

Access to Credit and Comparative Advantage*

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Abstract

Access to external funds is crucial for the entry and expansion of entrepreneurial firms and the sectors they predominantly arise in. This paper reports four important results. First, comparative advantage is shaped by factor endowments as well as fundamental determinants of corporate finance. In particular, a larger equity ratio of firms and tough governance standards relax finance constraints, lead to entry of firms at the lower bound of the productivity distribution, and create an endogenous comparative advantage in sectors where entrepreneurial firms are clustered. Second, in such a setting, factor price equalization does not only depend on technological characteristics of goods production but also of financial intermediation. Third, a small degree of trade protection in the constrained sector can raise a country's welfare by relaxing finance constraints if terms of trade effects are small. Fourth, a small degree of protection of the financially dependent industry in a financially underdeveloped country might even raise world welfare.

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1 Introduction

Limited access to external finance and a lack of tangible assets as collateral are major obstacles to the realization of investment opportunities of entrepreneurial firms. These obstacles do not surface at random across industries but are concentrated in rapidly growing sectors with a significant amount of experimenting by firms and, as a consequence, a high rate of entry and exit. The latter indicates that comparative advantage is not only a matter of factor endowments but also hinges upon fundamentals relating to corporate finance and legal institutions (see Kletzer and Bardhan, 1987; and Baldwin, 1989; for early arguments along those lines).¹ Moreover, such obstacles do not affect all firms symmetrically – even not in financially constrained sectors – but they particularly influence financially weak firms at the lower bound of the productivity distribution. Empirical findings clearly point to the importance of financing constraints rooted in the special characteristics of entrepreneurial firms: they have potentially attractive investment opportunities and are more reliant on external funds than other firms; they have a low proportion of tangible assets with high collateral value; and there is a great degree of asymmetric information between insiders and outsiders such as banks and investors.

While investment subject to financial constraints is a central theme in corporate finance (see Shleifer and Vishny, 1997; Holmstrom and Tirole, 1997; and Tirole, 2001; 2006), neoclassical trade theory explains countries’ production and international trade by

¹There is a large body of empirical work establishing stylized facts about financially constrained firms. Prusa and Schmitz (1992) find that entrepreneurial firms are more likely to introduce new products than other firms. Kortum and Lerner (2000) suggest that such activity often involves a higher degree of innovations which rely on financing through venture capital, and Hall (2002) reports that such entrepreneurial firms face particularly high costs of capital in general. Aghion, Bond, Klemm, and Marinescu (2004) suggest that these costs result from the lack of tangible assets and firms’ reliance on external investors who seek to avoid entrepreneurial moral hazard. Aghion, Fally and Scarpetta (2007) show that access to finance matters for the entry of (small) entrepreneurial firms and helps to expand new firms after successful start-up investment. See also Beck, Demircug-Kunt and Maksimovic (2005), Do and Levchenko (2007), Guariglia (2008), and Hall and Lerner (2009) for further evidence on the matter.

‘standard’ fundamentals such as relative factor endowment differences and sector-specific productivity differences across countries. However, there is agreement that those fundamental variables perform only weakly in determining sectoral production and trade patterns (see Baldwin, 1971; and Treffer, 1993, 1995, for eminent examples; and Feenstra, 2004, for a survey of related work). Obvious candidates to explain net trade flows beyond neoclassical factors are market imperfections and institutional characteristics as well as market entry costs that may be fixed or variable (such as trade costs). Yet, if fixed costs entail capital demand (rather than employment of workers), it is typically assumed that such demand meets supply in perfect capital markets. Only recently, economists considered capital market imperfections and financial fundamentals as possible determinants not only of the entry and exit of firms as such but also the extent of their economic activity through production and trade.

The literature on the role of financial frictions in trade is still small. Early theoretical work by Kletzer and Bardhan (1987) and Baldwin (1989) delivered key hypotheses about the tightness of credit constraints (through differences between countries’ domestic institutions for credit enforcement) as a source of comparative advantage in the production of goods which require more credit than others. Evidence in favor of that view has been provided by Beck (2002, 2003), Svaleryd and Vlachos (2005), Do and Levchenko (2007), and Manova (2008a). The results in Svaleryd and Vlachos (2005) even indicate that differences in financial systems may be more important for specialization patterns than differences in human capital.² More recent work focuses on finance constraints as a specific impediment to exporters in contrast to domestic firms, and it aims at shedding light on the effects of finance constraints as an obstacle to the least productive firms on the volume of trade (or multinational activity) in one-sector economies rather than the pattern of specialization across sectors (see Chaney, 2005; or Manova, 2008b).

Part of the work on finance constraints in open economies focuses on (trade and)

²Related to those arguments, Wynne (2005) points to the importance of the level and distribution of wealth as a determinant of trade in a small open economy where factor prices are fixed.

international capital flows in models with otherwise classical or neoclassical – Heckscher-Ohlin or Ricardian – reasons for trade. For instance, Matsuyama (2004) explores how financing frictions determine capital flows in a one-good world economy. Matsuyama (2005) studies trade and capital flows in a Ricardian model with a continuum of goods where hiring of workers (rather than investment) is constrained by a firm’s pledgable income to pay wages. Antràs and Caballero (2009) develop a model where one sector is financially constrained and the other is not to illustrate that trade and capital movements are complements in financially less developed countries. Ju and Wei (2011a,b) develop a model to show that the direction of causation between finance and the real economy depends on the quality of institutions – such as financial development and corporate governance. Differences in institutions lead financial capital to flow from countries with low-quality institutions to ones with high-quality institutions. Beyond factor endowments and technology, the quality of institutions determines the patterns of trade and capital flows.

In the aforementioned work on finance and trade, it is common to model either the availability of financial assets to financially constrained sectors, finance constraints themselves, technology, or all of them, to be exogenous rather than endogenous to deeper institutional factors. For instance, Antràs and Caballero (2009) or Ju and Wei (2011a,b) study the interplay between financial constraints and Ricardian factors in determining trade and capital flows. However, in those models entrepreneurs do not differ with regard to their productivity. Accordingly, financial constraints do not affect the selection of entrepreneurial firms into the market, a feature with strong empirical support (see, for instance, Aghion, Fally, and Scarpetta, 1997; or Manova, 2008b).

It is this paper’s task to develop a theoretical model which integrates endowment- and technology-related aspects in a Heckscher-Ohlin-Ricardian model of trade cum financial fundamentals. Unlike in previous work, occupational choice of potential entrepreneurs, the distribution of financial assets across sectors, and average productivity in the finance-constrained sector are jointly endogenous due to selection of entrepreneurs and (entry and

exit) of entrepreneurial firms in response to fundamental parameters measuring the quality of financial institutions (or moral hazard) and the economy-wide abundance of capital and its distribution across natural workers and potential entrepreneurs.³ The deeper financial fundamentals in our model co-determine economic activity in an interplay with classical and neoclassical determinants of production and trade in a general equilibrium set-up.

In this setting, deep financial variables importantly affect the financing of entrepreneurial firms and thereby determine the expansion of industries such firms are clustered in. To assure incentive compatibility and prevent opportunistic behavior, entrepreneurs must keep a substantial share of the profit, which limits the income pledgable to external investors. The latter limits the debt capacity of entrepreneurs and their ability to raise outside funds. As a consequence, firms may be denied credit and forced to exit the market, despite their investment might yield a positive net present value.

The novel treatment of corporate finance in a Ricardian model of international trade with heterogeneous firms leads to modifications of core trade theorems such as the Stolper-Samuelson and the Rybczynski theorem. In our model, these theorems as well as comparative advantage and welfare depend on structural parameters of corporate finance: agency costs of investment and the equity ratio of heterogeneous entrepreneurial firms. In particular, these fundamental parameters induce changes of the allocation of assets (capital) across sectors,⁴ entry and exit (churning) of heterogeneous entrepreneurial firms

³Unlike in the literature on finance constraints in new trade models, entrepreneurial firms may be finance constrained independent of exporting. This is consistent with a prominent literature in finance which views and reports financially constrained investment opportunities as a sector characteristic (see Rajan and Zingales, 2008).

In line with a recent literature in macroeconomics (see Cagetti and De Nardi, 2006; Quadrini, 2009), not only capital abundance as such matters for entrepreneurship, but also the initial distribution of capital across the labor force (natural workers and potential entrepreneurs) matters in our model and interacts with financing constraints in determining entry/exit, production, trade, and welfare, among others.

⁴For instance, in Antràs and Caballero (2008), the allocation of capital across sectors is exogenous (as in a specific factors model), which renders (i) the mass of entrepreneurs entering the constrained sector fixed and (ii) own assets as well as external leverage per firm constant.

at the lower bound of the productivity domain and, hence, they affect average productivity in the financially constrained entrepreneurial sector. For instance, an increase in the equity ratio as a measure of financial robustness relaxes the financing constraint and allows a margin of entrepreneurial firms with positive net present value to be active which otherwise would have been denied credit and driven out of the market. Unlike in previous work on financial constraints, comparative advantage, and trade, this affects the rate of churning of entrepreneurial firms and the productivity of the average producers active in the constrained and unconstrained sectors relative to each other.

In accordance with the law and finance literature (La Porta et al. 1997, 2000, and 2006), we argue that tough corporate governance as measured by high accounting standards and rights of external investors limit the scope for managerial discretion and moral hazard. In reducing agency costs, they relax firms' finance constraints, increase the support region of active firms with heterogeneous productivity at the lower bound, reduce churning of firms with low productivity support, and change the pattern of trade directly and indirectly (through firm selection). The fundamental finance parameters generate effects through transmission channels which lead to hitherto unexplored interactions of endogenous finance constraints, firm selection, and comparative advantage, in determining trade patterns, factor price equalization, and welfare. Fundamental financial variables and their interplay with 'standard' fundamental variables lead to modified core theorems in international economics while maintaining their insights with regard to the consequences of technology and endowments on factor prices, production, and trade patterns.

The remainder of the paper is organized as follows. Section 2 presents the model. Section 3 analyzes the role of corporate finance for a country's industry structure. Section 4 explores the impact of fundamental corporate finance parameters on goods trade. The paper concludes with a summary of the key findings.

2 A Model of Trade and Finance

2.1 Basic Assumptions

Consider a world with two countries, two sectors and two factors. The entrepreneurial sector uses a risky, experimental investment technology leading to potentially large returns and a high turnover with frequent entry and exit. Entrepreneurial firms depend on a key, irreplaceable input by their owner-manager who has relatively little own assets and might face difficulties in raising external funds to finance investment. In contrast, the standard sector consists of firms which use a mature technology with more predictable returns and have accumulated substantial own assets. Raising external funds is not a main problem in that sector. We take the distinction to the extreme and assume that entrepreneurial firms are financially constrained and standard firms are not. The traditional industry is assumed capital intensive.

Total labor endowment is $L_T = L + 1$, where L refers to natural workers who can only work in the traditional sector. In addition, there is a mass one of potential entrepreneurs who either start a firm (share E) or work in the traditional sector (share $1 - E$). A firm is managed by one entrepreneur. Occupational choice is limited only to agents with entrepreneurial skills, while L is a sector specific endowment. Employment in the traditional sector is, thus, $L + 1 - E$, while labor allocated to the entrepreneurial sector is E , equal to the number of firms started. The economy's total capital endowment is unevenly distributed and amounts to $A_T = A_L L + A$ in total. Potential entrepreneurs are endowed with assets A per capita and all natural workers with A_L . This assumption allows for changes in aggregate capital without changing own equity per firm. Alternatively, we can consider the role of capital distribution among natural workers and potential entrepreneurs for a given total asset endowment.

The experimental sector requires one unit of entrepreneurial (labor) input and a fixed amount of investment I per firm, or IE in total. The required investment is assumed to exceed the entrepreneur's own equity, $I > A$, and cannot take place without external

financing. The returns are uncertain in two ways. First, investment succeeds with a high or low probability, depending on the entrepreneur's managerial effort. Second, if investment is successful, the return can be higher or lower, leading to output $x \in [0, \infty)$. Production follows a logic sequence of events: (i) Firms are created, reflecting occupational choice with free entry of entrepreneurs. (ii) Productivity x of the firm becomes known. The firm continues if the entrepreneur expects a positive surplus and is able to raise external financing. It closes down if x is too low and credit is denied. (iii) Having obtained the required loan $I - A$, the entrepreneur manages the investment and chooses high or low effort. With high effort, the firm succeeds with probability p and fails with probability $1 - p$. Shirking yields private benefits but results in a low success probability $p_L < p$. (iv) If investment is successful, the firm sells output x at the going market price v and repays external debt. The entrepreneur collects residual profit and spends all income on consumption. If investment fails, banks do not get repaid, and entrepreneurs have zero income. Agents are assumed risk-neutral and are price takers with respect to prices v , w , and r in competitive output, labor and deposit markets.

2.2 Finance Constrained Investment

External Financing: When productivity x becomes known after entry and is sufficiently high, the entrepreneur injects her wealth as inside equity to start the company. Alternatively, she accepts employment in the traditional sector and invests in the deposit market. The deposit interest factor is $R = 1 + r$, yielding the entrepreneur's opportunity cost AR . Since required investment exceeds own equity, a bank must finance externally the remaining part $D = I - A$, with cost R per unit of lending. Given a loan rate i , the bank collects repayment $(1 + i)D$ only if the firm is successful, and nothing if it fails. The firm's total surplus is split according to

$$\begin{aligned}\pi^e &= p(xv - (1 + i)D) - AR, \\ \pi^b &= p(1 + i)D - DR, \quad D = I - A, \\ \pi &= pxv - IR.\end{aligned}\tag{1}$$

In this simple two state model, outside equity and outside debt are equivalent. Keeping this in mind, we phrase the model in terms of external debt. With competitive banks, the break even condition $\pi^b = 0$ in bank lending implies $(1 + i)p = R$, and the firm gets the entire surplus. The loan rate exceeds the deposit rate by an intermediation margin which reflects the rate of business failure and consequent credit losses, $i > r$.

In a first best situation without moral hazard, shirking is costlessly avoided and firms can thus raise external funds without a financing constraint. Given competitive lending, a firm should continue if investment I yields a positive surplus:

$$\text{First Best: } pxv \geq IR \quad \Rightarrow \quad x \geq x_0^{FB} = IR/(pv). \quad (\text{FB})$$

Credit Analysis: To go ahead with the venture, an entrepreneur must ask for a credit. Having obtained credit, the entrepreneur chooses effort. Anticipating high effort, banks offer a competitive loan rate $(1 + i)p = R$ but give credit only if the required repayment is incentive compatible. In exerting full effort, the entrepreneur assures a high success probability p but forgoes private benefits, $b = 0$. When she is shirking and enjoying private benefits, $b > 0$, the success probability falls to $p_L < p$. Shirking is avoided only if repayment leaves a large enough share $\beta^e \equiv xv - (1 + i)D$ to the entrepreneur to make effort worthwhile. The incentive constraint is

$$IC^e : \quad p\beta^e \geq p_L\beta^e + b \quad \Leftrightarrow \quad \beta^e \geq \beta \equiv b/(p - p_L). \quad (2)$$

To guarantee high effort, the insider must receive at least $\beta^e = xv - (1 + i)D \geq \beta$. Pledgeable income is the maximum incentive compatible repayment $xv - \beta$ that can credibly be promised to the bank. The incentive constraint limits repayment and, thereby, bank lending to $(1 + i)D \leq vx - \beta$. The lower the productivity draw x , the lower is output and revenue xv , and the lower is pledgeable income. Even if the firm promises the entire pledgeable income $vx - \beta$ as a repayment, it may not be enough to allow the bank to break even. Hence, there is a lowest productivity draw where the incentive constraint binds and pledgeable income just suffices to pay back. Combining with the bank's break-even

condition, the finance (incentive) constraint yields the cut-off productivity

$$x_0 = \frac{p\beta + (I - A)R}{pv}. \quad (3)$$

For any productivity draw $x \geq x_0$, the incentive constraint is satisfied and the firm is given credit. Less profitable ventures with $x < x_0$ are denied credit and are closed down again since the incentive constraint is violated.⁵

Credit rationing can occur only if the financing threshold exceeds the first best level, $x_0 > x^{FB}$. A firm would never pursue a project with productivity $x < x^{FB}$ even if it could fully self-finance the required investment. The continuation decision would be first best. Since the paper explores the implications of credit rationing, we assume that the following condition is satisfied in equilibrium,

$$p\beta > AR \quad \Leftrightarrow \quad x_0 > x^{FB}. \quad (A)$$

By (A), the marginal firm with threshold productivity x_0 earns a strictly positive surplus,

$$\pi_0 = pvx_0 - IR = p\beta - AR > 0. \quad (4)$$

Even the marginal firm thus earns an excess return on capital. An entrepreneur strictly prefers to invest all available assets in the firm rather than on the capital market. For slightly smaller x , the firm would still make a profit but is denied credit. Hence, the weakest firms with lowest productivity are credit constrained.

Free Entry: At the first stage, productivity is not yet known. Firms face a distribution $G(x) = \int_0^x g(x') dx'$ with density $g(x)$. From all productivity draws, a fraction $G(x_0)$ will be stopped, either by the bank or because the entrepreneur is unwilling to continue. From now on, we use the short-hand $G_0 \equiv G(x_0)$ and $g_0 \equiv g(x_0)$. For all $x > x_0$, profits

⁵With shirking, the net present value at x_0 is assumed to be negative, $p_L vx_0 - IR + b < 0$. Expanding this gives $[p_L(vx_0 - (1 + i_L)D) + b - AR] + [p_L(1 + i_L) - R]D < 0$, meaning that either the entrepreneur is better off not continuing, or the bank must deny credit because it cannot break even.

are strictly positive, $\pi(x) = vpx - IR$, and trivially increasing in x . Expected profit, conditional on getting financed, is

$$\bar{\pi} = \int_{x_0}^{\infty} \pi(x) \frac{dG(x)}{1 - G_0} = v p \bar{x} - IR, \quad \bar{x} = \int_{x_0}^{\infty} x \frac{dG(x)}{1 - G_0}. \quad (5)$$

Entrepreneurs of firms that are shut down, have already forgone a wage income but are still able to earn AR by investing her assets in the deposit market rather than injecting them into the firm. With probability $1 - G_0$, productivity is high enough to warrant continuation. The firm invests own equity and gets a loan.

Entry must be decided one stage earlier before the actual productivity of the firm is known. The expected net present value must be large enough to justify entry, i.e., to give up alternative wage earnings w ,

$$\bar{\pi}_e = (1 - G_0) \cdot \bar{\pi} \geq w. \quad (6)$$

Since $\pi(x) = vpx - IR$ is the surplus over the endowment value AR , expected end of period wealth from setting up the firm is $\bar{\pi}_e + AR$. Employment in the standard sector yields $w + AR$. Investors start a new venture in the entrepreneurial sector as long as $\bar{\pi}_e \geq w$. Free entry eliminates rents, making the inequality binding.

2.3 Standard Sector

Firms in the standard sector use a linear homogeneous technology combining capital and labor. In the absence of financial frictions, production is analyzed in the standard way. Denote capital and labor per unit of output by k and l . Cost minimization $u(w, R) = \min wl + Rk$ subject to $f_0 k^\alpha l^{1-\alpha} \geq 1$ yields unit factor demands $k = f_0^{-1} \left(\frac{\alpha}{1-\alpha} \frac{w}{R} \right)^{1-\alpha}$ and $l = f_0^{-1} \left(\frac{\alpha}{1-\alpha} \frac{w}{R} \right)^{-\alpha}$. Normalizing $f_0 = \alpha^{-\alpha} (1 - \alpha)^{-(1-\alpha)}$ implies $u = R^\alpha w^{1-\alpha} = 1$. With zero profit, unit cost must be equal to one when the standard good is the *numeraire*. Hence, the factor price frontier is $w = R^{-\alpha/(1-\alpha)}$. Since $du/dw = l$ and $du/dR = k$, the slope $w'(R) = -k/l$ is equal to the capital labor ratio. Substituting w into unit demands and introducing a sectoral index N yields,

$$k_N = \alpha_N / R, \quad l_N = (1 - \alpha_N) / w(R), \quad w(R) = R^{-\alpha_N/(1-\alpha_N)}, \quad w'(R) = -k_N / l_N. \quad (7)$$

2.4 Demand

Agents consume two goods and supply effort. We assume preferences to be linear homogeneous in commodity consumption and separable with respect to effort cost. Linear homogeneity implies risk-neutrality with respect to income. Linear separability simplifies the effort problem. Effort (foregone private benefits b_j) and income y_j are conditional on the type and sectoral activity of the agent. The consumer problem is

$$u_j = \max_{c_{jN}, c_{jE}, b_j} u(c_{jN}, c_{jE}) + b_j \quad s.t. \quad c_{jN} + v c_{jE} \leq y_j, \quad (8)$$

where subscripts N, E denote demand by agent j for standard and entrepreneurial sector output, respectively. Since the standard good (consumption c_{jN}) is the *numeraire*, v is the relative price for entrepreneurial goods. Without loss of generality, we specify

$$u(c_{jN}, c_{jE}) = u_0 \cdot (c_{jN})^{1-\gamma} (c_{jE})^\gamma, \quad (9)$$

implying constant expenditure shares, $v c_{jE} = \gamma y_j$ and $c_{jN} = (1 - \gamma) y_j$. None of the agents consumes private benefits in equilibrium. Hence, welfare of agent j is measured by real income, $u_j = y_j / v_c(v)$, where $v_c(v)$ is the price index.

2.5 Equilibrium

Total labor endowment consists of a mass one of entrepreneurial agents and L workers. Of all potential entrepreneurs, a part $1 - E$ opts for employment in the standard industry. The other part starts a firm in the entrepreneurial sector of which a fraction G_0 is shut down. When the firm continues, it invests capital I and, together with managerial effort, produces output x . By the law of large numbers, aggregate output X_E is the number of continuing entrants $(1 - G_0) E$, times their average productivity $\bar{x}$, times the fraction p surviving to the production stage. The total value of production then is

$$Y = X_N + v \cdot X_E, \quad X_E \equiv p \bar{x} \cdot (1 - G_0) E. \quad (10)$$

Banks intermediate between savers and investors. All investment is financed out of the initial capital endowment A_T . An agent who prefers employment, invests her full asset wealth in the deposit market, giving a supply $(1 - E) A$. The other part E starts a firm in the entrepreneurial sector. A fraction G_0 of them must give up again and invest their wealth A in the deposit market while $(1 - G_0) E$ entrants continue and invest equity A in their own firm, together with external funds, to finance investment. Equilibrium requires market clearing for loanable funds, $A_L L + A(1 - E) + AG_0 E = (I - A)(1 - G_0) E + k_N X_N$, which gives $A_T = (1 - G_0) I E + k_N X_N$. Dividing capital demand by total output in the entrepreneurial sector in (10) yields unit capital demand k_E . Full employment of the total potential labor force implies $L_T = E + l_N X_N$.⁶ Defining unit factor demands l_E and k_E gives the resource constraints

$$\begin{aligned} A_T &= k_E \cdot X_E + k_N \cdot X_N, \quad k_E \equiv I / (p\bar{x}), \\ L_T &= l_E \cdot X_E + l_N \cdot X_N, \quad l_E \equiv 1 / [(1 - G_0) p\bar{x}]. \end{aligned} \tag{11}$$

The L workers earn a wage w and interest on asset wealth, giving end of period income $w + A_L R$ per capita. Active entrepreneurs earn $\bar{\pi}_e + AR$ per capita where $\bar{\pi}_e$ is the expected surplus over asset wealth. Part of the potential entrepreneurs prefer employment and get $w + AR$. Occupational choice with free entry implies $w = \bar{\pi}_e$ and yields aggregate income $Y = (w + A_L R) L + (w + AR)(1 - E) + (\bar{\pi}_e + AR) E$, or

$$Y = w \cdot L_T + R \cdot A_T. \tag{12}$$

Aggregate income equals the value of output in (10). To see this, we first note the sectoral zero profit conditions. Free entry implies $\bar{\pi}_e = w$. Use (5)-(6), multiply by E , divide by aggregate sectoral output as noted in (10) and note the definition of unit factor demands in (11) to get

$$v = w l_E + R k_E, \quad 1 = w l_N + R k_N. \tag{13}$$

⁶A part L always works in the standard sector and is immobile. A mass 1 of agents is mobile and can work in either sector. A part E starts a firm in the entrepreneurial sector and thereby reduces labor supply in the standard industry. Sectoral employment $l_N X_N = L + 1 - E$ and $l_E X_E = E$ thus reflects free entry and occupational choice of entrepreneurial agents.

Replacing endowments in (12) by (11) and using zero profit conditions proves (10). National income is equal to the value of traditional and entrepreneurial sector output.

Commodity demand follows from (8)-(9) and depends on individual income. Since demand is linear in income, agent heterogeneity doesn't matter. Demand depends only on aggregate income and is $C_N = (1 - \gamma)Y$ and $C_E = \gamma Y/v$. The income expenditure identity $C_N + vC_E = Y = X_N + vX_E$ yields the trade balance of an open economy,

$$(C_N - X_N) + v \cdot (C_E - X_E) = 0. \quad (14)$$

In the absence of international capital flows, as assumed throughout the paper, a trade surplus in entrepreneurial goods must be offset by a deficit in traditional commodities.

3 Industrial Structure

To establish how comparative advantage is driven by financial frictions, we start with a small open economy taking world goods prices as given. We first study how an increase in the world price v of entrepreneurial sector output affects factor prices. We thus reestablish a modified Stolper Samuelson theorem in an economy with finance constrained firms. Second, we consider an increase in the economy's total capital endowment A_T , keeping constant the inside equity A per firm. In this scenario, the endowment comes from more assets of workers which does not directly affect the borrowing needs of entrepreneurial firms. We establish a modified version of the Rybczynski theorem in the presence of credit rationing and compute supply changes resulting from changes in factor endowments and factor prices. The classical analysis is completed by computing changes in aggregate income resulting from factor endowment shocks and deriving the impact on aggregate demand. We then get the impact of finance constraints on excess demand and the trade pattern.

One aim of the paper is to explore the influence of credit constraints on trade patterns. We thus consider an increase in inside equity A which determines the financial strength

and robustness of entrepreneurial firms, keeping constant the aggregate capital endowment A_T . The scenario considers an increase in A which is compensated by a reduction in A_L . The experiment may also be interpreted as moving to a more uneven distribution of the capital endowment among workers and potential entrepreneurs. We find that not only the level but also the distribution of wealth is important for outcomes which is in line with a recent literature in macroeconomics (see Cagetti and De Nardi, 2006, and Quadrini, 2009). Finally, we turn to the role of legal institutions. The law and finance literature has also emphasized the importance of tight investor protection, accounting standards and the quality of commercial law. These regulations determine the quality of governance which limits managerial autonomy and discretion, makes managers more accountable to outside stakeholders, and thereby reduces agency costs and facilitates external financing. We interpret better governance as a reduction of parameter β which relates to private benefits of shirking.

3.1 Unit Demands

Unit factor demands importantly depend on cost shares which reflect the factor intensity assumptions. We have argued in the introductory section that the finance constrained sector is intensive in (entrepreneurial) labor and the traditional sector is capital intensive. By (13), cost shares in the traditional numeraire sector are $\alpha_N = Rk_N$ and $1 - \alpha_N = wl_N$. Unit demands in (11) imply cost shares of $\alpha_E = Rk_E/v = RI/(vp\bar{x})$ for capital and $1 - \alpha_E = wl_E/v = \bar{\pi}/(vp\bar{x})$ for ‘entrepreneurial labor’. The second equality substitutes (11) and uses the occupational choice condition $w = (1 - G_0) \bar{\pi}$ which states that expected profit must compensate for the foregone wage. To check consistency, add up the cost shares and get $vp\bar{x} = IR + \bar{\pi}$ as in (5). Hence, the average value of output per firm in the entrepreneurial industry consists of the cost of capital plus the average expected profit required to reward entrepreneurial labor services.

To analyze comparative statics, we take log-differentials with hats indicating relative changes such as $\hat{x}_0 \equiv dx_0/x_0$. The continuation decision in (3) determines the threshold

x_0 , giving $vp x_0 (\hat{x}_0 + \hat{v}) = DR\hat{R} - AR\hat{A} + \beta p\hat{\beta}$ in differential form. Divide by output value, use the cost share α_E defined above, denote the debt asset ratio by $\delta \equiv D/I$ and, correspondingly, the equity ratio by $1 - \delta = A/I$,

$$\frac{x_0}{\bar{x}} \cdot \hat{x}_0 = \delta \alpha_E \cdot \hat{R} - \frac{x_0}{\bar{x}} \cdot \hat{v} - (1 - \delta) \alpha_E \cdot \hat{A} + \frac{\beta}{v\bar{x}} \cdot \hat{\beta}. \quad (15)$$

A higher deposit rate R makes credit rationing more severe and drives the weakest firms out of business, i.e., a higher threshold productivity is required to obtain credit. A higher price boosts revenues and pledgable income which relaxes the credit constraint, allows weaker firms to continue and, hence, reduces firms turnover (churning). Higher own equity A as a measure of financial strength reduces the need for external funding and allows for a lower threshold. Note that $\beta/(v\bar{x})$ expresses the agency cost as a share of the output value of the average firm.

A higher threshold productivity raises average productivity of active firms by

$$\hat{\bar{x}} = \frac{\bar{x} - x_0}{\bar{x}} \frac{x_0 g_0}{1 - G_0} \cdot \hat{x}_0. \quad (16)$$

Unit factor demands in the entrepreneurial sector exclusively depend on the threshold value x_0 which is driven by the impact on the finance constraint in (15). Consider capital demand per unit of output, $k_E = I/(p\bar{x})$. If x_0 rises, indicating tighter financing constraints, average productivity $\bar{x}$ rises, meaning that a unit of capital generates more output or, conversely, capital used per unit of output falls:

$$\hat{k}_E = -\frac{\bar{x} - x_0}{\bar{x}} \frac{x_0 g_0}{1 - G_0} \cdot \hat{x}_0, \quad \hat{l}_E = \frac{x_0}{\bar{x}} \frac{x_0 g_0}{1 - G_0} \cdot \hat{x}_0. \quad (17)$$

Unit labor demand $l_E \equiv 1/[(1 - G_0)\bar{x}p]$, in contrast, rises with tighter financing constraints since $(1 - G_0)\bar{x} = \int_{x_0}^{\infty} x dG(x)$ falls. A new entrant produces output less frequently if financial constraints reduce the continuation probability. Hence, one unit of output requires more entrants so that unit labor demand rises with tighter credit constraints. Substituting the determinants of credit rationing in (15) yields

$$\hat{l}_E = \frac{x_0 g_0}{1 - G_0} \left[\delta \alpha_E \hat{R} - (1 - \delta) \alpha_E \hat{A} - \frac{x_0}{\bar{x}} \hat{v} + \frac{\beta}{v\bar{x}} \hat{\beta} \right], \quad \hat{k}_E = -\frac{\bar{x} - x_0}{x_0} \cdot \hat{l}_E. \quad (18)$$

In the traditional sector, unit demands respond in standard ways to factor prices, see (7),

$$\hat{k}_N = -\hat{R}, \quad \hat{l}_N = -\hat{w} = \frac{\alpha_N}{1 - \alpha_N} \cdot \hat{R}. \quad (19)$$

3.2 Factor Prices

Free entry equates unit costs with output prices. Log-differentiating (13) yields

$$\begin{aligned} \hat{v} &= \alpha_E \left(\hat{R} + \hat{k}_E \right) + (1 - \alpha_E) \left(\hat{w} + \hat{l}_E \right), \\ 0 &= \alpha_N \left(\hat{R} + \hat{k}_N \right) + (1 - \alpha_N) \left(\hat{w} + \hat{l}_N \right). \end{aligned}$$

Use (19) and get $\alpha_N \hat{k}_N + (1 - \alpha_N) \hat{l}_N = 0$. By the envelope theorem, a small price induced variation in factor demands has no impact on profits when these quantities are optimally chosen. Hence, only the direct, mechanical effects of factor prices determine the change in unit costs which must be zero in the numeraire sector. The same does not hold for the entrepreneurial sector because factor demand is finance constrained. To see this, take the differential of the zero profit condition $w = \bar{\pi}_e$, yielding $(1 - G_0)(p\bar{x}dv - IdR) - dw = \pi_0 g_0 dx_0$. Price changes affect the zero profit condition not only by their direct mechanical effect but also by their effect on the financing threshold! Since the marginal firm is constrained, it earns an excess return $\pi_0 > 0$ on investment. A relaxation of the credit constraint, allowing an entrant to invest in the marginal, but profitable project, strictly raises expected profit by π_0 . Expressing in relative changes, multiplying by l_E/v and using the definitions of unit demand and cost shares yields⁷

$$\alpha_E \hat{R} + (1 - \alpha_E) \hat{w} = \hat{v} - \mu \cdot \frac{x_0}{\bar{x}} \hat{x}_0, \quad \mu \equiv \frac{\pi_0}{vp} \frac{g_0}{1 - G_0}. \quad (20)$$

If entry and continuation investment were unconstrained as in the first-best, $\pi_0^{FB} = 0$, the standard results would apply. In a credit constrained economy, however, continuation investment by the marginal firm earns an excess return $\pi_0 > 0$, indicating that entry into

⁷In consequence, and unlike adjustment in the unconstrained sector, an induced variation in factor demands affects unit cost by $\alpha_E \hat{k}_E + (1 - \alpha_E) \hat{l}_E = \mu (x_0/\bar{x}) \hat{x}_0$.

the expansion phase is too small and too many projects are abandoned. The parameter μ may be seen as a measure of capital market frictions which is small if either π_0 (deviation from the first best) or the density of firms near the threshold level is small. Since x_0 rises with R , this term acts to magnify the effect of a higher capital cost R on the output price. Equation (15) shows how prices and other parameters relating to corporate finance affect the financing threshold. Using this together with the previous two equations yields

$$\begin{bmatrix} \alpha_N & 1 - \alpha_N \\ (1 + \mu\delta)\alpha_E & 1 - \alpha_E \end{bmatrix} \begin{bmatrix} \hat{R} \\ \hat{w} \end{bmatrix} = \begin{bmatrix} 0 \\ (1 + \mu\frac{x_0}{\bar{x}})\hat{v} - \frac{\beta}{v\bar{x}}\mu\hat{\beta} + (1 - \delta)\alpha_E\mu\hat{A} \end{bmatrix}.$$

Given that the traditional sector is capital intensive and the entrepreneurial sector intensive in (managerial) labor, the determinant $\lambda_\alpha = \alpha_N - \alpha_E - (1 - \alpha_N)\mu\delta\alpha_E$ is positive. In the first best case with $\mu = 0$, the standard condition is $\alpha_N > \alpha_E$. With credit rationing, the condition $\lambda_\alpha > 0$ becomes more stringent. The tighter are financing frictions, the more capital intensive the traditional sector must be. We assume the deviation from the first best to be not too large. Inverting the system yields the solution

$$\hat{R} = -\varepsilon_{Rv} \cdot \hat{v} + \varepsilon_{R\beta} \cdot \hat{\beta} - \varepsilon_{RA} \cdot \hat{A}, \quad \hat{w} = -\frac{\alpha_N}{1 - \alpha_N} \cdot \hat{R}, \quad (21)$$

where elasticities are [as a convention, all parameters are defined positive]

$$\varepsilon_{Rv} \equiv \frac{1 - \alpha_N}{\lambda_\alpha} \left(1 + \mu\frac{x_0}{\bar{x}}\right), \quad \varepsilon_{R\beta} \equiv \frac{1 - \alpha_N}{\lambda_\alpha} \frac{\beta}{v\bar{x}}\mu, \quad \varepsilon_{RA} \equiv \frac{1 - \alpha_N}{\lambda_\alpha} (1 - \delta)\alpha_E\mu.$$

Proposition 1 (*Stolper Samuelson*) (a) *If the entrepreneurial sector is intensive in (managerial) labor ($\lambda_\alpha > 0$), a higher price reduces interest and raises wages: $\hat{R} < 0 < \hat{w}$.* (b) *Increased financial strength (own equity $\hat{A} > 0$) and better governance (agency costs $\hat{\beta} < 0$) in the entrepreneurial sector change factor prices qualitatively in the same way.*

The magnification effect noted in Jones (1965), $\hat{w} > \hat{v} > 0 > \hat{R}$, holds if $\hat{w}/\hat{v} = \frac{\alpha_N}{\lambda_\alpha} (1 + \mu\frac{x_0}{\bar{x}}) > 1$. Substituting λ_α and rearranging, this condition is equivalent to $\mu\frac{x_0}{\bar{x}}\alpha_N > 0 > -[1 + (1 - \alpha_N)\mu\delta]\alpha_E$ and is naturally fulfilled.

The statement on financial strength stems from the scenario that the total capital endowment is kept constant, i.e., asset wealth of workers is simultaneously reduced when

potential entrepreneurs are endowed with more assets, $\hat{A} > 0 > \hat{A}_L$. Hence, in essence, the statement about financial strength is one about the *distribution of wealth* in the economy. The importance of this distributional result is new in trade theory. Assuming that it is the more wealthy people who start a firm, $A > A_L$, a more unequal wealth distribution boosts interest and reduces wages, thus reinforcing inequality.

How exactly does financial robustness change factor prices? When new firms in the experimental industry come with more equity, they need less external funds to finance the required capital investment. Therefore, some marginal firms which were previously denied credit, are now able to obtain a loan if their balance sheet improves. Having more own equity, they require a smaller loan so that pledgable income is enough to repay credit. Along with a lower productivity of the marginal firm, average productivity $\bar{x}$ declines as well. Capital demand per unit of output, $k_E = I / (p\bar{x})$, rises. The marginal firm uses the same investment but produces much less output than other firms so that capital demand per unit of output rises when more firms at the low productivity margin are financed. When a firm has more equity and credit rationing is relaxed, an entrepreneur is allowed to continue more often and, thus, produces more output per unit of labor. Equivalently, labor demand per unit of output falls. With unit capital demand rising and unit labor demand falling, unit cost equaling the output price v in zero profit equilibrium can only remain constant when interest falls and wages rise.

When agency costs β increase due to weaker governance standards, it becomes more costly to compensate entrepreneurs for their managerial effort. Pledgeable income shrinks and debt capacity declines. Banks can no longer expect credible repayment from some marginal firms and will deny credit. Therefore, start-ups are terminated more often, the productivity x_0 of the marginal firm increases which, in turn, yields higher average productivity. Therefore, capital demand per unit of output falls and unit labor demand rises. Given a constant output price, unit cost is fixed in zero profit equilibrium, requiring a rise in interest and a decline in the wage rate. Equation (21) also shows that the impact of weak institutions on factor prices can be compensated by firms being financially more

robust, i.e., if $\hat{A} = (\varepsilon_{R\beta}/\varepsilon_{RA})\hat{\beta}$. The same statement applies to other results below on sectoral supply and comparative advantage.

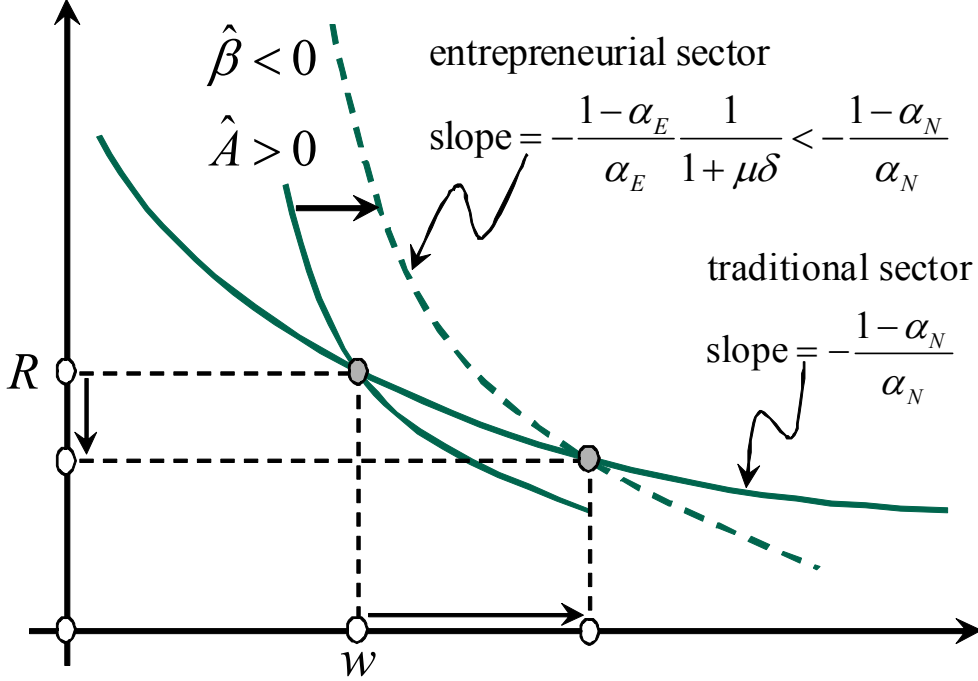


Fig. 1: Financial Robustness, Agency Costs and the Stolper Samuelson Theorem

Figure 1 illustrates the modified Stolper Samuelson theorem. The two solid curves are the sectoral zero profit conditions. The comparative statics is determined by the system following (20). For a given output price, entrepreneurial firms make a larger profit when they are financially stronger and need less outside funding ($\hat{A} > 0$). To lure away entrepreneurs from employment in the standard sector, they compete up the wage until profits are zero. The unit cost curve shifts to the right. When labor gets more scarce and expensive, the traditional sector must shrink. Being capital intensive, it releases relatively more capital than labor which reduces interest until traditional sector firms can break even. A lower interest, however, boosts profits of entrepreneurial firms, allowing them to compensate entrepreneurs for an even higher wage. The process continues until, in the new intersection with the broken zero profit condition for the entrepreneurial sector, firms in both sectors are on their cost curves and simultaneously break even at a lower interest and higher wage than ex ante. Lower agency costs or a higher price for entrepreneurial

sector output induces a similar adjustment.

3.3 Sectoral Outputs

The Rybczynski theorem of classical trade theory explains a country's sectoral structure in terms of factor endowments A_T and L_T . With an increase in total asset endowment we mean the endowment of workers only, keeping the equity ratio A of entrepreneurial firms constant. Log-differentiating the factor market conditions in (11) yields

$$\begin{aligned}\hat{A}_T - \hat{k} &= s_A \hat{X}_E + (1 - s_A) \hat{X}_N, & \hat{k} &= s_A \hat{k}_E + (1 - s_A) \hat{k}_N, & s_A &= k_E X_E / A_T, \\ \hat{L}_T - \hat{l} &= s_L \hat{X}_E + (1 - s_L) \hat{X}_N, & \hat{l} &= s_L \hat{l}_E + (1 - s_L) \hat{l}_N, & s_L &= l_E X_E / L_T.\end{aligned}\quad (22)$$

In a first step, we hold product prices as well as own equity A and agency costs β constant which implies that factor prices remain constant as well. Hence, unit factor demands remain invariant, $\hat{k}_j = \hat{l}_j = 0$. The determinant of the system, $s_A - s_L$, is negative and $\lambda_s = s_L - s_A > 0$, if the entrepreneurial sector is labor intensive and, thus, absorbs a larger share of the labor endowment. Inverting the system yields

$$\begin{aligned}\hat{X}_E &= \frac{1}{\lambda_s} \left[(1 - s_A) (\hat{L}_T - \hat{l}) - (1 - s_L) (\hat{A}_T - \hat{k}) \right], \\ \hat{X}_N &= \frac{1}{\lambda_s} \left[s_L (\hat{A}_T - \hat{k}) - s_A (\hat{L}_T - \hat{l}) \right].\end{aligned}\quad (23)$$

The magnification effect results in $\hat{X}_E = \frac{1-s_A}{s_L-s_A} \hat{L}_T > \hat{L}_T$ and $\hat{X}_N = \frac{s_L}{s_L-s_A} \hat{A}_T > \hat{A}_T$.

Proposition 2 (*Rybczynski*) *A larger labor endowment expands the entrepreneurial sector (using managerial labor intensively) and shrinks the standard sector.*

Next, we turn to the impact of changes in output prices and the structural parameters determining the financing of entrepreneurial firms (financial strength and governance of firms). Unit factor demand in the entrepreneurial sector depends on $\hat{x}_0$ only, see (17). We

thus need to evaluate the change in the threshold productivity in (15). Substituting the change in the interest rate given in (21) yields

$$\frac{x_0}{\bar{x}} \hat{x}_0 = - \left(\varepsilon_{Rv} \delta \alpha_E + \frac{x_0}{\bar{x}} \right) \cdot \hat{v} + \left(\varepsilon_{R\beta} \delta \alpha_E + \frac{\beta}{v \bar{x}} \right) \cdot \hat{\beta} - (\varepsilon_{RA} \delta + 1 - \delta) \alpha_E \cdot \hat{A}. \quad (24)$$

The effect of a higher price is to allow some marginal firms to continue which would otherwise have been finance constrained. Increased financial strength has the same effect. Observe that a lower threshold value also erodes the average productivity $\bar{x}$ in the entrepreneurial sector. The marginal and financially weakest firms are the least productive. When more of them continue, because a higher price or more own equity boosts their debt capacity, average productivity declines.⁸ However, recall that even marginal firms generate a positive net present value to society when investment is finance constrained. The decline in average productivity is, thus, not to be seen as damaging. Quite to the contrary, more continuation (i.e., less firm turnover and exit) is an improvement since constrained investment yields an excess return. Finally, higher agency costs tighten the financing constraint and raises the threshold productivity needed for continuation.

Unit factor demands in the entrepreneurial sector depend on the change in factor prices via their impact on the threshold productivity while unit demands in the traditional sector adjust to factor prices in a standard cost minimizing way. Armed with these results, we evaluate the change in unit factor demands in (22) by first substituting (18)-(19), collecting terms and finally replacing $\hat{R}$ with (21). After some computations,

$$\hat{k} = \varepsilon_{kv} \cdot \hat{v} + \varepsilon_{kA} \cdot \hat{A} - \varepsilon_{k\beta} \cdot \hat{\beta}, \quad \hat{l} = -\varepsilon_{lv} \cdot \hat{v} - \varepsilon_{lA} \cdot \hat{A} + \varepsilon_{l\beta} \cdot \hat{\beta}, \quad (25)$$

⁸This is consistent with the empirical finding of Lerner (2002) that venture capital backed investments are less productive and generate less value added in boom periods when the industry expands.

where the elasticity parameters are again defined with positive values,

$$\begin{aligned}
\varepsilon_{kv} &\equiv s_A \frac{(\bar{x} - x_0) g_0}{1 - G_0} [\delta \alpha_E \varepsilon_{Rv} + x_0 / \bar{x}] + (1 - s_A) \varepsilon_{Rv}, \\
\varepsilon_{lv} &\equiv s_L \frac{x_0 g_0}{1 - G_0} [\delta \alpha_E \varepsilon_{Rv} + x_0 / \bar{x}] + (1 - s_L) \varepsilon_{Rv} \frac{\alpha_N}{1 - \alpha_N}, \\
\varepsilon_{k\beta} &\equiv s_A \frac{(\bar{x} - x_0) g_0}{1 - G_0} [\delta \alpha_E \varepsilon_{R\beta} + \beta / (v \bar{x})] + (1 - s_A) \varepsilon_{R\beta}, \\
\varepsilon_{l\beta} &\equiv s_L \frac{x_0 g_0}{1 - G_0} [\delta \alpha_E \varepsilon_{R\beta} + \beta / (v \bar{x})] + (1 - s_L) \varepsilon_{R\beta} \frac{\alpha_N}{1 - \alpha_N}, \\
\varepsilon_{kA} &\equiv s_A \frac{(\bar{x} - x_0) g_0}{1 - G_0} \alpha_E [\delta \varepsilon_{RA} + 1 - \delta] + (1 - s_A) \varepsilon_{RA}, \\
\varepsilon_{lA} &\equiv s_L \frac{x_0 g_0}{1 - G_0} \alpha_E [\delta \varepsilon_{RA} + 1 - \delta] + (1 - s_L) \varepsilon_{RA} \frac{\alpha_N}{1 - \alpha_N}.
\end{aligned}$$

Since that sector is assumed to be labor intensive, a higher price reduces interest and boosts the wage rate. The impact on unit factor demand works via three channels. First, a price increase directly relaxes the financing constraint in (15), allowing entrepreneurs to pursue investment more frequently, thereby tilting unit factor demand from entrepreneurial labor towards capital, see (17). Second, by the Stolper Samuelson effect, a higher output price reduces interest which further relaxes the financing constraint and makes the entrepreneurial sector use more capital per unit of output. Third, lower interest together with increased wages leads the standard sector to substitute labor for more capital, reflecting unconstrained cost minimization. Higher own equity of entrepreneurial firms affects credit constraints and tilts the factor price frontier in the same way, yielding the same change in unit factor demands while higher agency costs induce the opposite adjustment. Combining (23) and (25), we can derive the impact on sectoral output,

$$\begin{aligned}
\lambda_s \hat{X}_E &= (1 - s_A) \hat{L}_T - (1 - s_L) \hat{A}_T + [(1 - s_A) \varepsilon_{lv} + (1 - s_L) \varepsilon_{kv}] \cdot \hat{v} \\
&: + [(1 - s_A) \varepsilon_{lA} + (1 - s_L) \varepsilon_{kA}] \cdot \hat{A} - [(1 - s_A) \varepsilon_{l\beta} + (1 - s_L) \varepsilon_{k\beta}] \cdot \hat{\beta}, \quad (26) \\
\lambda_s \hat{X}_N &= s_L \hat{A}_T - s_A \hat{L}_T - [s_L \varepsilon_{kv} + s_A \varepsilon_{lv}] \cdot \hat{v} \\
&: - [s_L \varepsilon_{kA} + s_A \varepsilon_{lA}] \cdot \hat{A} + [s_L \varepsilon_{k\beta} + s_A \varepsilon_{l\beta}] \cdot \hat{\beta}.
\end{aligned}$$

Note that all coefficients are defined positive, i.e., $\lambda_s > 0$. Apart from the Rybczynski effects in Proposition 2, we have

Proposition 3 (*Supply Changes*) *Entrepreneurial sector output expands when the price rises, firms become financially more robust, and corporate governance improves. Expansion shifts from the extensive to the intensive margin of production.*

To verify the last statement, observe that aggregate supply importantly depends on the number of entrants E and of mature firms $M \equiv (1 - G_0) E$ which are continued beyond the initial start-up phase. Using (10-11), we can relate the changes in firm numbers to changes in aggregate supply according to $E = l_E X_E$ and $M \cdot I = k_E X_E$, yielding $\hat{E} = \hat{l}_E + \hat{X}_E$ and $\hat{M} = \hat{k}_E + \hat{X}_E$. First, pure endowment effects at a constant output price v leave factor prices and unit demands unchanged. Therefore, a larger labor endowment leads to an expansion of the experimental industry which exclusively occurs at the extensive margin, raising both the number of entrants and mature firms. The cut-off and average productivities remain constant. How does a higher market price expand the entrepreneurial sector? By the Stolper Samuelson theorem, interest declines while the wage rate rises. The adjustment of both the output price and the interest rate relaxes the financing constraint as in (15), allows more firms with low productivity to proceed with investment and, thereby, reduces average productivity. By (17), a lower cut-off productivity, implying more frequent investment per entrepreneur, raises unit capital demand and squeezes unit labor demand, $\hat{k}_E > 0 > \hat{l}_E$. Clearly, a higher output price raises the number of mature firms in the entrepreneurial sector while the impact on the number of entrants becomes ambiguous. Hence, the expansion is shifted from the extensive (number of entrants) to the intensive margin (increased continuation rate, less churning, and higher probability of production per entrant). The same adjustments occur when firms are endowed with more own assets (higher A) and the institutional environment improves (lower β).

3.4 Demand Side

Consumer demand for entrepreneurial sector output is $C_E = \gamma \cdot Y/v$ and depends on aggregate income as noted in (12). Given an asset income share $\omega \equiv RA_T/Y$, higher factor

income raises aggregate spending by $\hat{Y} = \omega \left(\hat{R} + \hat{A}_T \right) + (1 - \omega) \left(\hat{w} + \hat{L}_T \right)$. Substituting the factor price changes in (21) yields

$$\hat{Y} = \omega \cdot \hat{A}_T + (1 - \omega) \cdot \hat{L}_T - \theta \cdot \hat{R}, \quad \theta \equiv \frac{\alpha_N - \omega}{1 - \alpha_N} > 0. \quad (27)$$

The sign of θ reflects our factor intensity assumptions. When the traditional industry is capital intensive, we must have $\alpha_N > \omega > \alpha_E$. To see this, multiply (11) by R and note $RA_T = \alpha_E v X_E + \alpha_N X_N$. Divide by Y , denote sectoral GDP shares by $\gamma_s \equiv v X_E / Y$ and $1 - \gamma_s \equiv X_N / Y$, and get $\omega = \gamma_s \alpha_E + (1 - \gamma_s) \alpha_N$. Hence, the income share of capital is larger in the traditional sector than in the economy at large. The average share, in turn, exceeds the share of capital income in the entrepreneurial sector where most of the income is a reward for managerial labor inputs (wage opportunity cost of entrepreneurship). The factor price frontier reflects cost minimization in the traditional sector. Given the factor intensity assumption, a higher interest and, correspondingly, a lower wage rate erode aggregate income. Substituting the equilibrium interest rate from (21) yields

$$\hat{Y} = \omega \cdot \hat{A}_T + (1 - \omega) \cdot \hat{L}_T + \theta \varepsilon_{Rv} \cdot \hat{v} - \theta \varepsilon_{R\beta} \cdot \hat{\beta} + \theta \varepsilon_{RA} \cdot \hat{A}. \quad (28)$$

A higher world price for entrepreneurial goods raises aggregate income. Part of it reflects the fact that a higher price boosts pledgable income and helps the expansion of finance constrained firms. The elasticity ε_{Rv} defined in (21) is magnified by the parameter μ which parameterizes the tightness of credit constraints. This parameter would be zero in a first best world where continuation occurs until profit of the marginal firm is driven down to zero. For the same reasons, the equity ratio of firms and agency costs are relevant only in a finance constrained economy with $\mu > 0$. In the first best, the interest elasticities in (21) would be zero, making corporate finance irrelevant for aggregate income.

Given that the weakest firms in the entrepreneurial sector are credit rationed, a larger equity ratio of firms (higher A for given A_T) which characterizes financially more robust firms with stronger balance sheets, raises aggregate income. The reason is that a larger equity ratio facilitates external funding of investments with strictly positive net present

value ($\pi_0 > 0$ at the margin). With lower equity, a larger credit is needed. Some marginal firms would be denied credit since pledgable income would not suffice to repay a bigger loan. Finally, bad legal institutions also reduce aggregate income. Inadequate corporate governance standards make insiders more autonomous and less accountable to outside investors. Such institutions invite managerial opportunism and, thereby, raise the agency costs of investment β in sectors that rely intensively on entrepreneurial inputs. Larger agency costs reduce pledgable income and, thereby, the debt capacity of these firms which limits the leveraged expansion of the entrepreneurial sector.

Aggregate income and relative prices determine demand,

$$\hat{C}_E = \hat{Y} - \hat{v} = \omega \cdot \hat{A}_T + (1 - \omega) \cdot \hat{L}_T - (1 - \theta\varepsilon_{Rv}) \cdot \hat{v} - \theta\varepsilon_{R\beta} \cdot \hat{\beta} + \theta\varepsilon_{RA} \cdot \hat{A}, \quad (29)$$

where $1 - \theta\varepsilon_{Rv} = [\omega - \alpha_E - \mu \cdot (\delta\alpha_E(1 - \alpha_N) + (\alpha_N - \omega)x_0/\bar{x})] / \lambda_\alpha$ uses the definitions of ε_{Rv} , θ and λ_α . The factor intensity assumption implies $\alpha_N > \omega > \alpha_E$. We argue for $1 > \theta\varepsilon_{Rv}$ which is fulfilled if finance constraints are not too tight and μ is close to zero. In this case, a higher output price restrains demand. Note that, even with a degenerate demand reaction, excess demand for entrepreneurial goods would still decline with a higher own price as long as the supply change dominates.

3.5 Trade Balance

Excess demand in the domestic economy, $\zeta_E \equiv C_E - X_E$, results in a trade balance deficit in the entrepreneurial sector. We are interested in how the trade balance responds to changes in the novel fundamental parameters introduced by our analysis: the abundance of total assets A_T in the economy, the financial robustness of entrepreneurial firms measured by A at given A_T , and the extent of agency costs as captured by β . Measuring the change in excess demand by $\hat{\zeta}_E \equiv v d\zeta_E / Y$, we get $\hat{\zeta}_E = \gamma\hat{C}_E - \gamma_s\hat{X}_E$. Substituting (29) and (26), and using $\lambda_s = s_L - s_A$ when necessary, yields

$$\hat{\zeta}_E = \varepsilon_{ZA_T} \cdot \hat{A}_T - \varepsilon_{ZL} \cdot \hat{L}_T - \varepsilon_{Zv} \cdot \hat{v} - \varepsilon_{ZA} \cdot \hat{A} + \varepsilon_{Z\beta} \cdot \hat{\beta}, \quad (30)$$

where coefficients are defined as

$$\begin{aligned}
\varepsilon_{Zv} &\equiv \frac{(1-s_A)\varepsilon_{lv} + (1-s_L)\varepsilon_{kv}}{\lambda_s} \gamma_s + (1-\varepsilon_{Rv}\theta)\gamma, \\
\varepsilon_{ZA_T} &\equiv \frac{\lambda_s \omega \gamma + (1-s_L)\gamma_s}{\lambda_s}, \quad \varepsilon_{ZL} \equiv \frac{(\lambda_s \omega + 1 - s_L)\gamma + (\gamma_s - \gamma)(1-s_A)}{\lambda_s}, \\
\varepsilon_{ZA} &\equiv \frac{(1-s_A)\varepsilon_{lA} + (1-s_L)\varepsilon_{kA}}{\lambda_s} \gamma_s - \varepsilon_{RA}\theta\gamma, \\
\varepsilon_{Z\beta} &\equiv \frac{(1-s_A)\varepsilon_{l\beta} + (1-s_L)\varepsilon_{k\beta}}{\lambda_s} \gamma_s - \varepsilon_{R\beta}\theta\gamma.
\end{aligned}$$

We wish to depart from the frequent assumption of balanced trade and allow for asymmetric country characteristics. But we do assume that the trade imbalance is not too large so that $\gamma_s - \gamma$ is small and $\varepsilon_{ZL} > 0$ in all cases. Furthermore, in restricting attention to a neighborhood of the first best, all elasticities are positive, despite of the countervailing influence of the terms associated with θ . To see this, note that assumption (A) in Section 2.2 implies credit rationing, leading to $\mu > 0$. Some marginal firms have unexploited investment opportunities, i.e., they could earn a strictly positive profit π_0 but are denied credit. Letting the agency cost approach $\beta p \rightarrow AR$ from above, implying $\pi_0 \rightarrow 0$ and $\mu \rightarrow 0$, moves the equilibrium arbitrarily close to the first best. All terms multiplying with μ drop out, obtaining the classic two sector trade model. Letting private benefits and, thus, agency costs only marginally exceed the borderline case of assumption (A), we keep close to the first best. Consider now the elasticity $\varepsilon_{Z\beta}$. Since $\mu \rightarrow 0$ implies $\varepsilon_{R\beta} \rightarrow 0$, the last term vanishes. However, since $\mu \rightarrow 0$ is equivalent to $\beta \rightarrow AR/p > 0$, the elasticities $\varepsilon_{l\beta}$ and $\varepsilon_{k\beta}$ as listed in (25) remain strictly positive, implying that $\varepsilon_{Z\beta}$ remains positive as well. Given that the debt and equity ratios δ and $1 - \delta$ are exogenous, ε_{lA} and ε_{kA} remain positive by the same argument which keeps ε_{ZA} positive. Hence, all elasticities in (30) are strictly positive when being close to the first best allocation.

Under these conditions, when the economy gets richer in financial assets, it starts to develop a surplus in the standard capital intensive sector while the entrepreneurial sector relying intensively on entrepreneurial inputs records a trade deficit. Given that demand declines in its own price ($1 > \theta\varepsilon_{Rv}$), a higher price for entrepreneurial goods expands output and results in a trade surplus in this sector (sectoral excess demand falls).

Finally, higher agency costs lead to an entrepreneurial sector trade deficit. When firms are endowed with stronger balance sheets, the entrepreneurial sector expands, resulting in a trade surplus there.

3.6 Trade Barriers and Welfare

Financial development and trade protection can have important consequences for per capita welfare. To investigate the consequences of trade protection, we assume the country to be a *net importer* in the entrepreneurial sector. In light of Proposition 3 and the results noted in (30), such a situation might emerge because underdeveloped institutions or weak balance sheets of firms in the entrepreneurial sector create difficulties in raising external funds. When firms are financially fragile and the entrepreneurial sector records a trade deficit, a country might introduce (non-tariff) trade barriers $\tau > 1$ to restrict imports and protect its infant industry. Domestic consumers pay v on home produced goods and τv^* for imports. No-arbitrage dictates $v = \tau v^*$.⁹ Since a small open economy cannot affect the world market price v^* , import protection raises the domestic price by $\hat{v} = \hat{\tau}$. Noting (9), aggregate welfare is equal to real income and changes by $\hat{U} = \hat{Y} - \hat{v}_c$, where the consumer price index rises in proportion to the demand share for entrepreneurial sector output, $\hat{v}_c = \gamma \hat{v}$. Substituting the income gain in (28), and noting the coefficients θ , ε_{Rv} , ω and λ_α yields

$$\hat{U} = (\theta \varepsilon_{Rv} - \gamma) \cdot \hat{v} - \theta \varepsilon_{R\beta} \cdot \hat{\beta} + \theta \varepsilon_{RA} \cdot \hat{A}, \quad (31)$$

where the welfare effect of the price increase is

$$\theta \varepsilon_{Rv} - \gamma = \mu \cdot \frac{\gamma_s (\alpha_N - \alpha_E) x_0 / \bar{x} + \gamma (1 - \alpha_N) \alpha_E \delta}{\lambda_\alpha} - (\gamma - \gamma_s) \cdot \frac{\alpha_N - \alpha_E}{\lambda_\alpha}.$$

The welfare consequences of import protection reflect two offsetting effects. On the negative side, the deterioration of the terms of trade reduces welfare in proportion to $\gamma - \gamma_s$. If the country is a net importer, the demand share exceeds the supply share of

⁹Foreign consumers pay v^* for the national good, and $\tau v = \tau^2 v^* > v^*$ when importing. Hence, foreigners demand only national goods. Any remaining excess supply is exported.

the entrepreneurial good, $\gamma > \gamma_s$. Since the country consumes more than it produces, a higher price raises household spending by more than it increases income so that welfare as measured by the real value of income falls. However, when finance constraints are binding ($\mu > 0$), the higher price strengthens earnings and pledgable income of firms and thereby relaxes finance constraints. The country is able to realize more projects with a strictly positive net present value which magnifies the income gains of a higher price. The coefficient μ shows that this welfare gain is proportional to the ‘excess return’ π_0 on unexploited investment opportunities. Hence, if the trade deficit is small and the finance constraint relatively tight, welfare in the importing country must increase despite of a negative terms of trade effect!

If for some reason a country cannot implement other policies to overcome financial frictions, trade protection can substitute for these policies as long as terms of trade effects are not too damaging. Another policy more directly targeted to financial frictions is institutional reform for better corporate governance ($\hat{\beta} < 0$). Such initiative facilitates access to external funds and thereby promotes the expansion of the entrepreneurial sector. Better governance helps constrained firms to realize profitable and previously unexploited investment opportunities. This is reflected in the parameter $\varepsilon_{R\beta}$ being proportional to μ which, in turn, reflects the ‘excess return’ π_0 on the last project that is implemented. Strengthening own equity A of constrained firms boosts welfare by the same arguments.

Proposition 4 (*Domestic Welfare*) (a) *Financial development (more own equity of firms and better institutions) boosts welfare.* (b) *In a constrained country with a small trade deficit of the entrepreneurial sector, protection relaxes finance constraints and can improve welfare despite of a negative terms of trade effect.*

4 The World Economy

4.1 Factor Price Equalization

A key result of classical trade theory is that free trade ensures factor price equalization when both countries have identical production technologies. The neoclassical result is retrieved in our model when setting $\mu = 0$ in (20-21) and noting that the solution of factor prices in both countries according to (21) depends in exactly the same way on the world market price v . When finance constraints are binding ($\mu > 0$), we still get factor price equalization, *provided that both countries have the same intermediation technology*, i.e., β and A are identical, and production technology, including the distribution $g(x)$ in the entrepreneurial sector, is symmetric as well. To see this, note that the cut-off $x_0(v, R)$ in (3), the profit of the marginal firm $\pi_0(v, R)$ in (4), and the average productivity $\bar{x}(v, R)$ in (5) all depend on v and R in exactly the same way, and so does the parameter μ in (20). Hence, the solution in (21) of factor prices in both countries depends in exactly the same way on the common world market price which clarifies the symmetry conditions for factor price equalization in our model of finance and trade.

Obviously, factor price equalization breaks down when technologies and, thereby, factor productivities become different. This also applies to the ‘financial intermediation technology’ as characterized by the two parameters A and β , i.e., financial robustness of firms and the quality of institutions. Starting with a symmetric equilibrium, if one country becomes financially more developed relative to the other, i.e., if it becomes more productive and technologically superior in financial intermediation (higher A and lower β), wages in that country will rise and interest will fall relative to the other country, see (21). Figure 1 illustrates this argument.

Proposition 5 (*Factor Price Equalization*) *Free trade leads to factor price equalization as long as both production and intermediation technologies are identical. Differences in financial development lead to factor price differences.*

4.2 Comparative Advantage

Autarky: Under autarky, $\zeta_E = \hat{\zeta}_E = 0$. Using this in (30) results in

$$\hat{v} = \frac{\varepsilon_{ZA_T}}{\varepsilon_{Zv}} \cdot \hat{A}_T - \frac{\varepsilon_{ZL}}{\varepsilon_{Zv}} \cdot \hat{L}_T - \frac{\varepsilon_{ZA}}{\varepsilon_{Zv}} \cdot \hat{A} + \frac{\varepsilon_{Z\beta}}{\varepsilon_{Zv}} \cdot \hat{\beta}. \quad (32)$$

If trade is balanced in the initial equilibrium ($\gamma = \gamma_s$), then $\varepsilon_{ZA_T} = \varepsilon_{ZL}$ in (30) and the price change $\hat{v}$ is homogeneous of degree zero with respect to a ceteris paribus proportional change $\hat{A}_T = \hat{L}_T$ of capital and labor endowments. This holds despite of the fact that the number of *potential* entrepreneurs is held fixed. However, while natural workers can only be employed in the traditional sector, entrepreneurs can perform both tasks. In an interior equilibrium, more entrepreneurship implies less employment in the traditional sector and conversely. The occupational choice free entry condition means that (entrepreneurial) labor is reallocated freely across sectors, and so is financial capital. A ceteris paribus increase in own equity of new firms, $\hat{A} > 0$, relaxes the financing constraint and expands the entrepreneurial sector, leading to excess supply and requiring a lower relative price.¹⁰ Lower agency costs in financing entrepreneurship ($\hat{\beta} < 0$), for example due to improved corporate governance standards or financial institutions, favor expansion of the entrepreneurial sector and also reduce the relative price.

Openness With Many Countries: Let us focus on parameter domains with imperfect specialization so that production of both goods takes place in all countries also after some economic shock. Suppose that protection and other economic shocks are limited to the home economy. Hence, v^* is the common world market price for all other countries, and $v = \tau v^*$ is the price in the domestic economy. We assume that there are no trade frictions at the outset, $\tau = 1$ and $v = v^*$. Whenever we discuss the consequences of the home economy introducing trade protection, we assume it to be an importer of entrepreneurial goods so that $\hat{v} = \hat{v}^* + \hat{\tau}$. We consider only exogenous changes in the home country so

¹⁰Note that $\hat{A} > 0$ at $\hat{A}_T = 0$ relaxes the financial constraints for a given total capital endowment and, thereby, also reflects a redistribution of wealth from workers to entrepreneurial agents.

that excess demand in other foreign countries, indexed by j , changes only in response to a world price shock, $\hat{\zeta}_E^j = -\varepsilon_{Zv}^j \cdot \hat{v}^*$. Note as well that we do not impose symmetry in the initial equilibrium but allow for trade imbalances. Hence, some of the foreign economies may be importing and others exporting goods of the entrepreneurial sector.

Equilibrium in the world market requires $d\zeta_E + \sum_j d\zeta_E^j = 0$. Note the definition $\hat{\zeta}_E^j \equiv v^* d\zeta_E^j / Y^j$, multiply by $v = v^*$, divide by world GDP and define country j 's GDP share by $\sigma^j \equiv Y^j / (Y + \sum_j Y^j)$. Of course, GDP shares add up to unity, $\sigma + \sum_j \sigma^j = 1$. Using (30) and the foreign equivalent, the condition for world market clearing $\sigma \hat{\zeta}_E + \sum_j \sigma^j \hat{\zeta}_E^j = 0$ pins down the impact on the common price

$$\hat{v}^* = \frac{\sigma \varepsilon_{ZA_T}}{\varepsilon_{Zv}^*} \cdot \hat{A}_T - \frac{\sigma \varepsilon_{ZL}}{\varepsilon_{Zv}^*} \cdot \hat{L}_T - \frac{\sigma \varepsilon_{ZA}}{\varepsilon_{Zv}^*} \cdot \hat{A} + \frac{\sigma \varepsilon_{Z\beta}}{\varepsilon_{Zv}^*} \cdot \hat{\beta} - \frac{\sigma \varepsilon_{Zv}}{\varepsilon_{Zv}^*} \cdot \hat{\tau}, \quad (33)$$

where $\varepsilon_{Zv}^* \equiv \sigma \varepsilon_{Zv} + \sum_j \sigma^j \varepsilon_{Zv}^j$ is the GDP weighted average of individual country elasticities. The small open economy case analyzed above results if the number of countries n gets very large. this is most easily seen in the symmetric case where $\varepsilon_{Zv}^* = \sigma n \varepsilon_{Zv}$, leading to $\hat{v}^* = \frac{1}{n} \frac{\varepsilon_{ZA_T}}{\varepsilon_{Zv}} \hat{A}_T$, for example. As $n \rightarrow \infty$, an isolated shock in the domestic economy has only a negligible impact on the world market price.

In general, changes in endowments or financing conditions induce direct (first-order) effects on domestic excess demand and indirect (second-order) effects on excess demand on all countries via the induced change in the common price $\hat{v}^*$. By (31), an increase in the world price boosts foreign welfare by relaxing finance constraints in the entrepreneurial sector while the terms of trade effect depends on the country's trade position. Apart from the traditional determinants of trade patterns, we can state:

Proposition 6 (*Comparative Advantage*) *In the reforming country, better investor protection and corporate governance standards reflected in lower agency costs (lower β) and a higher equity ratio of firms (higher A) create a comparative advantage in entrepreneurial sectors. Taking account of changes in terms of trade and the effect on financing constraints, foreign export nations unambiguously loose while the welfare change in foreign import nations is ambiguous.*

4.3 Protection and Welfare

Since goods are homogeneous, our specific protection scenario makes sense only if countries are asymmetric and the home country is importing goods of the entrepreneurial sector. Clearly, protection restricts domestic demand and, therefore, requires a reduction in the world market price where the strength of the impact depends on the share σ of the country in world GDP. In a small open economy, an increase in protection has no impact on the world market price but only raises the domestic demand price, $\hat{v} = \hat{\tau}$, giving rise to the results noted earlier. With large countries, protection in one of them reduces the world market price as in (33), but clearly by less than one. The end result is $\hat{v}^* < 0 < \hat{v}$ where the domestic demand price rises by $\hat{v} = (1 - \sigma\varepsilon_{Zv}/\varepsilon_{Zv}^*) \cdot \hat{\tau} > 0$. Hence, price changes relax finance constraints in the home economy but tighten them in foreign economies where the lower output price erodes earnings and pledgable income of constrained firms. If foreign countries are exporting entrepreneurial sector output, they loose both on account of a negative terms of trade effect and a welfare loss from tightening financing conditions. In contrast, the terms of trade effect is favorable for importing countries.

Proposition 7 (*Protection and Foreign Welfare*) *If the home country runs a trade deficit in the entrepreneurial sector and introduces an import barrier, the world market price declines. Foreign export nations of entrepreneurial sector output loose both on account of worsening terms of trade and tighter finance constraints. Foreign import countries loose from tighter finance constraints but gain from better terms of trade, rendering the overall effect on their welfare ambiguous.*

We now show the possibility that protection could even increase world welfare if finance constraints were very different across countries. To show this possibility, we restrict the analysis to a two-country version (with a star denoting the foreign country) and consider the following scenario: the home country is financially underdeveloped (high β and firms might also have little own assets A) while the foreign country is not constrained so that $\mu > 0$ and $\mu^* = 0$. Everything else equal, the home country will run a trade deficit in

the constrained sector as a result of financial underdevelopment, and the foreign country a surplus. Suppose that there is another country difference such as a relatively larger labor endowment which ‘almost’ compensates for the effect of finance constraints on the trade pattern. Hence, the asymmetric world equilibrium involves large differences in financial development but relatively small trade imbalances in the entrepreneurial sector. When trade barriers are absent at the outset, $v = v^*$ with free trade. We now show that introducing a small import barrier in the home country can raise world welfare. Protection raises the domestic price and, by restricting demand in the home country, at the same time reduces the world market price, $\hat{v} = \hat{v}^* + \hat{\tau} > 0 > \hat{v}^*$, see (33). Aggregate welfare in the home country changes as in (31) in response to the price increase while foreign welfare declines on account of a negative terms of trade effect. Adding up and noting $\mu^* = 0$, world welfare changes by

$$\begin{aligned} \hat{U} + \hat{U}^* &= \mu \cdot \frac{\gamma_s(\alpha_N - \alpha_E) x_0 / \bar{x} + \gamma(1 - \alpha_N) \alpha_E \delta}{\lambda_\alpha} \cdot \hat{v} \\ &: - (\gamma - \gamma_s) \frac{\alpha_N - \alpha_E}{\lambda_\alpha} \cdot \hat{v} - (\gamma^* - \gamma_s^*) \frac{\alpha_N^* - \alpha_E^*}{\lambda_\alpha^*} \cdot \hat{v}^*. \end{aligned} \quad (34)$$

Protection yields welfare gains because a higher price relaxes finance constraints of domestic firms as in the first line of (34). The second line captures welfare-reducing terms of trade effects. Since the home country is a net importer of entrepreneurial goods ($\gamma > \gamma_s$), the higher domestic price reduces welfare. Since the foreign country is a net exporter of such goods ($\gamma^* < \gamma_s^*$), the lower foreign price also reduces welfare. Since trade imbalances are assumed to be arbitrarily small, the terms of trade effects are close to zero. This leaves a positive welfare gain from relaxing finance constraints in the financially backward home country, resulting in higher world welfare, at least for small levels of protection.

Proposition 8 (*Protection and World Welfare*) *If firms are finance constrained in one country but not in the other, and if trade imbalances are small, world welfare may rise with a small degree of protection in the constrained country.*

The only distortion in this scenario are the finance constraints on investment of entrepreneurial firms at home while foreign firms have easy access to external funds thanks to

well developed institutions. Obviously, a policy which facilitates external financing in the home country must raise welfare if there are no countervailing welfare losses elsewhere. Trade protection in the absence of negative terms of trade effects is one such policy. Of course, there might be other policies such as institutional and financial market reform which are targeted more directly at the root of the problem. However, trade policy can have important consequences on pledgable income and the tightness of finance constraints. For this reason, as long as some financial frictions are present, trade policy can yield gains or losses that are entirely different from traditional channels for welfare effects.

5 Conclusions

This paper provides a two-sector, open-economy general equilibrium model where occupational choice of potential entrepreneurs, the allocation of financial assets across sectors, average productivity in the financially constrained sector, financial constraints of entrepreneurial firms, exit and entry (churning) of such firms, their production, and trade are determined endogenously as a function of the following factors: relative endowments of labor and capital across economies; the distribution of financial assets across potential entrepreneurs and natural workers within economies; the degree of development of financial institutions across countries which determine access to credit of entrepreneurs; and trade protection. Firms in a standard sector are financially unconstrained and use capital intensively. Companies in the entrepreneurial sector are heterogeneous with regard to productivity and their performance crucially depends on the managerial input of the founder. Entrepreneurs have little own assets and have to rely on external credit from (perfectly competitive) banks. Since managerial effort is not verifiable, entrepreneurs and banks cannot write contracts to avoid moral hazard. To prevent managerial misbehavior, entrepreneurs must keep a sufficiently large stake of the firm's profits which limits pledgable income and debt capacity. As a result, some marginal firms at the lower bound of the productivity distribution with positive net present value are denied external funding in equilibrium and, after entering the market in the first place, exit before engaging

in production. In the aggregate, the latter limits the rate of entry and leads to churning in the sense of a waste of capital in the entrepreneurial sector, and it inhibits a possible expansion of that sector.

Lower agency costs relax financial constraints by raising a firm's pledgable profit and debt capacity. A greater abundance of capital in an economy at a given equity ratio per firm reduces interest and, in turn, relaxes financial constraints so that more firms with low productivity may get credit. This reduces exit and lowers firm turnover (churning). Similarly, a greater equity ratio per firm at given capital supply in an economy (e.g., through a redistribution of capital towards potential entrepreneurs) has similar effects on finance constraints, exit, and churning, without affecting the interest margin. While the former leads to cheaper credit, the latter reduces credit demand per firm. In either case, a smaller pledgable profit suffices to repay the debt incurred to finance investment. Such fundamentals facilitate the financing of entrepreneurial firms with relatively low productivity but positive net present value and thereby support the expansion of the entrepreneurial sector. Fundamental parameters of corporate finance affect core theorems in international trade such as the Stolper-Samuelson theorem, the Rybczinsky theorem, and the law of comparative advantage through their impact on the extensive margin of production in the financially constrained, entrepreneurial sector. Not only economic activity as such but also factor price equalization depends on both *goods production technologies* and *financial intermediation technologies*. In this model, protection of the financially constrained entrepreneurial sector may raise a country's welfare if it is a net importer of this sector's output and pre-existing finance constraints can not be relaxed by other instruments. With many countries, protection of the most constrained net importer in that sector may even improve world welfare.

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