# Short-term Finance, Long-term Growth: Evidence from a Loan Guarantee Program in Morocco

*Preliminary*

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## Motivation

Finance is important for firm growth, especially in emerging countries:

- ▶ scarcity of long-term external finance and firm growth: i.e., Cooley and Quadrini (2001), Albuquerque and Hopenhayn (2004), Clementi and Hopenhayn (2006), Arellano, Bai, and Zhang (2012), Moll (2014), Midrigan and Xu (2014), and more.

However, the role of short-term external finance on firm growth is less studied:

- ▶ Impact on firm growth?
- ▶ Mechanisms?
- ▶ Policies?

## What do we do?

(1) We use a loan guarantee program (LGP) in Morocco to document the effect of short-term finance:

Fact 1  firms with guaranteed short-term loans decrease their cash ratio,

Fact 2  they expand their production scale persistently,

Fact 3  participation in the guarantee program is humped-shaped in firm size.

(2) We rationalize these findings in a heterogeneous-firm model:

- ▸ Short-term finance fulfills a firm's need for liquidity (i.e., working capital)and unproductive cash is reallocated to productive assets.
- ▸ It affects the firm's long-term scale in the presence of intertemporal distortions.
- ▸ Productive and medium-sized firms self-select into the program because of a flat entry cost.

(3) We provide a counterfactual analysis:

- ▸ increment in guaranteed ratio and lower entry cost

## The aggregate and distributional effect of LGPs

Aggregate gains: The aggregate gains from LGPs are elusive, both empirically and theoretically.

- ▸ We show that intertemporal distortions are key to generate a strong impact of the LGP both at the individual and aggregate level: self-financing cannot "undo" financial constraints
- ▸ In Morocco, intertemporal distortions are large
- → The individual gains of entering a LGP are large.
- → The aggregate gains of enlarging LGPs are substantial.
- ▸ Financial constraints interact with other frictions in the economy

Distributional effects:

- ▸ increment in guaranteed ratio and lower entry cost both increase participation of small firms.

[Empirical Analysis]

## Data

**Two databases:**

1. Tamwilcom Guarantee Database: `Background`
   - ▸ Unit of observation: firm-year
   - ▸ 2012-2018
   - ▸ A database of 23,017 guarantees, mobilizing an amount of 22 billion dirham loans (about 2.2 billion Euros) extended to credit-constrained firms

2. Orbis Database:
   - ▸ A commercial database by Bureau van Dijk (BvD)
   - ▸ Firm-level balance sheet data collected from Office of Industrial and Commercial Property (OMPIC)
   - ▸ About 1.58 million firms, representing the business world of Morocco

**Merge the two databases**: identify guaranteed firms in Orbis data `Details`

## Identification Strategy

- ▶ Endogeneity issue: Selection Bias

- ▶ Step 1: Multivariate Distance Matching
  - ▶ Find statistical twins for a guaranteed firm based on selected time-varying and observable variables that are relevant to selection into the program and outcomes. Details
- ▶ Step 2: Difference-in-Difference
  - ▶ Address firm-level unobservable fixed effects. Trend Inspection

- ▶ Goal: following the two steps, differences in outcome variables between treated and control firms can be effectively attributed to the guarantees.

## Regression Specification

We apply the following regression to the matched sample.

$$\Delta Y_{igt} = \delta D_{it} + \lambda_{gt} + \epsilon_{igt}$$

- $i$ indexes firms, $g$ indexes groups of one guaranteed firm with its matched controls
- $\Delta Y_{igt}$: change in outcome variable compared to the year prior to obtaining guarantee; $\Delta Y_{igt} = Y_{igs} - Y_{igt-1}$, where $s = t+1, t+2, t+3$
- $D_{it}$: a dummy variable indicating if firm $i$ is guaranteed in year $t$
- $\lambda_{gt}$: group and year fixed effects
- $\epsilon_{igt}$: error term

# Estimation Results I

## Fact 1: Firm size increases persistently.

Table: Effect of Tamwilcom Guarantee on Firm's Sales and Total Assets

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Sales Growth | | | Total assets Growth | | |
| | t+1 | t+2 | t+3 | t+1 | t+2 | t+3 |
| Guaranteed | $0.140^{***}$ | 0.053 | $0.128^{*}$ | $0.088^{***}$ | $0.079^{+}$ | $0.149^{**}$ |
| | (0.024) | (0.038) | (0.055) | (0.023) | (0.044) | (0.050) |
| $N$ | 18836 | 10770 | 5670 | 19150 | 11133 | 6015 |
| adj. $R^2$ | 0.209 | 0.197 | 0.264 | 0.191 | 0.215 | 0.214 |
| Group × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| City × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

5in Note:

Standard errors are clustered at group-year level. Significance level: $+$ $p < 0.10$, $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$.

Other outcome variables: Costs of Employees   Fixed Assets

# Estimation Results II

**Fact 2: Firms do not increase their cash holdings and increase their current liabilities.**

Table: Effect of Tamwilcom Guarantee on Firm's Current Liabilities

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Current Liabilities Growth | | | Cash Growth | | |
| | t+1 | t+2 | t+3 | t+1 | t+2 | t+3 |
| Guaranteed | 0.138*** | 0.119** | 0.194*** | -0.061 | -0.210+ | 0.089 |
| | (0.027) | (0.039) | (0.049) | (0.091) | (0.121) | (0.152) |
| $N$ | 19448 | 11262 | 6012 | 18766 | 10690 | 5816 |
| adj. $R^2$ | 0.204 | 0.203 | 0.163 | 0.322 | 0.303 | 0.289 |
| Group × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| City × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

5in Note:

Standard errors are clustered at group-year level. Significance level: $+\ p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

By size and age

# Participation

**Fact 3: Participation in the guarantee program is humped-shaped in firm size.**

Figure: Participation Rate by Size
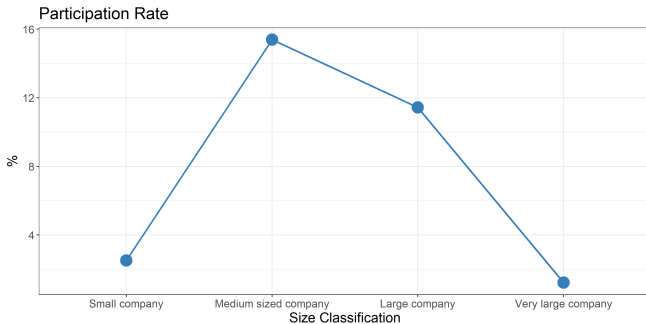
[Our Mechanism in a Simple Model]

## Simple Model: Setup I: Static Problem

A. Leontief Technology: $y_t = A[min(k_t, a^{-1}l_t)]^\alpha$, subject to

1. Budget constraint: $k_t + c_t = n_t$
2. Working capital constraint: $w_t l_t \le c_t + b_t$
3. Collateral constraint: $b_t \le \theta k_t$

B. Entrepreneur's Static Optimization I: Trade-off:

$$\max_{c_t, k_t} \underbrace{\psi(k_t) + (1-\delta)k_t + c_t}_{\pi_t} + \lambda_t \left(c_t + \theta k_t - ak_t\right) + \mu_t c_t + \gamma_t(n_t - k_t - c_t)$$

$$MBK_t = \underbrace{1}_{\text{Unit Return of Saving}} + \underbrace{(\psi'(k_t) - \delta)}_{\text{Real Return of Production}} + \underbrace{\lambda_t(\theta - a)}_{\text{Shadow Return of Finance}}$$

$$MBC_t = \underbrace{1}_{\text{Unit Return of Saving}} + \underbrace{0}_{\text{Real Return of Production}} + \underbrace{\lambda_t}_{\text{Shadow Return of Finance}}$$
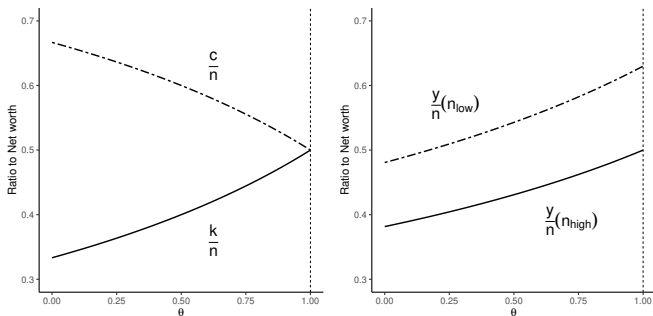
where $\psi_t = \psi(k_t) = (Ak_t^{\alpha-1} - ak_t)$ is production net of the wage bill.

# Simple Model: The Effects of Short-term Finance

C. The Effects on the Static Choices of Firms:

$$\frac{k_t}{n_t} = \frac{1}{1 + a - \theta} \quad \& \quad \frac{c_t}{n_t} = \frac{a - \theta}{1 + a - \theta}$$

Figure: RELATIONSHIP BETWEEN OPTIMAL CHOICES AND $\theta$



(a) Capital and Cash

(b) Production (or Sales)

# Simple Model: Setup II: Intertemporal Problem

A. Entrepreneur's Dynamic Optimization::

$$v(n_{t-1}) = \max_{k_t, c_t, d_t, n_t} \left\{ \frac{d_t^{1-\eta}}{1-\eta} + \beta \epsilon v(n_t) \right\}$$

subject to the constraints

$$(1-\tau)\pi_t - d_t - n_t \geq 0$$
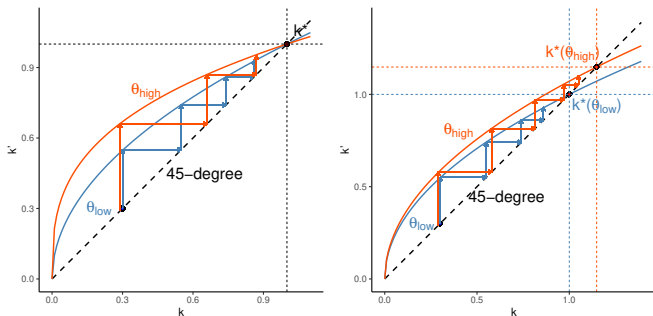
Euler equation with $\beta(1 + r_{t+1}) = 1$:

$$\left( \frac{d_{t+1}}{d_t} \right)^{\eta} = \epsilon(1-\tau) \left( 1 + \frac{\lambda_{t+1}}{\beta} \right)$$

# Simple Model: Growth Dynamics with Intertemporal Distortions

B. The Effects on the Dynamics of Firms' Long-run Growth with $\epsilon(1-\tau) < 1$:

$$\lambda^{LT} = \frac{1}{\beta}\left(\frac{1}{\epsilon(1-\tau)} - 1\right) \quad \& \quad \psi'(k^{LT}) - \psi'(k^{opt}) = (1 + a - \theta)\lambda^{LT}$$

Figure: DYNAMICS OF FIRMS' LONG-RUN GROWTH



(a) Without Intertemporal distortons     (b) With Intertemporal Distortions

## Simple Model: Takeaway

**Increase the supply of short-term finance** (i.e., loan guarantee program):

A. Effects on the Static Choices of Firm Production and Financing:

- ▶ increase the firm's optimal choice of capital
- ▶ decrease the firm's optimal choice of cash holdings
- ▶ increase the firm's optimal output (sales)

B. Effects on the Dynamics of Firms' Long-run Growth with Intertemporal Distortions ($\epsilon(1 - \tau) < 1$):

- ▶ increase the capital and production scale in the long-run

[Quantitative Model]

## Model Setup

- **Heterogeneous production firms:**
  - Firm decides on capital, labor, debt, cash and dividends
  - Firm faces exogenous exit risk & Concave utility
  - Idiosyncratic productivity shocks

- **Short-term finance:**
  - Working capital constraint (financed with short-term debt or cash)
  - Collateral constraint (borrow up to a proportion of capital value)
  - Loan guarantee program (fixed cost of entry, multiplier on CC)

- **General equilibrium**:
  - Aggregate capital good producer
  - Other households (supply labor and consume)

# Model Fit

| Moments | Data | Model |
|---|---|---|
| *Output Dynamics* | | |
| 1-year autocorrelation of output | 0.89 | 0.89 |
| 3-year autocorrelation of output | 0.69 | 0.71 |
| 5-year autocorrelation of output | 0.53 | 0.56 |
| Size ratio of entrant relative to average | 17% | 17% |
| Annual exit rate of firms | 9.0% | 9.0% |
| *Financial Frictions* | | |
| Mean cash/asset ratio (non-guaranteed) | 22% | 22% |
| Mean cash/asset ratio (guaranteed) | 9% | 7% |
| Mean debt/asset ratio (non-guaranteed) | 51% | 38% |
| Mean debt/asset ratio (guaranteed) | 64% | 62% |
| Guaranteed loan/current liability ratio | 22% | 22% |
| *Loan guarantee program* | | |
| Guaranteed loan commission fee | 0.5% | 0.5% |
| Percentage of loan guaranteed | 60% | 60% |
| Percentage of firms participating LGP | 3.4% | 3.8% |

# Model Fit - Long-term effect

Table: Calibration of $\tau$ using the long-term effect of guarantee program

|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
|  | Sales Growth (Data) | | | Sales Growth (Model) | | |
|  | t+1 | t+2 | t+3 | t+1 | t+2 | t+3 |
| Guaranteed | 0.140*** | 0.053 | 0.128* | 0.196*** | 0.177*** | 0.129*** |
|  | (0.024) | (0.038) | (0.055) | (0.005) | (0.008) | (0.009) |
| $N$ | 18836 | 10770 | 5641 | 480000 | 470000 | 460000 |
| Adjusted $R^2$ | 0.209 | 0.197 | 0.263 | 0.551 | 0.488 | 0.461 |
| Matched Group | Yes | Yes | Yes | No | No | No |
| Group × Year FE | Yes | Yes | Yes | No | No | No |
| Firm Controls | No | No | No | Yes | Yes | Yes |
| Firm FE & Year FE | No | No | No | Yes | Yes | Yes |

# Optimal Decisions
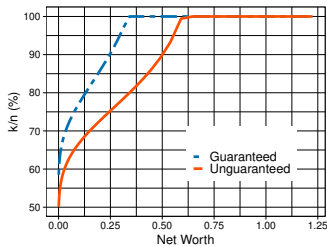
(a) Capital Policy
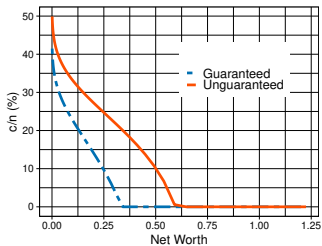
(b) Cash Policy

Distribution of firms

# Participation



Figure: PARTICIPATION RATE
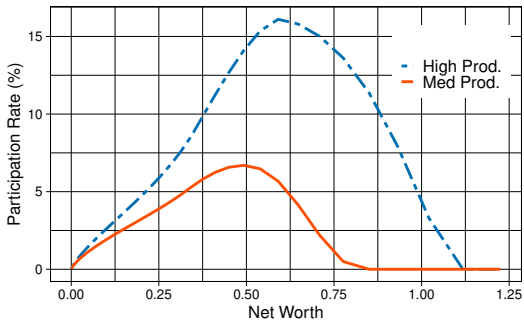
# Counterfactual Analysis: Expansion of LGP

| Model Outcomes | Benchmark $(\tilde{\xi}_{bm}, \chi_{bm})$ | C1 $\tilde{\xi}_{c1} = 0.173$ | C2 $\tilde{\xi}_{c2} = 0.087$ | C3 $\chi_{c3} == 3.33$ | C4 $\chi_{c4} = 5.00$ |
|---|---|---|---|---|---|
| *Firm Financing* | | | | | |
| LGP participation rate (%) | 3.8 | 5.8 | 11.3 | 5.7 | 8.6 |
| Guaranteed credit/total credit (%) | 1.7 | 2.6 | 4.9 | 4.0 | 10.3 |
| Mean cash/asset (guaranteed) (%) | 6.5 | 6.5 | 6.5 | 3.1 | 0.09 |
| Mean cash/asset (all firms) (%) | 21.0 | 20.7 | 20.1 | 20.4 | 19.5 |
| Mean debt/asset (guaranteed) (%) | 62.2 | 62.2 | 61.9 | 70.1 | 83.9 |
| Mean debt/asset (all firms) (%) | 37.7 | 38.1 | 39.2 | 38.7 | 40.8 |
| *Distribution of Firm Financing* | | | | | |
| Change in mean size (guaranteed, %) | - | -0.14 | -2.14 | -2.09 | -4.78 |
| Share of guaranteed credit (Q1, %) | 1.24 | 1.26 | 1.29 | 1.72 | 3.15 |
| Share of guaranteed credit (Q2, %) | 3.79 | 3.79 | 3.89 | 5.37 | 8.10 |
| Share of guaranteed credit (Q3, %) | 20.65 | 20.38 | 20.81 | 24.42 | 27.77 |
| Share of guaranteed credit (Q4, %) | 74.60 | 74.57 | 74.00 | 68.49 | 60.97 |
| *Economic Outcomes* | | | | | |
| Changes in Total Credit (%) | - | 1.01 | 3.98 | 2.65 | 8.22 |
| Changes in Aggregate TFP (%) | - | 0.05 | 0.17 | 0.10 | 0.31 |
| Changes in Total Output (%) | - | 0.07 | 0.28 | 0.18 | 0.39 |
| Changes in Total Consumption (%) | - | 0.08 | 0.31 | 0.20 | 0.49 |
| Changes in Total Welfare (%) | - | 0.04 | 0.16 | 0.10 | 0.21 |

# The Role of Intertemporal Distortions

Table: THE EFFECT OF A HIGHER GUARANTEE RATIO (C4)
UNDER ALTERNATIVE ASSUMPTIONS ON INTERTEMPORAL DISTORTIONS

| Model Outcomes | Benchmark ($\tau = 0.02, \epsilon = 0.91$) | Lower $\tau$ ($\tau = 0, \epsilon = 0.91$) | Higher $\epsilon$ ($\tau = 0.02, \epsilon = 0.93$) |
|---|---|---|---|
| *Economic Outcomes* | | | |
| Changes in Aggregate TFP (%) | 0.31 | 0.21 | 0.20 |
| Changes in Total Output (%) | 0.38 | 0.16 | 0.23 |
| Changes in Total Welfare (%) | 0.21 | 0.08 | 0.13 |

Note: This table reports the effects of policy C4 under different assumptions on $\tau$ and $\epsilon$.

## Conclusion

▶ We study the effect of short-term finance on firm growth and its aggregate implications.

▶ Empirically, we find that firms with guaranteed loans expand their production scale and sharply decrease their cash holdings.

▶ Quantitatively, we show the gain of enlarging the loan guarantee programs (through higher guaranteed ratio or lower inspection costs) are substantial.
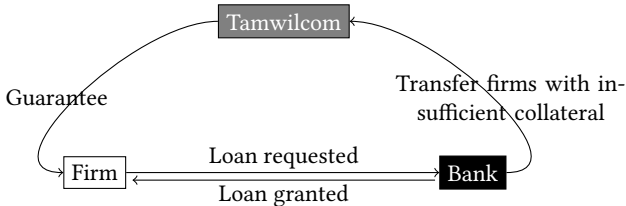
▶ Role of intertemporal distortions.

Thank You!

Appendix

- Tamwilcom, the credit guarantee agency in Morocco, facilitates bank credit to under-collateralized SMEs.
- We focus on two products related to working capital loans (Damane Exploitation and Damane Express) `Details1` `Details2`

## Details on Damane Exploitation and Damane Express (1)

We focus on two products related to working capital loans:

- ▶ Damane Exploitation: SMEs with sales below 175 million DH (about 17.5 million CHF)
- ▶ Damane Express (loan purpose: working capital): micro and small enterprises; loan size up to 1 million DH (100,000 CHF)

Loan Size

Damane Express          Damane Exploitation

1 million DH
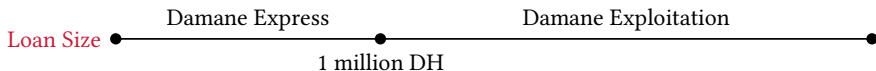
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# Details on Damane Exploitation and Damane Express (2)



Sales Distribution for Firms Guaranteed under Both Products
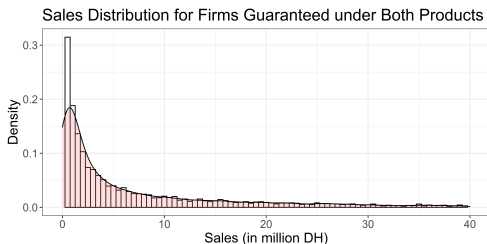
- ▶ Sales distribution of firms guaranteed under both products are smooth. We don't see lumps and gaps.
- ▶ Firms self-select into different programs based on the amount of their liquidity needs.

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## Merging Two Databases

▶ Guaranteed firms in Tamwilcom database are paired with their balance sheet data in Orbis.

  ▶ We have a rate of successful pairing of 49.3% (11,344 out of 23,017 CCG-guaranteed firms are identified in Orbis database.)
  ▶ Only 4000 guaranteed firms have data for the year where it is granted the guarantee.
  ▶ The number drops further when we would like to have data of several consecutive years.
  ▶ Only 4.3% of the CCG-guaranteed firms are in the final sample.

▶ Data attrition is consistent with existing literature in this field.

▶ Robustness check: inverse probability weights.

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# Step 1: Multivariate Distance Matching

- **Matching details**:
  - Nearest neighbor matching based on Mahalanobis distance of selected variables
  - One guaranteed firm is matched with five non-guaranteed firms with replacement.
  - Variables for matching: total assets (t-1, t-2, t-3), sales (t-1, t-2, t-3), current liabilities (t-1, t-2, t-3), cash (t-1, t-2, t-3) and firm age. (Note: year t refers to treatment year; all values are in log.)
  - Exact match: year, firm size, firm sector, city
  - Re-scale of weight: control firms are re-weighted based on their distance to the treated firm.
  - Imposed caliper: we impose maximum distance allowed in matching to exclude control firms that are not sufficiently similar to treated firm.

- **Final sample**: 991 guaranteed firms are matched with 4,577 control firms. (9,218 firm-year observations are matched with 56,202 observations.)

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# Sample Balancedness Check 1
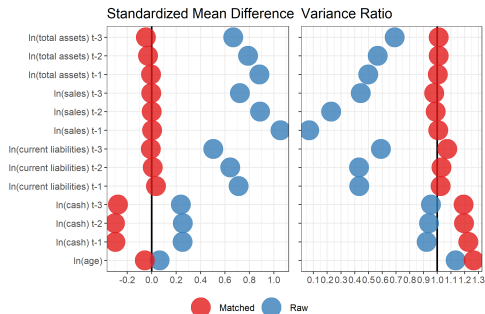


- ▶ Good balancedness is observed.
- ▶ Standardized mean differences are close to zero.
- ▶ Variance ratios are close to one.

## Sample Balancedness Check 2

- ▶ Logit model: We evaluate the probability of obtaining a guarantee based on the variables used for the matching in both raw and matched samples.

- ▶ Pseudo $R^2$: a drop indicates good balance in the sample.

- ▶ Purpose: the loss of explanatory power of selected variables towards treatment status after matching

- ▶ Indeed what we observe: It drops from 0.66 of the raw sample to 0.01 of the matched sample.

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# Trend Inspection: Weighted Means



▶ After the matching proce-
dure, the two groups share
parallel trends before the
treatment year *t*.

▶ The changes in the trends of
weighted means give some
preliminary evidence at the
treatment effects.

## Empirical Results: Costs of Employees

|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
|  | Costs of Employees Growth | | | Costs of Employees/Sales | | |
|  | t+1 | t+2 | t+3 | t+1 | t+2 | t+3 |
| Guaranteed | 0.116*** | 0.141*** | 0.151*** | 0.081 | -0.016 | 0.052 |
|  | (0.016) | (0.024) | (0.042) | (0.076) | (0.011) | (0.041) |
| $N$ | 28618 | 22810 | 17076 | 28488 | 22685 | 16958 |
| Adjusted $R^2$ | 0.301 | 0.319 | 0.333 | 0.447 | 0.368 | 0.370 |
| Group × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

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## Empirical Results: Fixed Assets

|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
|  | Fixed Assets Growth | | | Fixed Assets/Total Assets | | |
|  | t+1 | t+2 | t+3 | t+1 | t+2 | t+3 |
| Guaranteed | 0.139*** | 0.281*** | 0.283*** | 0.000 | 0.006 | 0.004 |
|  | (0.026) | (0.041) | (0.071) | (0.002) | (0.004) | (0.006) |
| $N$ | 27576 | 21862 | 16286 | 27576 | 21862 | 16286 |
| Adjusted $R^2$ | 0.239 | 0.248 | 0.261 | 0.255 | 0.263 | 0.265 |
| Group × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

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# Empirical Results: Effects on Firms' Financial Positions

## Expansion in Current Liability

A guaranteed firm has an increase of 14.0% in current liabilities growth in the first year after the guarantee with persistent growth in the following two years.

Table:
ESTIMATION RESULTS OF TAMWILCOM GUARANTEE ON FIRM'S CURRENT LIABILITIES

|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
|  | Current Liabilities Growth | | | Current Liabilities/Total Assets | | |
|  | t+1 | t+2 | t+3 | t+1 | t+2 | t+3 |
| Guaranteed | 0.140*** | 0.144*** | 0.224*** | -0.009 | 0.038 | -0.014 |
|  | (0.016) | (0.025) | (0.052) | (0.009) | (0.044) | (0.023) |
| $N$ | 30382 | 24427 | 18487 | 30039 | 24069 | 18139 |
| Adjusted $R^2$ | 0.395 | 0.411 | 0.413 | -0.108 | -0.052 | 0.068 |
| Group × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

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## Empirical Results: Conditional Effect of Guarantees

**Differential Effects Conditional on Size and Age**

$$\Delta Y_{igt} = \delta D_{it} + \alpha D_{it} \times \log(X_{it}) + \lambda_{gt} + \epsilon_{igt} \tag{1}$$

Table: Effect of Tamwilcom Guarantee depending on Firm's Age and Size

|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
|  | Sales Growth | | | Cash Growth | | |
|  | t+1 | t+1 | t+1 | t+1 | t+1 | t+1 |
| Guaranteed | 0.413*** | 0.955*** | 1.175*** | -0.392* | -2.491*** | -1.865*** |
|  | (0.084) | (0.280) | (0.310) | (0.190) | (0.570) | (0.519) |
| Guaranteed × $log$(Age) | -0.115*** |  |  | 0.116 |  |  |
|  | (0.032) |  |  | (0.077) |  |  |
| Guaranteed × $log$(Total Assets)$_{t-1}$ |  | -0.052** |  |  | 0.152*** |  |
|  |  | (0.017) |  |  | (0.036) |  |
| Guaranteed × $log$(Sales)$_{t-1}$ |  |  | -0.066*** |  |  | 0.112*** |
|  |  |  | (0.019) |  |  | (0.033) |
| $N$ | 30136 | 30058 | 30136 | 30083 | 30083 | 29773 |
| Adjusted $R^2$ | 0.416 | 0.417 | 0.417 | 0.385 | 0.385 | 0.384 |
| Group × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

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## Production Firm's Problem

**Production:**

$$y_{i,t} = z_{i,t} k_{i,t}^{\alpha} l_{i,t}^{\nu} e^{1-\alpha-\nu}, \quad \alpha + \nu < 1$$

$$\log(z_{i,t}) = \rho_z \log(z_{it-1}) + \sigma_z \varepsilon_{i,t}$$

**Short-term financing:**

▶ Working capital constraint:

$$w_t l_{i,t} \leq c_{i,t} + \bar{b_{i,t}}$$

▶ Collateral constraint (?):

$$b_{i,t} \leq \bar{b_{i,t}} \equiv \theta_0 k_{i,t} + \theta_1 \Psi(k_{i,t}) = \left[\theta_0 + \theta_1 \frac{\Psi(k_{i,t})}{k_{i,t}}\right] k_{i,t}$$

**Loan guarantee program for SMEs:**

$$b_{i,t} \leq \begin{cases} (1 + (\chi - 1)s)\left(\theta_0 k_{i,t} + \theta_1 \Psi(k_{i,t})\right) & if\, F = A \\ \theta_0 k_{i,t} + \theta_1 \Psi(k_{i,t}) & if\, F = N \end{cases}$$

**First period (maximize total profit)**:

$$\pi^*(z_{i,t}, n_{i,t-1}, F_{i,t}) = \max_{k,c,l} \left\{ z_{i,t} k_{i,t}^{\alpha} l_{i,t}^{\nu} - w_t l_{i,t} + (1-\delta) q_t k_{i,t} + (1+r_t) c_{i,t} - r_t b_{i,t} - F_{i,t} \cdot \mu \tilde{b}_{i,t} \right\}$$

subject to:

$$n_{i,t-1} = q_t k_{i,t} + c_{i,t}$$

$$w_t l_{i,t} \leq c_{i,t} + F_{i,t} \cdot (1 + (\chi - 1)s) \left( \theta_0 k_{i,t} + \theta_1 \Psi(k_{i,t}) \right) + (1 - F_{i,t}) \cdot \left( \theta_0 k_{i,t} + \theta_1 \Psi(k_{i,t}) \right)$$

$$\tilde{b}_{i,t} = (\chi - 1)s(w_t l_{i,t} - c_{i,t})$$

$$b_{i,t} = w_t l_{i,t} - c_{i,t}$$

**Value function:**

$$v(z_{i,t}, n_{-1}, F_{i,t}) = \max_{d_{i,t}} \left\{ \frac{d_{i,t}(z_{i,t}, n_{i,t-1}, F_{i,t})^{1-\eta}}{1-\eta} + \epsilon \beta E_z[v(z_{i,t+1}, n_{i,t})] \right\}$$

**Net worth accumulation:**

$$n_{i,t}(z_{i,t}, n_{i,t-1}, F_{i,t}) = \pi^*(z_{i,t}, n_{i,t-1}, F_{i,t}) - d_{i,t}(z_{i,t}, n_{i,t-1}, F_{i,t}) - \xi_{i,t}$$

**LGP fixed cost threshold:**

$$\xi^*(z_{i,t}, n_{i,t-1}) = \frac{\pi^*(z_{i,t}, n_{i,t-1}, A) - \pi^*(z_{i,t}, n_{i,t-1}, N)}{w_t}$$

**Other Household:**

$$E_0 \sum_{t=0}^{\infty} \beta^t \left( \frac{C_t^{1-\eta}}{1-\eta} - \theta \frac{L_t^{1+\omega}}{1+\omega} \right)$$

subject to:

$$C_t + \frac{1}{1+r_t} B_t \leq B_{t-1} + W_t L_t$$

**Capital Good Producer:**
Technology:

$$\Phi(I_t/K_t)K_t = \left( \frac{\delta/\phi}{1-1/\phi} \left( \frac{I_t}{K_t} \right)^{1-1/\phi} - \frac{\delta}{\phi-1} \right) K_t$$

Price of capital:

$$q_t = \frac{1}{\Phi'(I_t/K_t)} = \frac{I_t/K_t^{1/\phi}}{\delta}$$

| Parameter | Description | Value |
|:---:|:---|:---:|
| *Firms* | | |
| $\alpha$ | Capital coefficient | 0.21 |
| $\nu$ | Labor coefficient | 0.64 |
| $\delta$ | Capital depreciation | 0.10 |
| $\phi$ | Capital adjustment cost | 4.0 |
| *Households* | | |
| $\beta$ | Discount factor | 0.96 |
| $\eta$ | Elasticity of intertemporal substitution | 1 |
| $\theta$ | Leisure preference | 2 |
| $\omega$ | Inverse Frisch | 0.5 |

# Fitted Parameters

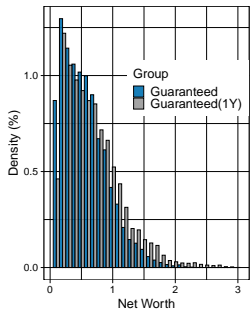| Parameter | Description | Value |
|:---------:|:------------|:-----:|
| *Output Dynamics* | | |
| $\rho_z$ | Persistence of TFP shock | 0.90 |
| $\sigma_z$ | Volatility of TFP shock | 0.06 |
| $\underline{n}_0$ | Net worth of entrants | 0.07 |
| $\epsilon$ | Survival rate | 0.91 |
| $\tau$ | Net worth erosion | 0.02 |
| *Financial Frictions* | | |
| $s$ | Share of formal bank loans | 0.20 |
| $\theta_0$ | Collateral constraint (size-irrelevant) | 0.01 |
| $\theta_1$ | Collateral constraint (size-dependent) | 0.26 |
| $\gamma$ | Collateral constraint (size-dependent) | 1.35 |
| *Loan guarantee program* | | |
| $\mu$ | Guaranteed loan commission fee | 0.5% |
| $\chi$ | Multiplier of LGP on loans | 2.5 |
| $\bar{\xi}$ | Upper bound of LGP fixed cost | 0.26 |

# Distribution of Firms `Back`

## How does the guarantee help firm growth? Selection vs Growth
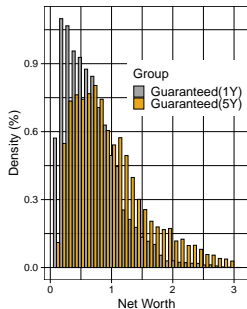


Figure:
DISTRIBUTION OF FIRM'S LONG-TERM SCALE
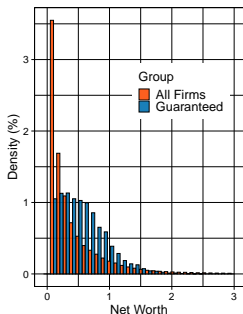
(a) LGP Self-Selection  (b) One Year Growth  (c) Five Year Growth