# Trust and the Size of Firms
## Evidence from countries and regions

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# Introduction

- Extensive evidence about the (positive) effect of trust on the aggregate level of economic activity
  - e.g. Knack & Keefer 1997, 2001; Tabellini 2010; Algan and Cahuc 2010
- Several channels have been proposed, highlighting the role of trust in institutions conducive to economic development
  - Financial markets (Guiso et al. 2004)
  - Entry and Labor market regulations (Aghion et al. 2010; Algan and Cahuc 2009; Aghion et al. 2010)
- We empirically study the direct effect of trust on the structure of production, focusing on firm size.

# Introduction

- Idea that interpersonal trust is key to the development of large organizations is not new (Putnam 1993; Fukuyama 1995; La Porta et al. 1997; Bloom et al. 2010)

- Large economic organizations require the principal (owner or entrepreneur) to decentralize decisions and tasks to agents (managers or employees)
  - to benefit from gains in specialization, division of production, etc
  - to benefit from managers' informational advantage (e.g. in high-skilled activities)

- Threat is non-cooperation (e.g. shirking or expropriation of ideas)
  - the principal might not be able to foresee or specify all the possible contingencies in which agents deviate from their obligations

# Introduction

- In this context close personal relationships, such as family ties, may solve the principal-agent problem
  - Reputation and the threat of future punishment may encourage cooperation
  - However, this necessarily limits the growth of firms
- Trust is an alternative way to solve the problem and does not limit the size of the organization
  - Higher interpersonal trust → lower probability of expropriation
  - Owner is more prone to decentralization of decisions and tasks

# Existing evidence and estimation issues

- Cross-country correlation between trust and firm size is positive (e.g. La Porta et al. 1997; Kumar et al. 1999), but
  - Other factors such as institutions play a role and might be difficult to fully account for
  - Reverse causality (i.e. economic conditions affecting aggregate cultural traits as trust) is an issue (see Giuliano and Spilimbergo, 2009)

- One possibility is to exploit industry data to account for time-invariant characteristics (such as institutions, or economic conditions) in a diff-in-diff framework

# This paper

- We test the "trust → size" relationship looking at the differential impact of trust on the size of firms characterized by a high need for the decentralization of decisions and tasks (cooperative behaviour)

- We construct two empirical (survey-based) measures of decentralization of decision-making across industries
  - Based on the number of "decision centres" reported by Italian firms (Bank of Italy Survey of Industrial and Service Firms)
  - Based on the degree of delegation in the workplace as reported by the European Social Survey (ESS)
- We address measurement and other endogeneity issues with 2SLS

# Framework and data/measures

$$\log(Size_{j,a}) = \alpha + \beta\left(Trust_a * Dec_j\right) + \phi\, X_{j,a} + \mu_a + \mu_j + \varepsilon_{j,a}$$

- Variables:
  - $Size_{ja}$: Average size of firms in industry $j$ and area (region or country) $a$;
  - $Trust_a$: Average trust in area $a$
  - $Dec_j$: Relevance of decentralization computed in industry $j$
  - $\mu_a$ and $\mu_j$ : area (region or country) and industry fixed-effects

- We test whether firms in "decentralization-intensive" industries are disproportionately larger in high-trust regions ($\beta>0$)

# Framework and data/measures

- $Dec_j$ is an industry dummy estimated in two steps
  - First, regress a disaggregated (e.g. firm-level) measure of decentralization on an industry dummy $\gamma_j$, an area dummy $\gamma_a$ and an interaction term capturing potential industry-specific effects of trust on decentralization ($\delta_j * Trust_a$).

$$dec_{f,j,r} = \gamma_j + \gamma_r + \delta_j Trust_r + \varepsilon_{j,r}$$

  - Second, the estimate is the fitted values of $del_{i,j,r}$ when $\gamma_a=0$ and $Trust_a$ is set at the maximum observed value

$$Dec_j = \hat{\gamma}_j + \hat{\delta}_j \overline{Trust}_r$$

- We obtain two alternative measures of $Dec_j$
  - Based on the number of "decision centres" in a sample of Italian firms (i.e. individuals or groups who are empowered with decision-making)
  - Based on the degree of delegation in the workplace (how much the management at your work allows you to influence policy decisions about the activities of the organization, ESS)

# Results: region-industry data, OLS

$$\log(Size_{j,a}) = \alpha + \beta\left(Trust_a * Dec_j\right) + \phi\, X_{j,a} + \mu_a + \mu_j + \varepsilon_{j,a}$$

| | (1) | (2) | (3) |
|---|---|---|---|
| *Trust X Dec* | 6.138*** | 3.650** | 4.571*** |
| | (2.266) | (1.526) | (1.398) |
| *Obs* | 285 | 285 | 285 |
| *Region FE* | YES | YES | YES |
| *Industry FE* | YES | YES | YES |
| *AdjR²* | 0.711 | 0.713 | 0.824 |

- $\beta>0 \longrightarrow$ "decentralization-intensive" industries are disproportionately larger in high trust regions
- Implied effects are similar in cols. 1 and 2 (where $\delta_j = 0$)
  - consider firm-size differential between industry at the 75th and the 25th percentile of decentralization intensity ("Machinery" and "Leather")
  - Coeffs. imply that moving from a low-trust region (Abruzzo, 25th) to a high-trust region (Tuscany, 75th), the differential would rise by approximately 17%

# Robustness to alternative explanations

- "Institutional" literature
  - Entry barriers (Fisman and Sarria Allende, 2004)
  - Employment protection (Schivardi and Torrini, 2008; Bassanini et al. 2009)
  - Property rights (Claessens Laeven, 2003)
    - ➢ Accounted for by use of regional data

- "Specialization/Comparative advantages" literature
  - Financial Development (Rajan Zingales, 1998 & followers)
  - Human Capital (Ciccone and Papaioannou, 2009)
  - Quality of justice and contract intensity (Nunn, 2007)
    - ➢ Accounted for by use of appropriate interactions. Motivated by correlation with Trust and Decentralization.

# Robustness to alternative explanations

| | (4) | (5) | (6) | ---------- | ---------- |
|---|---|---|---|---|---|
| *Trust X Dec* | 5.724** | 5.278** | 6.382*** | | |
| | (2.363) | (2.193) | (2.069) | | |
| *FD X ED* | 0.853 | | | | |
| | (1.156) | | | | |
| *School X HC* | | 1.923*** | | | |
| | | (0.544) | | | |
| *JQ X ConInt* | | | 0.354 | | |
| | | | (0.975) | | |
| *Obs* | 285 | 285 | 285 | | |
| *Reg + Ind FE* | YES | YES | YES | | |
| *Adj$R^2$* | 0.711 | 0.735 | 0.710 | | |

- Robustness:
  - (4) Financial Development
  - (5) Human Capital
  - (6) Quality of justice

# Robustness to alternative mechanisms

- "Firm-size" related mechanisms
  - "a more sophisticated legal system is needed to enforce property rights to intangible assets such as ideas or client relationships. This suggests […] the relative size of firms in industries with intangible assets should increase when the efficiency of the judicial system improves", Rajan and Zingales (2001)
  - Trust affects inter-firm linkages, rather than the internal organization: low trust yields integration of upstream/downstream production activities

# Robustness to alternative mechanisms

| | (4) | (5) | (6) | (7) |
|---|---|---|---|---|
| *Trust X Dec* | 5.724** | 5.278** | 6.382*** | 6.262*** |
| | (2.363) | (2.193) | (2.069) | (2.289) |
| *FD X ED* | 0.853 | | | |
| | (1.156) | | | |
| *School X HC* | | 1.923*** | | |
| | | (0.544) | | |
| *JQ X ConInt* | | | 0.354 | |
| | | | (0.975) | |
| *JQ X IntAssets* | | | | 0.054 |
| | | | | (0.111) |
| *Obs* | 285 | 285 | 285 | 285 |
| *Reg + Ind FE* | YES | YES | YES | YES |
| *AdjR*$^2$ | 0.711 | 0.735 | 0.710 | 0.710 |

- Intangible assets and justice quality
  - Add "Quality of justice X intangible assets" interaction in col. 7, as suggested by Rajan and Zingales, 2001

# Robustness to alternative mechanisms

| | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|
| *Trust X Dec* | 5.724** | 5.278** | 6.382*** | 6.262*** | 5.908*** |
| | (2.363) | (2.193) | (2.069) | (2.289) | (1.992) |
| *FD X ED* | 0.853 | | | | |
| | (1.156) | | | | |
| *School X HC* | | 1.923*** | | | |
| | | (0.544) | | | |
| *JQ X ConInt* | | | 0.354 | | |
| | | | (0.975) | | |
| *JQ X IntAssets* | | | | -0.054 | |
| | | | | (0.111) | |
| *Trust X ConInt* | | | | | -0.899 |
| | | | | | (2.739) |
| *Obs* | 285 | 285 | 285 | 285 | 285 |
| *Reg + Ind FE* | YES | YES | YES | YES | YES |
| *AdjR*$^2$ | 0.711 | 0.735 | 0.710 | 0.710 | 0.710 |

- Integration
  - Add "Quality of justice X Contract intensity" interaction in col. 8
  - Idea: lower trust should be more relevant in industries that rely intensively on relationship-specific inputs (those not traded on an organized exchange)

# Measurement and endogeneity issues

- Measurement error in the decentralization measure
  - The response rate for the Bank of Italy Survey of Industrial and Service Firms is around 50%
  - Indicators absorb idiosyncratic shocks that are specific to Italy
    - ➢ Use alternative (ESS) measure of decentralization as instrument
- Endogeneity of trust
  - Regional trust evolves endogenously to accommodate comparative advantages
  - Ex: Historically-high human capital regions specialize in HC intensive industries (as shown, those more in need for decentralization), and this prompts the accumulation of moral values required to sustain production in such sectors
    - ➢ Use past (1650-1850) regional political institutions and 1880 literacy as instrument for trust today (as in Tabellini, 2010)

# Results: region-industry data, 2SLS

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Trust* X *Dec* | 11.671** | 15.757* | 10.741** | 14.803** |
| | (5.897) | (8.520) | (5.344) | (7.415) |
| Controls | NO | NO | YES | YES |
| Reg + Ind FE | YES | YES | YES | YES |
| Observations | 285 | 285 | 285 | 285 |
| AdjR2 | 0.702 | 0.684 | 0.724 | 0.710 |
| | *first stage* | | | |
| *Trust* X *Dêc* | 0.078*** | | 0.080*** | |
| | (0.014) | | (0.012) | |
| *Trûst* X *Dêc* | | 0.078*** | | 0.080*** |
| | | (0.015) | | (0.014) |
| First stage F (excl. Instr.) | 32.797 | 27.193 | 44.412 | 33.5388 |

- Cols 1&3, only $Dec_j$ is instrumented; Cols 2&4 both vars. are
- Estimates almost double: higher trust implies a relative increase in firm size in high decentralization industries of nearly 35%

# Results: region-industry data, 2SLS

| | (1) OLS | (2) 2SLS | (3) OLS | (4) 2SLS |
|---|---|---|---|---|
| | Empl Share in 20- firms | | Empl Share in 20-50 firms | |
| *Trust* X *Dec* | -3.272*** | -5.138* | 3.256*** | 8.054* |
| | (1.006) | (2.745) | (1.166) | (4.779) |
| Reg + Ind FE | YES | YES | YES | YES |
| Observations | 285 | 285 | 285 | 285 |
| AdjR2 | 0.990 | 0.990 | 0.970 | 0.968 |

- Some evidence that the action goes through shifts in employment between "smaller" size classes
  - from firms in 1-19 to firms in the 20-49 employment classes (holding total employment in the region-industry constant)

# Results: country-industry data, 2SLS

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Base | PropRights Regulation | FD, HC Justice | RZ (2001) | Integration of inputs |
| *Trust X Dec* | 8.736** | 8.182*** | 9.418** | 10.326** | 8.824** |
| | (3.551) | (2.293) | (4.066) | (4.317) | (3.743) |
| Observations | 195 | 195 | 195 | 195 | 195 |
| Cou + Ind FEs | YES | YES | YES | YES | YES |
| AdjR2 | 0.822 | 0.854 | 0.821 | 0.819 | 0.821 |
| | | | *First stage* | | |
| trust X decentralization* | 0.082*** | 0.101*** | 0.074*** | 0.069*** | 0.080*** |
| | (0.024) | (0.027) | (0.019) | (0.019) | (0.024) |
| First stage F (excl. instr.) | 11.2102 | 14.338 | 14.907 | 13.1659 | 10.9301 |

- Col. 2 adds controls for EPL, Entry barriers, and Property rights protection. Col. 3 adds Financial Development, Schooling and Judicial quality. Cols 4-5 account for the two alternative mechanisms outlined above
- Implied effect: very similar to those from 2SLS estimates on regional data

# Conclusions

- We empirically study the effect of trust on the structure of production, focusing on firm size. We exploited the idea that trust favours firms' expansion by easing the decentralization of decisions and tasks (from principal/owner to agents/managers)
- We find that firms in decentralization-intensive industries tend to be disproportionately larger in high-trust regions (and countries)
- We used firm- and individual-level data to construct measures of decentralization intensity
- We attempted to accoutn empirically for many sources of bias: omitted variables, measurement error and the endogeneity of trust

# Correlations