Startup Types, Structural Policy and Macroeconomic Performance across Europe¹

Ralph De Haas Vincent Sterk Neeltje Van Horen EBRD, Tilburg, CEPR UCL, CEPR BoE, UvA, CEPR

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Startups and Macro Performance

¹The views expressed herein are those of the authors and not necessarily those of the Bank of England or the European Bank for Reconstruction and Development.

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Policy levers explored in the literature:

- Encourage innovation, technology diffusion, etc.
 - Bloom, Griffith and Van Reenen (2002), Akcigit, Grigsby, Nicholas and Stantcheva (2018),..
- Reduce misallocation
 - Hsieh and Klenow (2009), Gopinath et al. (2017),...
- etc, etc.

- Vast heterogeneity among firms, mostly determined ex ante.
 - Hurst and Pugsley (2011); Guzman and Stern (2015); Belenzon, Chatterji and Daley (2017); Sedláček and Sterk (2017); Sterk, Sedláček and Pugsley (2021).

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- High exit during the COVID pandemic
 - Opportunity to "build back better"

Research questions

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- 1. How large are the potential policy gains at the macro level?
- 2. Lessons for policy design?
 - Which startup types to encourage?

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- Rich CompNet data on startups in 10 EU countries.
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 - Idea: startup choices reveal latent types; Bonhomme et al. (2021)
 - Multiple dimensions of heterogeneity

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- Document life cycles and performance
 - Employment, productivity, etc.

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 - Idea: startup choices reveal latent types; Bonhomme et al. (2021)
 - Multiple dimensions of heterogeneity
- Document life cycles and performance
 - Employment, productivity, etc.
- Present agnostic firm dynamics model.
 - Guides empirical work (sufficient statistics).
 - Use for policy counterfactuals.

1. Firm dynamics model Overview

- Generalization of Hopenhayn (1992) with ex-ante types
- Production and demand structure heterogeneous within and across. types
 - Entrants know their type, i.e. the distribution from which they draw their demand and production functions.
 - Remain agnostic on the precise demand and production functions. Arbitrary set of constraints.
- Heterogeneous entry costs.

Composition effects of a (tax) policy change

First-order approximation of the entry condition:

$$\frac{dn_j}{n_j} = -\varepsilon_j \tilde{\mathbb{E}}_j [\frac{dT}{V}].$$

- ε_j : entry elasticity of type j.
- $\tilde{\mathbb{E}}_{j}[\frac{dT}{V}]$: direct effect of policy change on firm value.

Macro Composition effect of a (tax) policy change Sufficient statistics

- 1. The average life cycle profiles,
- 2. The entry elasticity,
- 3. The immediate effect of the policy change on profits.

All can be measured in the data.

2. Data

Large, administrative data set obtained via CompNet.

• Observables:

- Micro data on balance sheets and income statements at the firm level.
- Firm ID, age (we can follow startups over time)
- 1-digit industry identifier
- Sample:
 - 10 countries (Croatia, Denmark, Finland, France, Italy, Lithuania, Netherlands, Slovenia, Spain, Sweden)
 - Years: 2004-2018 (varies by country)
 - Exclude the self-employed
 - Representative sample, comparable across countries.

- Cluster firms based on *choice variables* based in the first year after entry:
 - Employment
 - Real capital-to-labor ratio (capital intensity)
 - Real total assets
 - Cash-to-total assets ratio
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- Use k-means clustering algorithm
 - results for 5-7 clusters at country level
 - ▶ apply "meta clustering" to group country-level clusters and give names

K-means meta clustering



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Clustering outcomes meta-clustering

	Number of employees	Capital intensity	Real total assets	Cash/total assets ratio	Leverage ratio
Basic	4	8.27	160.35	0.13	0.16
Capital intensive	2	91.61	446.55	0.10	0.39
Cash rich	3	6.63	135.04	0.38	0.10
High leverage	4	15.84	242.63	0.12	0.73
Large	18	20.50	1875.45	0.13	0.35

Table 1: Characteristics of startup types at time of entry

Notes: This table shows for each of the five startup types the cross-country means of the five cluster variables in the year of firm birth. Means are weighted by the number of startups in a cohort and based on the balanced sample.

Type distribution stable across industries



Type distribution stable over time



Type distribution stable across countries



Life cycle profiles



Notes: Coefficients relative to "basic" + 95pct error bands. Based on separate regressions for each age group.

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Life cycle profiles



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Performance

	(1)	(2)	(3)	(4)	(5)
	Aggregate labor productivity	Aggregate TFP (GMM estimation)	Exit probability	Wage per employee	Average profit margin
Capital intensive	0.316^{***}	0.048^{***}	-0.062***	2.406***	0.012^{***}
Cash rich	0.030***	0.050***	-0.008***	0.980***	0.023***
High leverage	(0.004) -0.052***	(0.003) -0.041***	(0.003) -0.002	(0.078) -1.695***	(0.001) -0.030***
Large	(0.004) 0.167^{***}	(0.003) 0.042^{***}	(0.003) - 0.128^{***}	(0.086) 3.385^{***}	(0.001) - 0.016^{***}
Constant	(0.004) 3.327^{***} (0.003)	(0.004) 2.200^{***} (0.002)	(0.003) 0.708^{***} (0.002)	(0.088) 27.369*** (0.054)	(0.001) 0.043^{***} (0.001)
R-squared N	$0.902 \\ 26,491$	0.978 19,499	$0.630 \\ 28,565$	0.909 27,677	$0.612 \\ 27,420$
Country \times cohort FE	1	1	1	1	1
Industry \times cohort FE Country \times Industry FE	1	1		1	
Age \times Country FE	1	1	1	1	1
Age \times Industry FE Age \times Cohort FE	1	1	1	1	1

Table 2: Start-up type and firm outcomes

Notes: Table showing OLS regressions where the dependent variable is indicated in the column heading. The regressions are at the 1-digit industry level, we use the full panel but remove observations corresponding to firms that have been active for more than 8 years.

5. Policy space (preliminary)

Aggregate labor productivity













Employment versus productivity



5. Policy counterfactuals Other trade-offs

	Agg. Employment	Agg. Labor Productivity	Agg. TFP	No. Firms	Avg. Profits
Agg. Employment	1.00				
Agg. Labor Productivity	0.56	1.00			
Agg. TFP	0.12	0.30	1.00		
No. Firms	0.58	0.66	0.80	1.00	
Avg. Profits	0.72	0.61	0.74	0.98	1.00

Notes: Table showing correlation matrix between aggregate employment, aggregate labor productivity, aggregate total factor productivity, number of firms and average profits.

Application: subsidized loans (preliminary)

• Consider a subsidy of 100bp on business loans.

- especially benefits types with high debt-to-profit ratios
- Evaluate effect startup composition using formula:
 - ▶ increased share of basic high leverage (+2.5ppt)
 - reduced share of cash intensive (-4ppt)
 - decline in aggr labor productivity of 0.6 percent

Conclusion

- Document European startup landscape
 - multi-dimensional type heterogeneity
- 5 clear types
 - robust results across countries, time, and industries
 - large and persistent differences in business strategies
 - substantial differences in performance
 - heterogeneous entry elasticities
- Evaluate Macro effects of policies altering startup composition (preliminary)
 - substantial potential gains / losses
 - not necessarily strong trade-offs between employment and productivity
 - relevant also for evaluation of many existing policies

THANK YOU!

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