(0.021)
Average sectoral productivity	0.027	-0.013	0.000	0.035	-0.011	0.009
	(0.026)	(0.016)	(0.017)	(0.024)	(0.015)	(0.021)
Returns to scale	-0.030	0.017	-0.009	-0.006	0.022	0.019
	(0.019)	(0.018)	(0.017)	(0.021)	(0.019)	(0.022)
R^2	0.008	0.002	0.011	0.003	0.001	0.005
N	53,309	50,878	47,710	53,246	50,817	47,656

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods at four-digit NACE industries, and the expenditure elasticities come from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary and Bils, Klenow, and Malin (2013) at two-digit NACE industries. Source: APEH.

Table C.11: Additional Mechanisms: Financial Dependence

	Rajan and Zingales			Inventories to Sales			Cash Conversion Cycle		
	Δ Real Value Added	Δ Capital	Δ Employment	Δ Real Value Added	Δ Capital	Δ Employment	Δ Real Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Capital elasticity	0.926**	1.074**	0.927***	0.930**	1.047***	0.838***	0.860**	1.097***	0.898***
	(0.394)	(0.416)	(0.305)	(0.368)	(0.403)	(0.311)	(0.377)	(0.400)	(0.299)
Expenditure elasticity	0.393***	0.119	0.362***	0.409***	0.111	0.348***	0.403***	0.085	0.348***
	(0.083)	(0.106)	(0.090)	(0.091)	(0.101)	(0.078)	(0.091)	(0.090)	(0.077)
Financial Dependence	-0.001	0.034	-0.003	0.263	0.052	-0.274*	0.000	-0.001*	-0.000
	(0.028)	(0.021)	(0.015)	(0.159)	(0.179)	(0.155)	(0.000)	(0.000)	(0.000)
Average sectoral productivity	0.037	-0.024	-0.027	0.027	-0.024	-0.023	0.031	-0.021	-0.029
	(0.057)	(0.049)	(0.037)	(0.051)	(0.047)	(0.035)	(0.055)	(0.044)	(0.035)
Returns to scale	-0.517**	0.295	-0.170	-0.494**	0.261	-0.186	-0.481**	0.238	-0.180
	(0.226)	(0.295)	(0.175)	(0.207)	(0.285)	(0.161)	(0.212)	(0.273)	(0.157)
R^2	0.009	0.003	0.010	0.009	0.002	0.010	0.009	0.003	0.010
N	45184	43127	40694	46052	43976	41518	46027	43951	41501

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods and the expenditure elasticities come from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary. Columns 1-3 include as a control the Rajan and Zingales (1998) index. Columns 4-6 controls for the inventories to sales index and columns 7-9 controls for the cash conversion cycle, both estimated as in Raddatz (2006). The three financial dependence measures are estimated at four-digit NACE industries. Source: APEH.

Table C.12: Alternative Mechanisms: Firms without Debt

	Credit Registry	Balance Sheet Data					Credit Registry + BS Data
	No ST or LT	No LT	ST Obligations				No Credit or LT/ST
	Credit	Obligations	w/ Owners	Trade Credit	w/ Banks	All	Obligation
						=(3)+(4)+(5)	=(1)+(2)+(6)
	Panel A- Δ Real Value Added						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Capital elasticity	0.362	0.318	1.174**	1.459	0.639	3.982***	2.511*
	(0.447)	(0.506)	(0.541)	(0.979)	(0.503)	(1.495)	(1.401)
Expenditure elasticity	0.525***	0.585***	0.547***	0.494***	0.420***	0.804**	0.740**
	(0.107)	(0.128)	(0.125)	(0.181)	(0.120)	(0.314)	(0.292)
Average sectoral productivity	0.052	0.053	0.039	-0.005	0.044	-0.112	-0.012
	(0.037)	(0.047)	(0.056)	(0.069)	(0.053)	(0.113)	(0.079)
Returns to scale	-0.308	-0.502*	-0.458*	-1.216***	-0.500*	-2.292***	-1.873***
	(0.203)	(0.269)	(0.269)	(0.416)	(0.268)	(0.599)	(0.605)
R^2	0.010	0.013	0.016	0.026	0.008	0.103	0.066
N	26947	22114	20332	8197	21580	2263	2620
	Panel B- Δ Capital						
Capital elasticity	0.199	0.070	1.139*	-0.296	0.264	0.121	0.368
	(0.392)	(0.439)	(0.594)	(0.437)	(0.324)	(0.493)	(0.552)
Expenditure elasticity	0.229***	0.259***	0.182	0.254**	0.199*	0.232*	0.269**
	(0.085)	(0.089)	(0.133)	(0.104)	(0.106)	(0.130)	(0.130)
Average sectoral productivity	-0.023	0.005	-0.071	-0.037	-0.036*	-0.055	-0.080***
	(0.019)	(0.026)	(0.063)	(0.036)	(0.022)	(0.037)	(0.031)
Returns to scale	0.103	0.282	0.250	-0.173	0.256	-0.194	-0.260
	(0.161)	(0.207)	(0.315)	(0.328)	(0.232)	(0.317)	(0.248)
R^2	0.002	0.002	0.004	0.002	0.002	0.002	0.004
N	24939	20179	18752	6921	19772	3482	1821
	Panel C- Δ Employment						
Capital elasticity	0.280	0.275	0.723	-0.024	0.557**	-0.320	-0.485
	(0.389)	(0.282)	(0.467)	(0.354)	(0.283)	(0.395)	(0.541)
Expenditure elasticity	0.628***	0.546***	0.531***	0.303***	0.415***	0.245**	0.383***
	(0.109)	(0.093)	(0.113)	(0.089)	(0.086)	(0.121)	(0.131)
Average sectoral productivity	0.012	0.019	-0.010	0.001	0.003	0.011	0.043
	(0.027)	(0.029)	(0.042)	(0.034)	(0.024)	(0.038)	(0.044)
Returns to scale	-0.063	0.009	-0.031	-0.124	-0.059	-0.163	-0.066
	(0.129)	(0.153)	(0.218)	(0.183)	(0.138)	(0.269)	(0.248)
R^2	0.019	0.013	0.019	0.005	0.008	0.004	0.008
N	22353	18641	17551	5855	18174	3037	1527

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. Column 1 excludes firms reporting short term (ST) and/or long term (LT) credit in the credit registry data. Columns 2 to 6 consider liabilities obligations reported in balance sheet data. Column 2 excludes firms reporting long-term obligations. Column 3 excludes firms reporting short-term loans with owners, column 4 excludes firms reporting short-term trade credit, column 5 excludes firms reporting short-term credit with financial institutions, and column 6 excludes firms reporting all short-term obligations. Column 7 excludes firms reporting any type of short or long term obligation or credit reported either in the credit registry or balance sheet data. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods and the expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary. Source: APEH and credit registry.

Table C.13: Robustness: Continuous Treatment Effect

	Δ Real Value Added (1)	Δ Capital (2)	Δ Employment (3)
Capital elasticity * RIR/Real Wage Growth	2.697**	2.859**	2.555***
	(1.162)	(1.219)	(0.957)
Expenditure elasticity * Real Consumption Growth	1.066***	0.324	1.176***
	(0.247)	(0.277)	(0.250)
Average sectoral productivity	0.047	-0.031	0.000
	(0.045)	(0.037)	(0.027)
Returns to Scale * Real Wage Growth	0.370	-0.288	0.106
	(0.237)	(0.294)	(0.187)
R^2	0.008	0.002	0.011
N	53,309	50,878	47,710

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at year and four-digit NACE industries. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary. Source: APEH.

Table C.14: Robustness: Panel Regression

	Log Real Value Added (1)	Log Capital (2)	Log Employment (3)
FL * Capital Elasticity	1.053**	1.050**	0.888***
	(0.407)	(0.399)	(0.290)
FL * Income Elasticity	0.417***	0.121	0.355***
	(0.093)	(0.099)	(0.075)
FL * Returns to scale	Yes	Yes	Yes
Average sectoral productivity	Yes	Yes	Yes
R^2	0.810	0.879	0.807
N	849,269	783,796	733,695

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at year and four-digit NACE industries. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary. Source: APEH.

Table C.15: Robustness: Continuing Firms

	Δ Real Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)
Capital elasticity	0.939**	0.928**	0.755**
	(0.381)	(0.403)	(0.374)
Expenditure elasticity	0.402***	0.164*	0.418***
	(0.087)	(0.093)	(0.086)
Average sectoral productivity	0.067	-0.017	-0.012
	(0.044)	(0.037)	(0.032)
Returns to scale	-0.418**	0.145	-0.076
	(0.203)	(0.217)	(0.151)
R^2	0.012	0.002	0.014
N	20,991	20,592	19,921

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit sector level. These regressions only consider firms existing all over the period 1995-2008. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary. Source: APEH.

Table C.16: Robustness: Non-Exporters and Domestically-Owned Firms

	Non-Exporters			Domestically-Owned Firms		
	Δ Real Value Added	Δ Capital	Δ Employment	Δ Real Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)	(4)	(5)	(6)
Capital elasticity	1.083***	1.185***	1.016***	0.879**	1.031**	0.844**
	(0.405)	(0.430)	(0.333)	(0.390)	(0.416)	(0.336)
Expenditure elasticity	0.329***	0.083	0.394***	0.407***	0.146	0.435***
	(0.092)	(0.109)	(0.094)	(0.093)	(0.107)	(0.094)
Average sectoral productivity	0.048	-0.026	0.007	0.040	-0.042	0.000
	(0.048)	(0.038)	(0.027)	(0.044)	(0.038)	(0.029)
Returns to scale	-0.239	0.236	-0.113	-0.326*	0.141	-0.068
	(0.182)	(0.237)	(0.144)	(0.179)	(0.219)	(0.149)
R^2	0.007	0.002	0.011	0.008	0.002	0.012
N	48,439	46,074	42,954	48,099	45,773	43,017

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. Columns 1-3 exclude exporters. Columns 4-6 exclude multinational firms (where MNC are firms with 10% foreign ownership). The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary. Source: APEH.

Table C.17: Robustness: Controlling for Imports

	Δ Real Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)
Capital elasticity	0.782**	0.918**	0.781**
	(0.385)	(0.410)	(0.316)
Expenditure elasticity	0.375***	0.103	0.407***
	(0.087)	(0.100)	(0.088)
Imports	0.014***	0.001	0.011***
	(0.003)	(0.003)	(0.003)
Average sectoral productivity	0.041	-0.033	-0.002
	(0.044)	(0.037)	(0.028)
Returns to scale	-0.250	0.209	-0.036
	(0.178)	(0.219)	(0.143)
R^2	0.010	0.002	0.014
N	52,682	50,414	47,451

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary. Source: APEH.

Table C.18: Robustness: Price Index

	Δ Real Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)
Capital elasticity	1.060**	1.219**	1.156***
	(0.497)	(0.480)	(0.389)
Expenditure elasticity	0.385***	0.125	0.366***
	(0.080)	(0.112)	(0.094)
Sectoral Price Index	-0.081	0.067	0.008
	(0.198)	(0.168)	(0.108)
Returns to scale	-0.296	0.131	-0.139
	(0.193)	(0.254)	(0.158)
R^2	0.007	0.002	0.009
N	53,309	50,878	47,710

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit sector level. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary. Source: APEH.

Table C.19: Robustness: Olley and Pakes

	Δ Real Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)
Capital Elasticity	1.078***	0.533	0.912***
	(0.301)	(0.334)	(0.240)
Expenditure elasticity	0.262***	0.044	0.320***
	(0.079)	(0.097)	(0.088)
Average sectoral productivity	0.051	-0.026	0.004
	(0.045)	(0.035)	(0.029)
Returns to scale	-0.305*	0.180	-0.111
	(0.170)	(0.217)	(0.148)
R^2	0.009	0.001	0.012
N	53,233	50,804	47,643

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. The capital elasticity is estimated using the Olley and Pakes (1996) methods used at four-digit NACE industries, and the expenditure elasticity comes from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary. Source: APEH.

Table C.20: Alternative Mechanisms: Controlling for the Local Currency Housing Program

	Δ Real Value Added						
	County Fixed Effects	County Real Value Added Growth			County Real Investment Growth		
	Panel A. Expenditure Elasticity: USDA						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Capital elasticity	0.918**	0.878**	0.878**	0.888**	0.905**	0.880**	0.879**
	(0.365)	(0.378)	(0.377)	(0.377)	(0.372)	(0.378)	(0.378)
Expenditure elasticity	0.426***	0.376***	0.379***	0.388***	0.407***	0.378***	0.376***
	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)
Average sectoral productivity	0.050	0.047	0.048	0.048	0.048	0.048	0.047
	(0.043)	(0.045)	(0.045)	(0.045)	(0.044)	(0.045)	(0.045)
Returns to scale	-0.275	-0.271	-0.272	-0.270	-0.270	-0.270	-0.271
	(0.169)	(0.174)	(0.174)	(0.173)	(0.172)	(0.174)	(0.174)
Growth b/ 1999 and 2000		-0.008			-0.304***		
		(0.062)			(0.057)		
Growth b/ 1999 and 2001			0.096*			-0.081**	
			(0.053)			(0.033)	
Growth b/ 1995 and 2008				-0.061**			-0.005
				(0.024)			(0.024)
Country FE	Yes	No	No	No	No	No	No
R^2	0.011	0.008	0.008	0.008	0.009	0.008	0.008
N	53309	53309	53309	53309	53309	53309	53309
	Panel B. Expenditure Elasticity: Bils, Klenow, and Malin (2013)						
Capital elasticity	0.649*	0.642*	0.641*	0.644*	0.648*	0.643*	0.642*
	(0.361)	(0.368)	(0.367)	(0.368)	(0.366)	(0.368)	(0.368)
Expenditure elasticity	0.110**	0.095**	0.096**	0.098**	0.105**	0.096**	0.095**
	(0.047)	(0.048)	(0.047)	(0.047)	(0.047)	(0.048)	(0.047)
Average sectoral productivity	0.064	0.061	0.061	0.061	0.063	0.061	0.061
	(0.040)	(0.042)	(0.042)	(0.041)	(0.041)	(0.042)	(0.042)
Returns to scale	-0.038	-0.056	-0.054	-0.050	-0.039	-0.053	-0.056
	(0.192)	(0.193)	(0.193)	(0.194)	(0.194)	(0.193)	(0.193)
Growth b/ 1999 and 2000		-0.028			-0.236***		
		(0.062)			(0.060)		
Growth b/ 1999 and 2001			0.084			-0.074**	
			(0.053)			(0.034)	
Growth b/ 1995 and 2008				-0.037			0.011
				(0.027)			(0.027)
Country FE	Yes	No	No	No	No	No	No
R^2	0.006	0.003	0.004	0.004	0.004	0.004	0.003
N	53246	53246	53246	53246	53246	53246	53246

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. The capital elasticity is estimated using the Petrin and Levinsohn (2012) and Wooldridge (2009) methods used at four-digit NACE industries, and the expenditure elasticities come from Seale, Regmi, and Bernstein 2003 (USDA) computations for Hungary and from Bils, Klenow, and Malin (2013). Source: APEH.

Table C.21: Characteristics of Entrants Before and After the Financial Liberalization

	RTFP		Labor Productivity (VA per worker)		Real Value Added	
	(1)	(2)	(3)	(4)	(5)	(6)
FL	-0.151***	-0.077***	-0.221***	-0.138***	-0.784***	-0.619***
	(0.029)	(0.019)	(0.028)	(0.023)	(0.044)	(0.021)
Sector FE		Yes		Yes		Yes
R^2	0.003	0.095	0.005	0.096	0.035	0.134
N	95,689	95,687	143,427	143,314	211,241	211,163

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. Sector fixed effects are estimated at four-digit NACE industries. Period: 1995-2008. Source: APEH.

Table C.22: Top 15 Industries in Net Entry (2001-2007)

Broad Sector	Sector (II digits)	Industry (IV digits)	Description	Expenditure 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	1.29	1,180	2	0.06
Service	Construction	4521	General construction of buildings and civil engineering	1.18	623	3	0.17
Service	Other business activities	7487	Other business activities n.e.c.	1.00	611	3	0.08
Service	Other business activities	7414	Business and management consultancy activities	1.29	486	2	0.06
Service	Hotels and restaurants	5530	Restaurants	1.29	485	3	0.11
Service	Retail trade	5248	Other retail sale in specialized stores	1.29	410	2	0.05
Service	Land transport	6024	Freight transport by road	1.19	408	3	0.07
Service	Other business activities	7420	Architectural and engineering activities and consultancy	1.29	358	2	0.05
Service	Real estate activities	7020	Letting of own property	1.29	342	9	0.06
Service	Computer	7222	Software consultancy and supply	1.38	321	2	0.03
Service	Repair of motor vehicles	5010	Sale of motor vehicles	1.19	299	3	0.05
Service	Retail trade	5211	Non-specialized stores with food, beverages or tobacco	1.29	263	4	0.08
Service	Hotels and restaurants	5540	Bars	1.29	260	2	0.03
Service	Retail trade	5263	Other non-store retail sale	1.29	229	2	0.01
Service	Construction	4531	Installation of electrical wiring and fittings	1.18	227	3	0.04
Total					6,501		0.95

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

Table C.23: 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.

Theory Appendices

Appendix D Boppart Preference

First, we describe new parameters we need to calibrate. The household preference is introduced following Boppart (2014) as

$$U = \sum_{t=0}^{\infty} V\left(P_{Mt}, P_{St}, E_t\right),$$

where $V\left(P_{Mt}, P_{St}, E_t\right)$ is an indirect instantaneous utility function taking the form

$$V\left(P_{Mt}, P_{St}, E_t\right) = \frac{1}{\varepsilon}\left[\frac{E_t}{P_{St}}\right]^{\varepsilon} - \frac{\nu}{\tilde{\gamma}}\left[\frac{P_{Mt}}{P_{St}}\right]^{\tilde{\gamma}} - \frac{1}{\varepsilon} - \frac{\nu}{\tilde{\gamma}},$$

where $0 \leq \varepsilon \leq \tilde{\gamma} < 1$ and $\nu > 0$.

We need to calibrate ε, $\tilde{\gamma}$, and ν to pin down the expenditure elasticities. The expenditure elasticities can be calculated by the following. We first apply the Roy's identity to obtain Marshallian demand for the service and manufacturing sector

$$\begin{aligned} C_{Mt} &= \nu \frac{E_t}{P_{Mt}}\left[\frac{P_{St}}{E_t}\right]^{\varepsilon}\left[\frac{P_{Mt}}{P_{St}}\right]^{\tilde{\gamma}} \\ C_{St} &= \frac{E_t}{P_{St}}\left[1 - \nu\left[\frac{P_{St}}{E_t}\right]^{\varepsilon}\left[\frac{P_{Mt}}{P_{St}}\right]^{\tilde{\gamma}}\right] \end{aligned}$$

Then, the expenditure elasticities are defined by

$$\begin{aligned} \frac{\partial \log C_{Mt}}{\partial \log E_t} &= 1 - \varepsilon \\ \frac{\partial \log C_{St}}{\partial \log E_t} &= 1 + \frac{\varepsilon \nu \left[\frac{P_{St}}{E_t}\right]^{\varepsilon}\left[\frac{P_{Mt}}{P_{St}}\right]^{\tilde{\gamma}}}{1 - \nu\left[\frac{P_{St}}{E_t}\right]^{\varepsilon}\left[\frac{P_{Mt}}{P_{St}}\right]^{\tilde{\gamma}}} \end{aligned}$$

Therefore, the manufacturing sector expenditure elasticity is directly pined down by ε while the service sector expenditure elasticity depends on ε, ν, and $\tilde{\gamma}$ as well as the steady state values of P_{St}, P_{Mt}, and E_t.

The externally calibrated parameters remain the same as the baseline model.

Table D.1: Externally Calibrated Parameters

Parameter	Description	Value	Source
σ	Substitution M varieties	2.85	Hungarian Micro Data
δ_S	Exogenous exit rate M	0.105	Hungarian Micro Data
δ_M	Exogenous exit rate S	0.08	Hungarian Micro Data
α_S	Capital share S sector	0.282	Hungarian Micro Data
α_M	Capital share M sector	0.346	Hungarian Micro Data
r^*	World interest rate	0.05	Hungarian Macro Data
η_M	Substitution $C_D - C_F$ M	1.93	Hungarian Macro Data
δ^k	Depreciation of capital	0.078	Hungarian Macro Data
β	Discount rate	0.95	$\frac{1}{1+r^*}$
γ	Risk aversion	2	Corsetti, Dedola, and Leduc (2008)
η	Substitution $C_M - C_S$	0.23	Sposi, Yi, and Zhang (2018)
f_S^e	Fixed entry cost S	1	Normalization
f_M^e	Fixed entry cost M	1	Normalization
ξ	Variable entry cost	1	Small
A	Foreign demand for M	1	Normalization
τ	Capital control tax	0	Full liberalization

Table D.2: Internally Calibrated Parameters

Parameter	Description	Value	Target	Target	Model
ν	Share C_S in C	0.453	$\frac{P_S \cdot C_S}{E}$	0.58	0.57
θ_D	Share C_D in C_M	0.794	$\frac{P_D \cdot C_D}{P_M \cdot C_M}$	0.72	0.70
ξ_S/ξ_M	Pareto parameters S/M	0.479 / 0.498	$\frac{M_S}{M_M}$	8.10	8.10
f_S^d	Fixed operating cost S	0.058	$\log(VA_M^{p50}) - \log(VA_S^{p50})$	1.21	1.17
f_M^d	Fixed operating cost M	0.214	$\log(VA_M^{p25}) - \log(VA_S^{p25})$	1.08	1.15
f_M^x	Fixed exporting cost M	2.33	$\frac{1-G(\varphi_M^x)}{1-G(\varphi_M^d)}$	0.12	0.12
$\tilde{\gamma}$	Expenditure elasticity S	0.444	Hungarian Micro Data	1.25	1.13
ε	Expenditure elasticity M	0.18	Hungarian Micro Data	0.82	0.82
K_0	Initial condition K	0.53	Consistent with Baseline Capital	$0.53 \times K_{SS}$	$0.53 \times K_{SS}$
$\bar{L}$	Labor supply	0.1840	Nominal GDP Y	1.00	1.00
$\bar{M}_S^e$	Convex entry cost S	0.0392	Open SS Value	n.a.	n.a.
$\bar{M}_M^e$	Convex entry cost M	0.0468	Open SS Value	n.a.	n.a.

To ensure the calibration is consistent with the model implication, we can check if the following is satisfied.

$$\frac{P_{St}C_{St}}{E_t}\frac{\partial \log C_{St}}{\partial \log E_t} + \frac{P_{Mt}C_{Mt}}{E_t}\frac{\partial \log C_{Mt}}{\partial \log E_t} = 1$$

By substituting the calibrated numbers in, we can see

$$(1 - 0.57) \times 0.82 + 0.57 \times 1.13 = 1,$$

which validates our calibration.

Table D.3: Short-run Dynamics of a Financial Liberalization: New Targets and Parameters

	Data		Baseline	Boppart (2014)
	Source (1)	Coefficient (2)	(3)	(4)
Consumption and Capital Accumulation				
Household consumption (real) (log)	Hungarian Macrodata	0.058** (0.026)	0.072	0.192
Average within capital increase (real)	Hungarian Microdata	0.225*** (0.010)	0.249	0.315
Reallocation Across Sectors				
Production				
Share of real value added in services	Hungarian Microdata	0.039* (0.021)	0.027	0.043
Relative mass of firms (MS/MM) (log)	Hungarian Microdata	0.064*** (0.015)	0.019	0.031
Consumption				
Consumption ratio (CS/CM)	Hungarian Macrodata	0.040* (0.021)	0.069	0.086
Prices				
Relative price index (PS/PM) (log)	Hungarian Microdata	0.029** (0.010)	0.017	0.013
Reallocation Within Sectors				
Entry				
Entry rate in services	Hungarian Microdata	0.108*** (0.027)	0.184	0.180
Entry rate in manufacturing	Hungarian Microdata	0.057** (0.021)	0.086	0.046
Difference in entry rate S-M	Hungarian Microdata	0.051** (0.011)	0.097	0.134
Relative entrant size S/M (log)	Hungarian Microdata	-0.027** (0.010)	-0.031	-0.053
Cut-offs				
Relative operational cut-off (S/M) (log)	Hungarian Microdata	-0.023** (0.010)	-0.017	-0.010
Relative exporting cut-off (X/D) (log)	Hungarian Microdata	0.046** (0.020)	0.045	0.106

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: $y_t = \alpha \mathrm{FL}_t + T_t + \varepsilon_t$, where $\mathrm{FL}_t = 1$ if year $\geq$ 2001 and 0 otherwise.

Comparing non-targeted moments generated using the preference in Boppart (2014) with the baseline mode, the model generates the same qualitative results in a sense that the model correctly captures the signs of the effect of financial liberalization. However, the model with Boppart (2014) preference overshoots the increase in the household consumption, subsequently leading to overshoots in other measures related to the aggregate consumtpion.

Appendix E Four Sector Model

In this section, we extend the baseline model to 4 sector allowing the expenditure elasticities to vary within service and manufacturing sector. The purpose of this exercise is to show how the heterogeneous expenditure elasticity matters beyond the dichotomy of tradable and non-tradable sector.

We extend the model by nesting the preference in the following way:

$$\begin{aligned} 1 &= \left[\left(\theta_S^H\right)^{\frac{1}{\eta_S}} C_{St}^{\frac{e_S^H-\eta_S}{\eta_S}} \left(C_{St}^H\right)^{\frac{\eta_S-1}{\eta_S}} + \left(\theta_S^L\right)^{\frac{1}{\eta_S}} C_{St}^{\frac{e_S^L-\eta_S}{\eta_S}} \left(C_{St}^L\right)^{\frac{\eta_S-1}{\eta_S}}\right] \\ 1 &= \left[\left(\theta_{MD}^H\right)^{\frac{1}{\eta_{MD}}} C_{MDt}^{\frac{e_{MD}^H-\eta_{MD}}{\eta_{MD}}} \left(C_{MDt}^H\right)^{\frac{\eta_{MD}-1}{\eta_{MD}}} + \left(\theta_{MD}^L\right)^{\frac{1}{\eta_{MD}}} C_{MDt}^{\frac{e_{MD}^L-\eta_{MD}}{\eta_{MD}}} \left(C_{MDt}^L\right)^{\frac{\eta_{MD}-1}{\eta_{MD}}}\right], \end{aligned}$$

where C_{St}^H, C_{St}^L, C_{MDt}^H, and C_{MDt}^L represent demand for service sectors with high and low expenditure elasticities and domestic manufacturing sectors with high and low expenditure elasticities respectively. Each demand is defined by a CES aggregate of a continuum of differentiated varieties:

$$C_{St}^H = \left[\int_{\omega\in\Omega_{St}^H} q_{St}^H(\omega)^{\frac{\sigma-1}{\sigma}} d\omega\right]^{\frac{\sigma}{\sigma-1}} \quad \text{and} \quad C_{St}^L = \left[\int_{\omega\in\Omega_{St}^L} q_{St}^L(\omega)^{\frac{\sigma-1}{\sigma}} d\omega\right]^{\frac{\sigma}{\sigma-1}}$$

$$C_{MDt}^H = \left[\int_{\omega\in\Omega_{MDt}^H} q_{MDt}^H(\omega)^{\frac{\sigma-1}{\sigma}} d\omega\right]^{\frac{\sigma}{\sigma-1}} \quad \text{and} \quad C_{MDt}^L = \left[\int_{\omega\in\Omega_{MDt}^L} q_{MDt}^L(\omega)^{\frac{\sigma-1}{\sigma}} d\omega\right]^{\frac{\sigma}{\sigma-1}}$$

Now, we describe how expenditure elasticities are determined and normalized for the calibration. We first calculate within sector expenditure elasticity and apply the chain rule.

$$\begin{aligned} P_{MD}^H C_{MD}^H &= \left(P_{MD}^H\right)^{1-\eta_{MD}} P_{MD}^{\eta_{MD}} \theta_{MD}^H C_{MD}^{e_{MD}^H} \\ &= \left(\frac{P_{MD}^H}{E_{MD}}\right)^{1-\eta_{MD}} \theta_{MD}^H C_{MD}^{e_{MD}^H-\eta_{MD}} \end{aligned}$$

This expression simply implies that

$$\frac{\partial \log C_{MD}^j}{\partial \log E_{MD}} = \eta_{MD} + (1-\eta_{MD})\frac{e_{MD}^j - \eta_{MD}}{\bar{e}_{MD} - \eta_{MD}}, \ j \in \{H, L\}$$

where $\bar{e}_{MD} = \omega^H_{MD} e^H_{MD} + \omega^L_{MD} e^L_{MD}$. By the chain rule, we know that

$$\begin{aligned}
\frac{\partial \log C^j_{MD}}{\partial \log E} &= \frac{\partial \log C^j_{MD}}{\partial \log E_{MD}} \frac{\partial \log E_{MD}}{\partial \log E} \\
&= \left\{ \eta_{MD} + (1-\eta_{MD}) \frac{e^j_{MD} - \eta_{MD}}{\bar{e}_{MD} - \eta_{MD}} \right\} \frac{\partial \log E_{MD}}{\partial \log E} \\
&= \left\{ \eta_{MD} + (1-\eta_{MD}) \frac{e^j_{MD} - \eta_{MD}}{\bar{e}_{MD} - \eta_{MD}} \right\} \frac{\partial \log C_{MD}}{\partial \log E} \\
&= \left\{ \eta_{MD} + (1-\eta_{MD}) \frac{e^j_{MD} - \eta_{MD}}{\bar{e}_{MD} - \eta_{MD}} \right\} \varepsilon_{MD},
\end{aligned}$$

where ε_{MD} represents the expenditure elasticity for the domestic manufacturing after the normalization.

The straightforward normalization is

$$\begin{aligned}
\omega^H_S e^H_S + \omega^L_S e^L_S &= 1 \\
\omega^H_{MD} e^H_{MD} + \omega^L_{MD} e^L_{MD} &= 1
\end{aligned}$$

This in turn implies that

$$\begin{aligned}
\omega^H_{MD} \underbrace{\frac{\partial \log C^H_{MD}}{\partial \log E}}_{\text{Data}} + \omega^L_{MD} \underbrace{\frac{\partial \log C^L_{MD}}{\partial \log E}}_{\text{Data}} &= \omega^H_{MD} \frac{\partial \log C^H_{MD}}{\partial \log E_{MD}} \frac{\partial \log E_{MD}}{\partial \log E} + \omega^L_{MD} \frac{\partial \log C^L_{MD}}{\partial \log E_{MD}} \frac{\partial \log E_{MD}}{\partial \log E} \\
&= \frac{\partial \log E_{MD}}{\partial \log E} \underbrace{\left(\omega^H_{MD} \frac{\partial \log C^H_{MD}}{\partial \log E_{MD}} + \omega^L_{MD} \frac{\partial \log C^L_{MD}}{\partial \log E_{MD}} \right)}_{=1} \\
&= \frac{\partial \log E_{MD}}{\partial \log E} \\
&= \underbrace{\varepsilon_{MD}}_{\text{Expenditure Elasticity for Domestic Manufacturing after Normalization}}
\end{aligned}$$

Table E1: Externally Calibrated Parameters

Parameter	Description	Value	Source
σ	Substitution M varieties	2.85	Hungarian Micro Data
δ_S	Exogenous exit rate M	0.105	Hungarian Micro Data
δ_M	Exogenous exit rate S	0.08	Hungarian Micro Data
α_{S^H}	Capital share S^H sector	0.276	Hungarian Micro Data
α_{M^H}	Capital share M^H sector	0.368	Hungarian Micro Data
α_{S^L}	Capital share S^L sector	0.291	Hungarian Micro Data
α_{M^L}	Capital share M^L sector	0.328	Hungarian Micro Data
r^*	World interest rate	0.05	Hungarian Macro Data
η_M	Substitution $C_D - C_F$ in M	1.93	Hungarian Macro Data
δ^k	Depreciation of capital	0.078	Hungarian Macro Data
β	Discount rate	0.95	$\frac{1}{1+r^*}$
γ	Risk aversion	2	Corsetti, Dedola, and Leduc (2008)
η	Substitution $C_M - C_S$	0.23	Sposi, Yi, and Zhang (2018)
$\eta_{MD} = \eta_S$	Substitution high/low expenditure sectors	1.93	Simplification
f_S^e	Fixed entry cost S	1	Normalization
f_M^e	Fixed entry cost M	1	Normalization
ξ	Variable entry cost	1	Small
A	Foreign demand for M	1	Normalization
τ	Capital control tax	0	Full liberalization

Table E2: Internally Calibrated Parameters

Parameter	Description	Value	Target	Target	Model
θ_S	Share C_S in C	0.55	$\frac{P_S \cdot C_S}{P \cdot C}$	0.58	0.59
θ_D	Share C_D in C_M	0.89	$\frac{P_D \cdot C_D}{P_M \cdot C_M}$	0.72	0.72
θ_S^H	Share C_S^H in C_S	0.56	$\frac{P_S^H \cdot C_S^H}{P_S \cdot C_S}$	0.50	0.49
θ_{MD}^H	Share C_{MD}^H in C_{MD}	0.52	$\frac{P_{MD}^H \cdot C_{MD}^H}{P_{MD} \cdot C_{MD}}$	0.50	0.49
ξ_S/ξ_M	Pareto parameters S/M	0.468 / 0.498	$\frac{M_S}{M_M}$	8.10	8.11
f_{Sd}^H	Fixed operating cost S^H	0.08	$\log(VA_{M^H}^{p50}) - \log(VA_{S^H}^{p50})$	1.13	1.07
f_{Md}^H	Fixed operating cost M^H	0.29	$\log(VA_{M^H}^{p25}) - \log(VA_{S^H}^{p25})$	1.01	1.05
f_{Mx}^H	Fixed exporting cost M^H	2.90	$\frac{1-G(\varphi_{M^H}^x)}{1-G(\varphi_{M^H}^d)}$	0.12	0.12
f_{Sd}^L	Fixed operating cost S^L	0.11	$\log(VA_{M^L}^{p50}) - \log(VA_{S^L}^{p50})$	0.93	0.94
f_{Md}^L	Fixed operating cost M^L	0.31	$\log(VA_{M^L}^{p25}) - \log(VA_{S^L}^{p25})$	0.75	0.92
f_{Mx}^L	Fixed exporting cost M^L	1.13	$\frac{1-G(\varphi_{M^L}^x)}{1-G(\varphi_{M^L}^d)}$	0.12	0.11
ε_S	Expenditure elasticity S	2.07	Hungarian Micro Data	1.18	1.18
ε_M	Expenditure elasticity M	1.23	Hungarian Micro Data	0.75	0.74
ε_{S^H}	Expenditure elasticity S^H	1.29	Hungarian Micro Data	1.26	1.24
ε_{M^H}	Expenditure elasticity M^H	1.17	Hungarian Micro Data	0.79	0.79
ε_{S^L}	Expenditure elasticity S^L	1.21	Hungarian Micro Data	1.11	1.11
ε_{M^L}	Expenditure elasticity M^L	1.06	Hungarian Micro Data	0.71	0.70
K_0	Initial condition K	$0.50 \times K_{SS}$	r^k decrease during liberalization	-0.035	-0.032
$\bar{L}$	Labor supply	0.1840	Nominal GDP Y	1.00	1.00
$\bar{M}_S^e$	Convex entry cost S	0.0392	Open SS Value	n.a.	n.a.
$\bar{M}_M^e$	Convex entry cost M	0.0468	Open SS Value	n.a.	n.a.

We run the following regression specification to recover the effect of capital and expenditure elasticity on output changes before and after financial liberalization. This is compatible with the empirical counterpart.

$$\Delta q_{ij} = \gamma_0 + \gamma_1 \alpha_j + \gamma_2 e_m + \gamma_3 \Delta\tilde{\varphi}_j + \Delta\varepsilon_i.$$

We constructed the dependent and independent variables following the empirical counterpart. Δq_{ij} is calculated by

$$\Delta q_{ij} = \log\left(\frac{1}{8}\sum^{after} q_{ijt}\right) - \log\left(\frac{1}{6}\sum^{pre} q_{ijt}\right),$$

where the time periods before and after liberalization are consistent with the empirical specification. We also construct the sectoral average productivity differences by

$$\Delta\tilde{\varphi}_j = \frac{1}{8}\sum^{after}\tilde{\varphi}_{jt} - \frac{1}{6}\sum^{pre}\tilde{\varphi}_{jt},$$

which takes 4 values in the baseline setting. $\tilde{\varphi}_{jt}$ is the sectoral average productivity at period t directly calculated from the model.

Finally, we focus on firms that never export in both manufacturing sector. The idea is to isolate the effect of heterogeneous expenditure elasticity instead of goods' tradability.

Table E3: Regression Results

	Δ Real Value Added		
	Baseline	$\alpha_{SH} = \alpha_{SL}$ & $\alpha_{MH} = \alpha_{ML}$	$\varepsilon_{SH} = \varepsilon_{SL}$ & $\varepsilon_{MH} = \varepsilon_{ML}$
	(1)	(2)	(3)
Capital Elasticity	0.45***	0.35***	0.28***
	(0.0000)	(0.0000)	(0.0000)
Expenditure Elasticity	0.20***	0.22***	0.09***
	(0.0000)	(0.0000)	(0.0000)
N	156,513	165,765	172,246

Notes: *, **, *** significant at 10, 5, and 1 percent. The regression includes controls for $\Delta\tilde{\varphi}_j$ and a constant term. Given that $\alpha_j + \beta_j = 1$ for all j, this specification aligns with the difference-in-differences estimation employed in the empirical analysis.

For the baseline result, the estimated coefficients are in the same order of magnitude as the empirical counter part in Table 1. We next impose two restrictions on the model to see the impact of heterogeneous expenditure elasticity within sectors. First, we shut down the capital elasticity heterogeneity within sectors by imposing $\alpha_{SH} = \alpha_{SL}$ and $\alpha_{MH} = \alpha_{ML}$ while the capital elasticities are different across sectors. Then we impose a different restriction that

$\varepsilon_{SH} = \varepsilon_{SL} = \varepsilon_S$ and $\varepsilon_{MH} = \varepsilon_{ML} = \varepsilon_M$.

Comparing column (2) and (3), we see shutting down within sector capital elasticity heterogeneity would reduce 23% of the associated coefficient while shutting down within sector expenditure elasticity heterogeneity halves the associated coefficient.

This shows that for the baseline result, the coefficient associated with the expenditure elasticity is not driven by tradable versus non-tradable dimension but is driven by within sector expenditure heterogeneity supporting our empirical results.

Appendix F Measure of Productivity

Solow Residual

To construct Solow residuals, we use the true capital shares for the service and manufacturing sectors and the estimated capital share for the aggregate.

$$\log\left(\text{Solow Residuals}_{it}^{p}\right) = \log(Y_{it}^{p}) - (1-\alpha_i)\log(L_{it}^{p}) - \alpha_i \log(K_{it}^{p}),$$

where $p \in \{cc, co\}$. The capital shares are defined as follows:$\alpha_S = 0.282$, $\alpha_M = 0.346$, and $\alpha_A = 0.31$. Fixed costs are excluded from capital and labor so that these inputs are used strictly for production.

Labor-Share Weighted Productivity

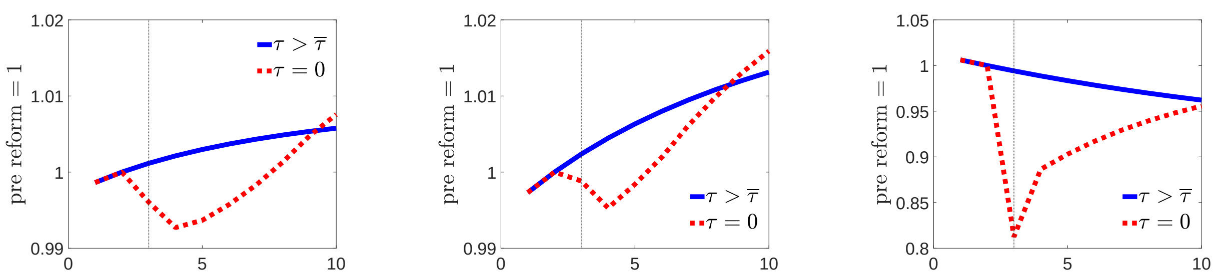
We define labor-share weighted productivity as follows:

$$\begin{aligned} Z_{St} &= M_{St}\int_{\varphi_{St}} \varphi \frac{\tilde{l}_{St}(\varphi)}{\tilde{L}_{St}} \mu_{St}(\varphi) d\varphi \\ Z_{Mt} &= M_{Mt}\left(\int_{\varphi_{Mt}^{d}} \varphi \frac{\tilde{l}_{Mt}^{d}(\varphi)}{\tilde{L}_{Mt}} \mu_{Mt}(\varphi) d\varphi + \int_{\varphi_{Mt}^{x}} \varphi \frac{\tilde{l}_{Mt}^{x}(\varphi)}{\tilde{L}_{Mt}} \mu_{Mt}(\varphi) d\varphi\right), \end{aligned}$$

We then aggregate these using the relative labor share of each sector:

$$Z_t = \frac{\tilde{L}_{St}}{\tilde{L}_{St} + \tilde{L}_{Mt}} Z_{St} + \frac{\tilde{L}_{Mt}}{\tilde{L}_{St} + \tilde{L}_{Mt}} Z_{Mt},$$

where the tilde denotes that fixed costs have been excluded from the corresponding labor variables.



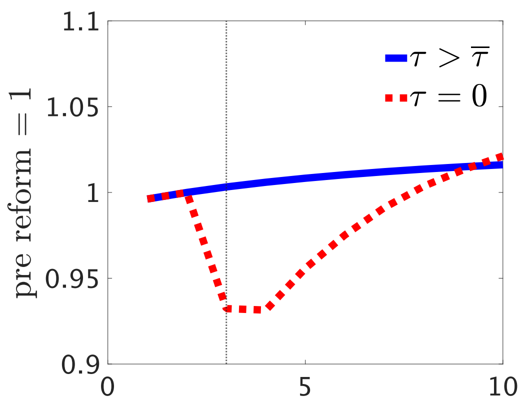
Service Manufacturing Aggregate

Figure F1: Labor-Share Weighted Productivity: Baseline

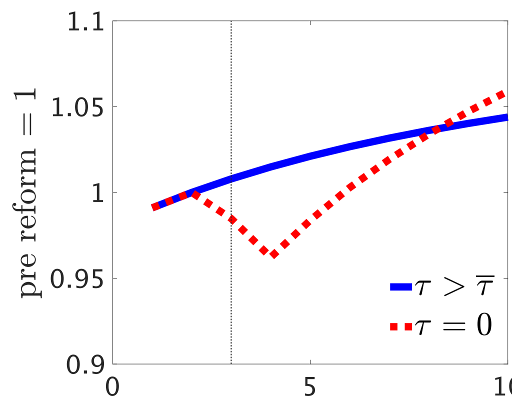
The figures show that productivity declines in both sectors due to falling entry cutoffs. The decline is larger in the aggregate because the economy becomes more concentrated in the service sector, which is relatively less productive.

This measure primarily reflects reallocation effects. Financial liberalization raises demand in both sectors, which lowers the productivity cutoff required for firms to operate. As cutoffs fall, more low-productivity firms enter the market, reducing average sectoral productivity. The service sector, which has a higher expenditure elasticity, experiences a stronger increase in demand and a larger decline in its cutoff compared to manufacturing. As a result, more production shifts toward the less productive service sector, leading to a sharper fall in aggregate productivity.

To better understand the role of non-homothetic preferences, we compare this baseline scenario with a version of the model in which both sectors share the same expenditure elasticity.



Cutoffs for the Service



Cutoffs for the Domestic Manufacturing

The figures above illustrate how cutoffs evolve in each sector in the baseline model. As discussed in the main text, financial liberalization increases demand, which reduces cutoffs in both sectors and allows less productive firms to enter. The decline in cutoffs is more pronounced in the service sector because of its higher expenditure elasticity. This drives a larger fall in labor-share weighted productivity there than in manufacturing.

To isolate the role of expenditure elasticity heterogeneity, we also simulate a counterfactual scenario in which the elasticity is equal across sectors. The table below compares 3-year, 5-year, and 7-year average deviations from trend for the baseline and counterfactual models.

This comparison shows that eliminating expenditure elasticity differences reduces the decline in service and aggregate productivity, while causing a larger drop in manufacturing productivity. These results imply that higher expenditure elasticity generates stronger demand, which encourages the entry of less productive firms and lowers average productivity in that sector. Aggregate productivity declines less in the homogeneous case because resources are not exces-

Table F1: LABOR-SHARE WEIGHTED PRODUCTIVITY: MODEL COMPARISON

	Baseline			$\varepsilon_S = \varepsilon_M$ $\alpha_S \neq \alpha_M$		
	Service	Manufacturing	Aggregate	Service	Manufacturing	Aggregate
Up to 3 Periods	-0.0080	-0.0069	-0.1321	-0.0059	-0.0080	-0.1065
Up to 5 Periods	-0.0069	-0.0052	-0.0901	-0.0043	-0.0063	-0.0654
Up to 7 Periods	-0.0060	-0.0043	-0.0799	-0.0034	-0.0053	-0.0561

sively reallocated toward the less productive sector. This confirms that our measure captures the reallocation mechanism.

Solow Residual Construction

We now describe how we compute real output by integrating firm-level revenues and adjusting by the appropriate price indices. For the service sector, real output is defined as:

$$Y_{St} = P_{St}^{-1} M_{St} \int_{\varphi_{St}^d}^{\infty} p_{St}(\varphi) q_{St}(\varphi) \mu_{St}(\varphi) d\varphi$$

For manufacturing, real output includes both domestic and export components:

$$Y_{Mt} = P_{MDt}^{-1} M_{Mt} \int_{\varphi_{Mt}^d}^{\infty} p_{Mt}(\varphi) q_{Mt}^d(\varphi) \mu_{Mt}(\varphi) d\varphi + P_{XMt}^{-1} M_{Mt} \int_{\varphi_{Mt}^x}^{\infty} p_{Mt}(\varphi) q_{Mt}^x(\varphi) \mu_{Mt}(\varphi) d\varphi$$

The aggregate real output is a weighted sum of service and manufacturing outputs, divided by an aggregate price index:

$$Y_t = P_t^{WA-1} \left(M_{St} \int_{\varphi_{St}^d}^{\infty} p_{St}(\varphi) q_{St}(\varphi) \mu_{St}(\varphi) d\varphi + M_{Mt} \left(\int_{\varphi_{Mt}^d}^{\infty} p_{Mt}(\varphi) q_{Mt}^d(\varphi) \mu_{Mt}(\varphi) d\varphi + \int_{\varphi_{Mt}^x}^{\infty} p_{Mt}(\varphi) q_{Mt}^x(\varphi) \mu_{Mt}(\varphi) d\varphi \right) \right).$$

We define the export price index as a CES aggregator over export varieties:

$$P_{XMt} \equiv \left(\int_{\omega \in \Omega_{XMt}} p_{Mt}(\omega)^{1-\sigma} d\omega \right)^{1/(1-\sigma)}$$

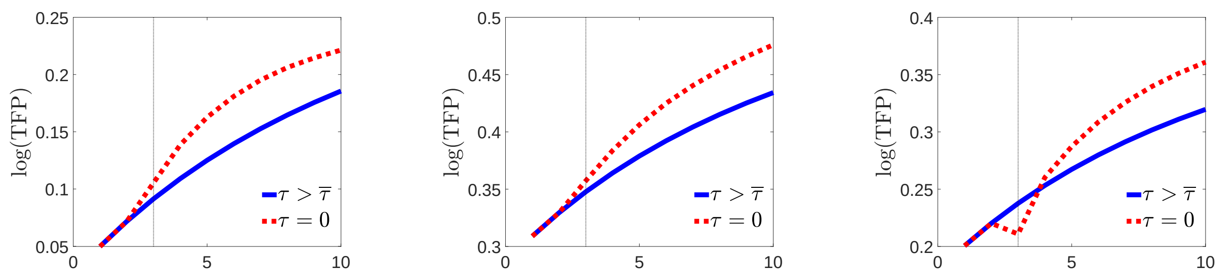
TThe aggregate price index, P_{WA}, is a weighted average of sector-specific price indices, using sales shares as weights:

$$P_{WA} \equiv P_{St} \frac{P_{St}C_{St}}{P_{St}C_{St} + P_{MDt}C_{MDt} + P_{XMt}X_{Mt}} + P_{MDt} \frac{P_{MDt}C_{MDt}}{P_{St}C_{St} + P_{MDt}C_{MDt} + P_{XMt}X_{Mt}} + P_{XMt} \frac{P_{XMt}X_{Mt}}{P_{St}C_{St} + P_{MDt}C_{MDt} + P_{XMt}X_{Mt}}.$$

Export sales are given by:

$$P_{XMt}X_{Mt} \equiv M_{Mt} \int_{\varphi^x_{Mt}}^{\infty} p_{Mt}(\varphi) q^x_{Mt}(\varphi) \mu_{Mt}(\varphi) d\varphi$$

The price index for the export is the integral of exported varieties' prices, while the aggregate price index is calculated by the sales share weighted average.



SERVICE MANUFACTURING AGGREGATE

Figure F2: SOLOW RESIDUAL: BASELINE

The Love of Variety Effect

We now explain how the love-of-variety effect enters the Solow residual, using the service sector as a representative case. Real GDP in the service sector can be expressed as:

$$Y_{St} = P_{St}^{-1} M_{St} \int_{\varphi^d_{St}}^{\infty} p_{St}(\varphi) q_{St}(\varphi) \mu_{St}(\varphi) d\varphi$$

Because the price index P_{St} cancels out with nominal revenue, this simplifies to:

$$Y_{St} = C_{St},$$

where consumption in the service sector, C_{St}, takes the form:

$$C_{St} = \left[\int_{\omega \in \Omega_{St}} q^d_{St}(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right]^{\frac{\sigma}{\sigma-1}}.$$

This formulation shows that real output depends not only on quantities but also on the number of available product varieties. To make this mechanism more transparent, suppose that all firms produce the same quantity q^d_{St}. Then,

$$C_{St} = \left[M_{St} \left(q^d_{St} \right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} = M_{St}^{\frac{\sigma}{\sigma-1}} q^d_{St}.$$

Since $\sigma > 1$, the exponent $\frac{\sigma}{\sigma-1}$ is greater than one, meaning that real output increases more than proportionally with the mass of firms. This is the essence of the love-of-variety effect: expanding the range of available products leads to higher real consumption and output.

The figure below illustrates how the number of operating firms in the service sector changes under different initial capital levels. It also highlights that the love-of-variety effect is stronger when the economy starts out poorer, since the expansion in firm mass is more pronounced.

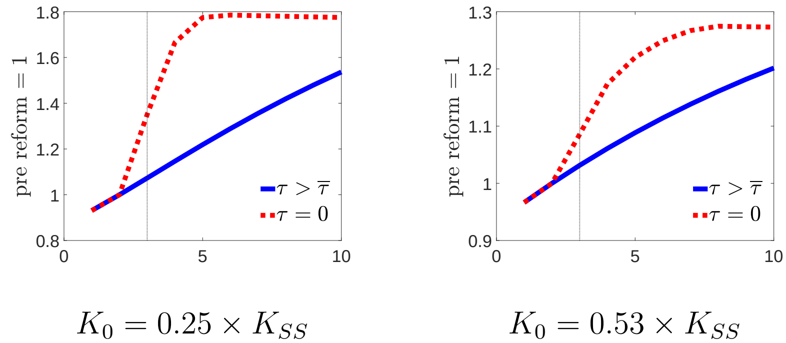


Figure F3: Mass of Firm: Service

Appendix G 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 G.1 Household

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

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

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

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

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

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

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

$$1 = \beta\,(1 + r) \tag{G.8}$$

$$r = r^* + \tau \tag{G.9}$$

Appendix G.2 Production

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix G.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 G.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 G.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 G.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 H Dynamic System

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

Appendix H.1 Household

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

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

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

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

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

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

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

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

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

$$1 = \Lambda_{t,t+1}\left(1 + r_{t+1}\right) \tag{H.10}$$

$$r_{t+1} = r^* + \tau \tag{H.11}$$

Appendix H.2 Production

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix H.2.2 Value Functions and Cut-Offs

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

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

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

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

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

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

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

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

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

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

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

Appendix H.2.4 Aggregation

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

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

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

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

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

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

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

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

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

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

Appendix H.3 Markets Clear

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

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

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

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

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

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

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