On the Role of Financial Frictions and the Saving Rate during Trade Liberalizations

Pol Antràs and Ricardo Caballero

Harvard & MIT

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The process of globalization involves the integration of goods and financial markets of heterogeneous economies:

- one central dimension of heterogeneity is financial development;
- increasingly important role both in the macro and trade literatures.


- differences in financial development can be determinants of comparative advantage.

Our question: In such an environment with financial frictions, how do goods and financial markets integration interact?

Approach: Dynamic $2 \times 2$ general-equilibrium model with cross-country variation in financial development and cross-sectoral variation in financial dependence.
Earlier work: in less financially developed economies, trade and capital mobility are *complements* (focused on implications for steady-state rental rate).

Here: we study how financial frictions and the saving rate shape the long-run effects of trade liberalization on income, consumption and the distribution of wealth in financially underdeveloped economies.

Key result: when financial frictions are important, the standard static gains from trade liberalization can be severely diluted over time in financially underdeveloped economies.

- endogenous tightening of credit constraints.

Steady state consumption and income may well be lower than those that would be attained without trade liberalization. More likely:

- the higher is financial development (provided that it is below the average one in the world)
- the higher is the saving rate (for economies with an open capital account).
One-Sector, Macro Models:

- Gertler and Rogoff (1990), Boyd and Smith (1997), Shleifer and Wolfenzon (2002), Reinhart and Rogoff (2004), Kraay et al. (2005), 

Financial Development as a Source of Comparative Advantage:


Trade Liberalization and Credit Constraints: Chesnokova (2009).

Second-best literature.
Plan of the Talk

1. A Small-Open Economy with Financial Frictions
2. Trade Liberalization with a Closed Capital Account
3. Trade Liberalization with an Open Capital Account
4. Discussion
Time evolves continuously. Infinitesimal agents are born at a rate $\phi$ per unit of time and die at the same rate; population mass is constant and equal to $L$.

All agents are endowed with one unit of labor services which they supply inelastically to the market.

Intertemporal preferences are such that agents save all their income and consume only when they die.

If $W_t$ denotes aggregate savings accumulated up to date $t$, then aggregate consumption at time $t$ is $\phi W_t$.

The economy produces two goods (1 and 2) and agents consuming at time $t$ allocate their spending between these two consumption in a way that maximizes

$$U = \left( \frac{C_1}{\eta} \right)^\eta \left( \frac{C_2}{1-\eta} \right)^{1-\eta}$$

(1)
Physical capital is the *only* store of value in the economy and is freely tradable within borders.

- initial stock of capital is equal to $K_0$, that there is no depreciation.

New physical capital can be produced by combining goods 1 and 2 according to the same utility aggregator in (1).

- the relative price of capital $q_t$ is equal to the ideal price index, $q_t = (p_1)^\eta (p_2)^{1-\eta} = 1$ (hence, $W_t = K_t$).

Production in both sectors combines physical capital and labor according to:

$$Y_i = Z (K_i)^\alpha (L_i)^{1-\alpha}, \quad i = 1, 2.$$  \hspace{1cm} (2)

Although technology is identical in both sectors, we think of production in sector 1 as being relatively more complex

- only a fraction $\mu$ of the population knows how to operate that production technology (entrepeneurs)
Factor Markets

- Goods and labor markets are perfectly competitive and factors of production are freely mobile across sectors.
- Key feature: the capital market has a friction and this friction has an asymmetric effect in the two sectors.
  - for simplicity, financial contracting in sector 2 is perfect (unlimited supply of capital at the equilibrium rental rate $\delta$);
  - when investing in sector 1, rentiers are willing to lend to entrepreneurs only an amount proportional to the wealth of entrepreneurs (sector 1 is more complex).
- Hence, capital invested by entrepreneur $i$ is
  \[ I^i \leq \theta K^i_t, \quad \text{for } \theta > 1. \] (3)
- If $\theta$ is sufficiently large, (3) does not bind and entrepreneurs are able to allocate a fraction $\eta$ of economy's capital to sector 1 (first-best).
- For financial constraints to bind we need:
  Assumption 1: $\mu \theta < \eta$. 

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Equilibrium

- Under A.1, financial constraint binds and allocation of capital to sector 1 is given by
  \[ K_{1,t} = \theta s_t K_t, \tag{4} \]
  where \( s_t \equiv K_t^e / K_t \) is the share of wealth (and thus of the physical capital stock) in the hands of entrepreneurs.

- As long as financial constraints bind in world markets, this economy faces a relative price \( \pi \equiv p_2 / p_1 < 1 \).

- In order to characterize the dynamic path of this economy, note that aggregate savings of each group (entrepreneurs \( e \) and rentiers \( r \)) evolve according to:
  \[
  \dot{K}_t^e = -\phi s_t K_t + \mu w_t L + s_t R_t K_t, \tag{5}
  \]
  \[
  \dot{K}_t^r = -\phi (1 - s_t) K_t + (1 - \mu) w_t L + \delta_t (1 - s_t) K_t. \tag{6}
  \]

- Notation: \( w_t \equiv \) wage rate; \( \delta_t \equiv \) rental rate; \( R_t \equiv \) entrepreneurial return.
Equilibrium Factor Prices

- Equilibrium factor prices can in turn be obtained by:
  1. equating the wage rate to the value of the marginal product of labor in each sector;
  2. imposing factor market clearing;
  3. equating the value of the marginal product of capital in sector 1 and 2 to \(\delta_t (\theta - 1) / \theta + R_t / \theta\) and \(\delta_t\), respectively.

- Defining
  \[
  \rho (s_t, \pi) \equiv (1 - \theta s_t) \pi^{1/\alpha} + \theta s_t < 1
  \]
  we obtain yield:
  \[
  \begin{align*}
  w_t &= \frac{(1 - \alpha) Z}{\pi^{1-\eta}} \left( \rho (s_t, \pi) \frac{K_t}{L} \right)^{\alpha} \\
  \delta_t &= \alpha Z \pi^{1/\alpha+\eta-1} \left( \rho (s_t, \pi) \frac{K_t}{L} \right)^{\alpha-1} \\
  R_t &= \left( 1 + \theta \left( \pi^{-1/\alpha} - 1 \right) \right) \delta_t.
  \end{align*}
  \]

- Note: \(w_t\) and \(\delta_t\) increase in \(\pi\), \(R_t\) decreases in \(\pi\).
Dynamics and Steady State

- We can now express the dynamic path of $K_t$ and $s_t$ in terms of these two state variables and exogenous parameters:

$$\dot{K}_t = \frac{Z}{\pi^{1-\eta}} (\rho (s_t, \pi) K_t)^\alpha L^{1-\alpha} - \phi K_t$$

$$\dot{s}_t = \frac{\alpha (1 - s_t) (1 - \pi^{1/\alpha}) \theta s_t - (s_t - \mu) (1 - \alpha) \rho (s_t, \pi)}{\pi^{1-\eta}}$$

$$\times Z \left( \rho (s_t, \pi) \frac{K_t}{L} \right)^{\alpha-1}.$$

- System is stable and converges to a unique steady state with associated factor prices:

$$w^* = (1 - \alpha) \phi \left( \frac{Z}{\phi} \frac{(\rho (s^*, \pi))^\alpha}{\pi^{1-\eta}} \right)^{1/(1-\alpha)}$$

$$\delta^* = \alpha \phi \frac{\pi^{1/\alpha}}{\rho (s^*, \pi)}.$$
Suppose now that economy experiences an unexpected trade liberalization at $T > 0$.

We think of this economy as being relatively financially underdeveloped:

- trade will tend to increase the relative price of the economy’s export sector, which is the less financially dependent sector 2. So $\pi$ goes up.
Effect on Rental Rate

- In the dynamic version of AC, we emphasized the fact that trade liberalization increases the steady-state value of the rental rate of capital $\delta^*$. 
- This is the result of two forces:

1. **Impact Effect:** $\delta^*$ increases with $\pi$ holding constant $s^*$. Trade integration allows South to further specialize in its comparative advantage sector, which is the sector without financial frictions (rentier capital works with more labor).

2. **Dynamic Effect:** Trade reduces the entrepreneurial return and hence $s_t$ gradually falls through time and settles at a steady state level that is decreasing in $\pi$.
   - Because $\delta_t$ is decreasing in $s_t$ this leads to further increases in the rental rate along the transition path.
More on the Dynamic Effect

- Remember that this economy is inefficient because it is unable to allocate enough resources to the complex sector 1.
- By reducing the share of capital in the hands of entrepreneurs, trade liberalization aggravates this problem and may qualify the standard arguments in favor of trade liberalization.
- The increased misallocation of capital across sectors leads to a gradual decline in the wage rate ($w_t$ is increasing in $s_t$).
  - Incidentally, this is why $\delta_t$ goes up along the transition
    \[ p_2 = \zeta (\delta_t)^{\alpha} (w_t)^{1-\alpha}. \]
- This does not mean that steady-state wages are necessarily lower, since the impact effect is positive.
Our First Key Result

- The gradual tightening of credit conditions also gradually reduces the growth of consumption and income along the transitional path.

- **Proposition 1:** *Consider an economy with a level of financial development below the average world level (θ < θ^W). Then, there is a unique threshold \( \tilde{\theta} \) such that if \( \theta > \tilde{\theta} \), a trade liberalization reduces steady-state wages, consumption and output, while the converse is true for \( \theta < \tilde{\theta} \).*

- **Intuition:**
  - static gains from trade are relatively lower for economies with \( \theta \) closer to \( \theta^W \);
  - tightening of financial constraints is more pronounced in economies that had less binding financial constraints to begin with.
A. Trade Liberalization for $\theta = 1.1$

- Path of C, trade liberalisation at $t=10$
- Path of Y, trade liberalisation at $t=10$
- Path of K growth, trade liberalisation at $t=10$

B. Trade Liberalization for $\theta = 1.4$

- Path of C, trade liberalisation at $t=10$
- Path of Y, trade liberalisation at $t=10$
- Path of K growth, trade liberalisation at $t=10$
So far small open economy is linked to the world economy only through the goods market.

Consider now the case in which the country undergoes a trade liberalization while having an open capital account.

Dynamics of the domestically owned capital stock $K_t$ and the share $s_t$ of this capital are analogous to those above, but the determination of factor prices is now quite different.

The real rental rate will be pinned down by world markets (net capital inflows or outflows).

- For simplicity, we assume that the world rental rate is time-invariant.

Now the capital-labor ratio in sector 2 is pinned down by the world rental rate and time-invariant parameters $\Rightarrow$ wage rate is also independent of local conditions (and time invariant):

$$w_t = \frac{1 - \alpha}{\alpha} \left( \frac{\alpha Z \pi^\eta}{\delta W} \right)^{1/(1-\alpha)} \delta W.$$
A process of trade liberalization raises the wage rate, reduces the return to entrepreneurial capital, and leaves the rental rate of capital unchanged.

Factor prices jump to their new level on impact and remain at that level thereafter.

Furthermore, an increase in $\pi$ always increases aggregate income on impact (provided $\pi < \pi^W$).

But the fact that factor prices remain constant after the trade liberalization episode does not imply that the economy does not feature interesting dynamics after the shock.

Impact changes on factor prices affect aggregate income, the incentives of the economy to invest as well as the wealth accumulation paths of entrepreneurs and rentiers.

- dynamics of $K_t$ and $s_t$ still very much affected, and credit constraints again become tighter ($s^*$ falls).
Our Second Key Result

- **Proposition 2:** Consider an economy with an autarky relative price $\pi$ below the world relative price. Then, there exist thresholds $\tilde{\theta}$ and $\tilde{\phi}$ such that if $\theta > \tilde{\theta}$ or $\phi < \tilde{\phi}$, a trade liberalization reduces steady-state wages, consumption and output.

- So trade liberalization is more likely to reduce steady-state consumption and output, the higher is the level of financial development $\theta$ and the propensity to save $1 - \phi$.

- New Result: Economies with high saving rates (low levels of $\phi$) tend to accumulate higher levels of entrepreneurial capital income relative to labor income, and thus the negative effect of trade on the share $s^*$ is particularly harmful for those economies.

- Why does the saving rate matter with an open capital account but not with a closed capital account?
  - Distribution of wealth will be much more responsive to the savings rate in economies where factor prices are pinned down by int’l markets.

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A. Trade Liberalization for $\phi = 0.1$

B. Trade Liberalization for $\phi = 0.075$
Some limitations of the analysis:

1. Some results may be sensitive to the way we have modeled financial constraints.
   - in our model trade opening tightens credit constraints by reducing wealth inequality, but alternative frameworks might predict a negative link between wealth inequality and financial frictions (see Banerjee and Duflo, 2003).

2. Our result regarding the role of the saving rate is derived from a particularly stylized modelling of intertemporal substitution in consumption, and also seems to be particularly tied to the propensity to save of entrepreneurs.
   - lack of intertemporal substitution complicates welfare analysis.

Future research should shed light on the robustness of our results in richer and more realistic frameworks.