Informal Sector: The Credit Market Channel

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Motivation

▶ Informality is a pervasive phenomenon around the world. Represent a major challenge for economic and social policies in developing countries.
▶ Being formal entails a cost (e.g. Entry costs) but has some benefits also (e.g. access to the credit market).
▶ There are some substitutes for the benefits of being formal (e.g. informal credit lenders).
▶ The paper builds on a dual credit market structure, in which the ex-post income is verifiable for formal lenders but not for informal ones. There will be some entry costs to formality. And it will be extended to see the effect of better law systems, the volatility of the economic environment and labor rigidities.
Negative correlation between informality and ≠ aspects of quality of institutions. (Johnson et al (1998) and Friedman et al (2000)).

Positive relation between entry costs and informality (Djankov et al (2002)).
Environment

» Follow the continuous investment model (Holmstrom and Tirole, 1997).

» Individuals have initial assets $A$. Initial distribution of assets is $F(A)$ in $[0, \bar{A}]$.

» Investment is $I$ so the agent should borrow $I - A$. The project yield $RI$ in case of success and 0 in case of failure.

» The probability of success ($p_H$) depends on the firm’s effort which is not observable by the lender.

» If the firm does not work it gets $BI$ (effort save).

» Credit contract implies a sharing rule $RI = R_b + R_l$.

» Assumptions $p_H R > 1$ and $p_L R + B < 1$. 
Incentive compatibilities

- For the Borrower

\[ p_H R_b \geq p_L R_b + BI \iff R_b \geq \frac{BI}{\Delta p} \]

- Break-even Constraint for the lender

\[ p_H R_l \geq I - A \]

- Assuming that the credit market is competitive, so (2) is binding we obtain that \( I \leq kA \) where \( k \) is a constant that depends on \( p_H, B, \Delta p, \) and \( R \).

- The Utility of a borrower is \( U_b(A) = (p_H R - 1)I = (p_H R - 1)kA \) so she invest as much as possible.
**Sector Choice**

- If the firm operates **formally** the amount to invest is
  \[ I^F = k(A - C) \]
  where \( C \) is the entry cost and the utility it gets is
  \[ U^F_b(A) = (p_H R - 1) k(A - C) \]
  In this case the firm has access to the formal credit market. Formal lender can verify outcome ex-post.

- If it stays **informal** it saves the entry cost \( C \) but has to rely in informal lenders.

- Informal lender can not verify outcome but it can impose a loss \( K \) on the borrower in case of non repayment. The lender only recovers a fraction \( \gamma K \). \( \gamma \) is the enforcement technology.
In this case we have 2 incentive compatibility constraints:

Truth Revelation

\[
p_H R_b - (1 - p_H)K \geq p_L R_b - (1 - p_L)K + BL \iff R_b \geq \frac{Bl}{\Delta p} - K
\]

and

\[
p_H R_b - (1 - p_H)K \geq p_H R_l - K \iff R_b \geq R_l - K
\]

Only this last constraint will be binding and \( R_b = R_l - K \).

Participation constraint for the lender:

\[
p_H R_l + (1 - p_H)\gamma K \geq I - A \Rightarrow p_H K + (1 - p_H)\gamma K \geq I - A.
\]

Assuming competition in the informal credit market we get the feasible level of investment: \( I^I = A + \phi K \) where

\[
\phi = p_H + (1 - p_h)\gamma
\]

Utility of the borrower \( U^I_b = p_H R_b - (1 - p_H)K - A \) and substituting we get

\[
U^I_b(A) = (p_H R - 1)A + (p_H R\phi - 1)K.
\]

Depending on \( \gamma \) the second term of the last equation might be positive or negative. If it is negative the firm is better off not borrowing.
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Figure 1: Formality-informality trade-off

\[ I = A + \phi K \]

\[ I^I_{\text{max}} \]

\[ I^F_{\text{min}} \]

\[ (p^R_0R_0-1)K \]

\[ U^F_b \]

\[ U^I_b \]

\[ A^* \]

\[ A \]

\[ C \]
Prevalence of informality depends on the relative efficiency of credit markets.

A more efficient formal credit market (i.e., a higher \(k\)) favors formality.

A more efficient technology in the informal lending market (higher enforcement technology \(K\), and lowers transaction costs \(\gamma\)) favors informality.

The interest rate differential is given by \(\frac{1}{\phi} - 1 > 0\) which is decreasing in \(\gamma\).
Imperfect Enforcement and Taxes in the Formal Sector

- We introduce this by modifying the break-even constraint of the lender which now is:
  \[ \theta p_H R_l \geq I - A \]
  where \( \theta \in [0, 1] \) is an index of the quality of institutions and of the enforcement of these rules. As \( \theta \) decreases, lenders know that it will be harder to recover their loans. Now \( k \) will also depend of \( \theta \) and \( \frac{\partial k}{\partial \theta} > 0 \)

- The previous implies that better institutions make the formal credit more efficient and so more attractive. Now for lower A's firms will decide to become formal.

- Firms are willing to avoid paying taxes to reduce cost and also because they can free-ride the use of some public goods.

- The authors introduce the taxes as a tax on benefits that affects \( k \) and \( \theta \). In the way they introduce taxes the effect on the efficiency of the credit markets is ambiguous.
Stability of the Environment

- The variance of output is \((1 - p_H)p_H R^2\).
- A shift toward a more stable economic environment, in which the risk of failure is lower makes it more valuable to sink the cost \(C\) in order to become formal. It favors more formal than informal activities.

**Proposition 1:** The minimum level of initial assets \(A^*\) above which the firm finds it profitable to sink the entry cost and become formal is:

- Increasing in \(C\)
- Decreasing in the interest rate differential.
- Decreasing in the quality of legal enforcement of creditors’ rights
- Decreasing in the stability of the environment
- Ambiguously related to the level of taxation.
Introducing a production function

- Consider that the output $\tilde{R}(I)$ is such that:
  
  $\tilde{R}(I) = F[I, L(I)] - wL(I)$

- They show that this framework with a Cobb-Douglas CRS production function is fully compatible with the previous framework.

- **Labor Market Rigidities** They introduce a minimum wage and find that a binding wage constraint in the formal sector has 2 effects. It shifts the allocation of labor from formal to informal sector, and so we end up with more informal employees with lower wages. The cutoff level $A^*$ above which formality dominates goes up reinforcing the first effect.
Figure 2: Effect of Wage Rigidities
Degrees of Formality

The authors introduce the idea of different degrees of formality. Full informality (same as before). Partial formality where the firm has access to the formal credit market and the minimum wage is enforced and pay an intermediary entry cost $C_{PF}$. Complete Formality with access to credit market and to a public good $G$ that enters in the production function and pay a high entry cost of $C_{CF}$.
Data

- They use the World Business Environment Survey which covers 10,000 firms in 80 countries and was done in 1999-2000.
- Complete the firm-level data with indicators from Djankov (2002) for entry cost.
- From Beck et al (2000) get a measure of credit to GDP.
- Index of rule of law is from Kaufmann et al (1999).
- Volatility of the environment they use the GDP growth rate for the 90’s from the Global Development Finance and World development indicators.
The model they use is an ordered probit of the form:

\[ y_{in}^* = x_{in} \beta_1 + C_n \beta_2 + \delta F_n + e_{in} \]

where \( y_{in}^* \) is the level of undeclared sales, \( x_{in} \) is a vector of individual characteristics of the firms, \( C_n \) is a vector of fixed country characteristics, \( F_n \) is the country level characteristics capturing the degree of development of the credit market.
Results

- Informality prevails more amongst smaller firms.
- Private and local ownership both increase informality.
- Incidence of informality seems to be lower in agriculture and construction than in manufacture and service.
- Financial variables have the expected sign and are significant. More developed credit markets reduce the prevalence of informality, as do more efficient financial intermediaries.
- The entry costs effect is also convincing with positive coefficients.
- More developed credit market reduces informality, and the better the rule of law, the stronger the effect (table 2).
- Finally, more volatile environment pushes firms toward informality (table 2).
## Results

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<th>Dependent Variable: Ordinal Variable (1 to 8) Indicating the Percentage of Sales Declared to Tax Authorities.</th>
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<td>Overhead costs (IV)</td>
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<td>Growth volatility</td>
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Conclusions

- Built a model of how registering formally and the associated availability of public goods facilitate the access to the formal credit market.

- Introduce in the model different variables as Entry Cost, Taxes, Volatility of the economic environment and study how this affect the sectorial choice of firms.

- In the empirical results they find that the effects of most of the variables were significant and with the expected sign.