No country for young managers: Firm control rights and misallocation in general equilibrium

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Abstract. Using Bruegel data on European manufacturing firms (EFIGE), I document that the prevalence of senior leadership (over-65-year-old CEO/owner) in Italian firms cannot be explained by firm characteristics, while it is associated with a higher probability of obtaining credit. I argue that easier access to funding, likely due to weak contract enforcement rising the value of credit relationships, can give rise to an incumbent advantage and explain the prevalence of old managers in Italy. I describe and investigate this mechanism through a static general equilibrium model of firm allocation, showing how it can cause misallocation and hence help us explain Italy's productivity lag. Finally, I use this model to determine in which cases such access to funding frictions can justify policies in favor of new managers/entrepreneurs.

Keywords: Gerontocracy, Credit access, Managers selection, Entrepreneurs selection.

JEL Classification: E02, G32, G38, M12

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I Introduction

Firms' management and the quality of contract enforcement are two critical factors that help explain disparities in growth, innovation, and productivity (see Bloom and Van Reenen, 2010; Acemoglu, Johnson, and Robinson, 2005; Moser, 2013). In this paper, I work on how the quality of contract enforcement can affect firms' leadership selection. I contribute in two ways. First, using publicly available firm-level data, I bring novel empirical evidence of a link between managerial selection and contract enforcement through the access to credit; second, I use a simple static general equilibrium model of firm allocation to study the mechanics of this potential link, and when its presence can justify policy interventions.

I start documenting the possible link between defective contract enforcement and managerial selection. Using the World Bank "Doing Business" survey and Eurostat labor data, I highlight the case of Italy, where two anomalies – lengthy expected time to enforce a contract and a higher presence of old managers – can be observed jointly. First, it takes double the amount of time to solve a commercial dispute in Italy than any other major European country. Second, Italian firms have approximately 2.3 *times* more over-60-year-old CEOs than the firms of other comparable European countries,[1] and such difference cannot be rationalized by differences in the age profile of the population, labor force, or by systematic differences in the entry or exit rates of firms across such countries.

Using Bruegel's firm-level survey data (EFIGE survey, Altomonte and Aquilante, 2012), I confirm that the age anomaly is robust to controlling for different regional and firm-level characteristics. Moreover, the EFIGE dataset includes rich information about firms' access to credit, which is strongly affected by a weak enforcement environment (see Jappelli, Pagano, and Bianco, 2005; Schiantarelli, Stacchini, and Strahan, 2020). I thus document a series of robust correlations, both economically and statistically significant, suggestive of a trade-off between management quality and access to financing when the quality of enforcement is bad.

First, old CEOs come with older credit relationships across all major European countries, but more so in Italy; furthermore, only in Italy is it the case that old CEOs come with a higher probability of being granted a loan application. For a subsample of the dataset for which information on the use of external financing is available, I show that there is no evidence that old Italian CEOs invest systematically in different projects, implying that the difference in the likelihood of being granted credit appears to be linked

[1] Bandiera et al. (2008) highlight that the age distribution of Italian public companies' managers has a fat right tail, though such is compensated by higher dispersion yielding to small difference in the average age with respect to the European peers. I instead show that the average age is higher for smaller, private firms, and that such difference cannot be explained by firms and demographic characteristics.

directly to CEO's characteristics, instead of firm's or projects' characteristics. On the other hand, I also find evidence that such old CEOs come at a cost, as firms with old CEOs tend to list "lack of managerial resources" as a constraint to their growth.

I then present a theoretical investigation of the trade-off highlighted by the descriptive evidence, which is between adopting a new vintage of human capital[2] and facing financing and contracting frictions that destroy value. I encase such trade-off in a simple model of a market in firms' control rights, in the style of Caselli and Gennaioli (2005) and building on Lucas (1978)'s framework augmented with a working capital constraint.[3] In the model, old managers facing exogenously low interest rates can sell the firm to young workers who start with better human capital but face higher interest rates.

I use the model to obtain three results in closed form. First, the solution of the trade-off within the firm engenders a pecuniary externality that can reduce the economy's productive capacity. Indeed, when the old and the young trade for control at the firm level, they do not internalize the global effect on wages of adopting the new vintage of human capital at the economy level. Consequently, trade may not happen even if aggregate consumption would be higher if everybody traded. Second, no transfer can improve the market allocation of control rights when the planner faces the same constraints as the players in the economy. The presence of the pecuniary externality does not justify interventions such as subsidies to young entrepreneurs. Third, a simple extension of the model can grant a range of interventions. If we assume that a fraction of the control right's price is lost in the passage from old to young, multiple Pareto-ranked equilibria arise. The economy can be stuck in the equilibrium with lower consumption, while both the low and high consumption equilibria are feasible.[4] A benevolent planner could, in this case, intervene to select the best among feasible equilibria.[5]

The logic of Greenwald and Stiglitz (1986) explains the results. Waste emerges in the equilibrium with only the financing friction due to the complementarity in the old's

[2]We must believe that the new vintage is better for this to be a proper trade-off. I will start with the assumption that the new vintage is better; such belief is empirically justified. For example, Daveri and Maliranta (2007) and Daveri and Parisi (2015), using Finnish and Italian data respectively, find that old managers can harm firm performance in innovative industries. Moreover, Kodama and Li (2018) estimate the managerial performance curve on Japanese panel data and see it peaks at around 55 years of age.

[3]In greater detail, firms are a production technology that employs human capital and labor to produce the final consumption good. Managers provide the human capital of the firms, while workers offer labor. To manage the firm, a person must own a "license" to operate the technology and pay the wage of her workers before production realization. Such working capital constraint forces the managers to borrow funds from a bank, a foreign, deep-pocketed investor.

[4]Note that the inefficient equilibrium may involve either young or old managers. The allocation depends on the relative size of the frictions and the gap in ability between young and old.

[5]In this paper, I will not perform a policy-design exercise. To do so, I would need an explicit equilibrium coordination model, as in Ennis and Keister (2005), or of the political economy of how an economy gets stuck with inferior technology, as in Krusell and Rios-Rull (1996). For the moment, I leave this for future work.

relinquishing action, which causes a large shift in the price of labor (and firms). At the same time, as long as the control market is frictionless, gains and losses from the pecuniary externality net out, which is why the planner cannot improve upon the outcome within the constraints of the economy. The inefficiency in the extended model is, instead, due to the interaction of the two frictions. Again, control allocation affects wages and, through wages, it exerts an indirect effect on the firm's value. Though, this now affects *differentially* old and young agents because of the friction in the control market. The pecuniary externality does not net out, but nobody can individually act on wages to take this asymmetry into account, and the economy can get stuck with a wasteful allocation of firms, even if a better one is feasible.

The model I present allows me to feed into the policy debate regarding the subsidization of new entrepreneurs. Such policies of subsidy are common both in the developing and developed world, while their effectiveness is debated (see Acs et al., 2016; Åstebro, 2017; Fotopoulos and Storey, 2019). I highlight how believing that the potential new entrants' "quality" (the human capital endowment in the model) is higher and that they face financing frictions does not *per se* grant an economic argument for a policy of subsidies. Instead, I show that to sustain interventions to help new managers/entrepreneurs we must believe that the control market is frictional itself.

I organize the rest of the paper as follows. Section II presents aggregate and firm-level motivating my interest in the topic and some of the assumptions of the modeling framework; Section III presents the theoretical framework and the policy implications I derive from it; Section IV concludes.

Related literature. The works closest to the present are the theoretical papers by Burkart, Panunzi, and Shleifer (2003), Caselli and Gennaioli (2005); the quantitative papers by Caselli and Gennaioli (2013) and Lippi and Schivardi (2014); and the empirical literature spurred by works such as La Porta, Lopez-de Silanes, and Shleifer (1999), La Porta et al. (2000) and Volpin (2002). I distinguish myself from these strands, shifting my focus on access to credit and studying the implication for optimal policy from the planner perspective.

In particular, the closest works in the first and second set are Caselli and Gennaioli (2005) and Lippi and Schivardi (2014). Caselli and Gennaioli (2005) studies a setting where an agency problem in the credit market causes firm misallocation, giving rise to multiple equilibria through a general equilibrium effect on wages too. In my case, the mechanism giving rise to the multiplicity is simpler and exogenous, as it impinges on the add-on to factor prices that only young agents must pay. Such choice is coarser but allows for a simple environment that justifies allocating the firm to the "less capable" agents when saving in the capital market is large enough. Such trade-off is at the core of

the planner problem through which I study optimal policy. Lippi and Schivardi (2014), instead, studies in partial equilibrium the decision to retain senior executives when these can provide private benefits to the owner. In my setting, I too work on the reason for retaining senior firm leadership; though, I abstract from the owner *vs* managers interactions in partial equilibrium to focus on the externalities of slow turnover in general equilibrium. Finally, I contribute to the third strand of literature, studying how weak enforcement can affect private enterprises via the access to funding channel, even in the absence of ownership and control separation. Previous works, such as Volpin (2002), focus on the role of investor protection in the context of public enterprises and through the frictions between ownership and control.

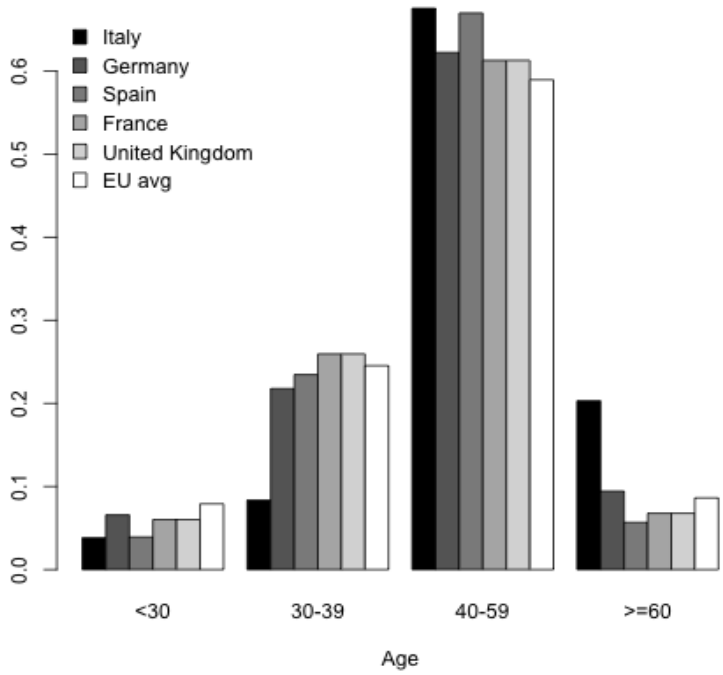
Moreover, I contribute to the debate about the problem of the Italian economy and how business leadership contributes to them (Bandiera et al., 2008; Daveri and Parisi, 2015; Pellegrino and Zingales, 2017; Schivardi and Schmitz, 2020). In particular, and complementary to Pellegrino and Zingales (2017), I point out that even if we do not believe that the prevalence of old managers in Italy links directly to lower productivity at the firm level, it can be a relevant indicator of the importance of frictions in the market for funding and control. Indeed, it may link to overall firm misallocation.

II Motivating evidence

Among the major European economies (France, Germany, Italy, and Spain), the country with the worst enforcement of contracts, Italy, is also an outlier in terms of the share of managers that are over-60 years old. I document this regularity employing two primary sources. First, I use Eurostat data for aggregate business and population demographics. Second, to track the quality of enforcement, I use the Doing Business survey by the World Bank. Both sources are publicly available and free to download from Eurostat's and World Bank's websites.

I start from the age distribution of managers across countries. My data source, Eurostat, is the European Union's Directorate-General responsible for collecting data and analysis to inform the European institutions. Among other information, it collects firms', workers' and population's demographics and makes them available by country, age group, profession, role in the firm.

Figure 1: Managers age distribution, Eurostat

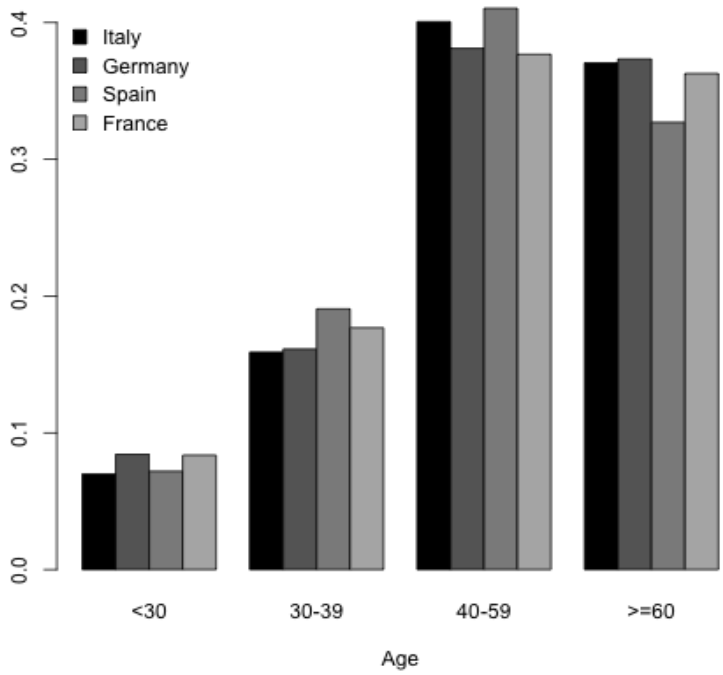


Note: The Figure plots the age distribution of managers as of the second quarter of 2017, for the 5 major European economies and the European Union as a whole (EU avg). Bars represent the fraction of the total managers population in each age bracket. Employees are classified as "managers" by Eurostat following the International Standard Classification of Occupations from the International Labour Office.

In Figure 1 we can see that Italy has about 2.3 times more over-60 years old managers than the Euro area average.[6] Previous evidence on Italian managers' age distribution in relation to their European and global peers is mixed. If a tendency to gerontocracy is noted in Daveri and Parisi (2015) and Pellegrino and Zingales (2017), coherently with the slow turnover highlighted in different settings by Volpin (2002) and Lippi and Schivardi (2014); nevertheless, Bandiera et al. (2008) finds no difference in *average* age when focusing on large companies. At the same time, even Bandiera et al. (2008) documents a fatter right tail in Italian managers' age distribution, even if compensated by a fatter left tail. Overall, such discrepancies point to the fact that it is important to investigate whether and how differences in demographics and firms' characteristics explain the age gap I document.

[6]The data shown refer to the second quarter of 2017, the last available for all the EU's major economies when drafting this document. Eurostat defines managers as employees that fall within the International Labour Office Major Group 1 definition, i.e. employees who "plan, direct, coordinate and evaluate the overall activities of enterprises, governments and other organizations, or other organizational units within them, and formulate and review their policies, laws, rules and regulations" (ILO, 2012, Vol. I, p.87).

Figure 2: Population age distribution



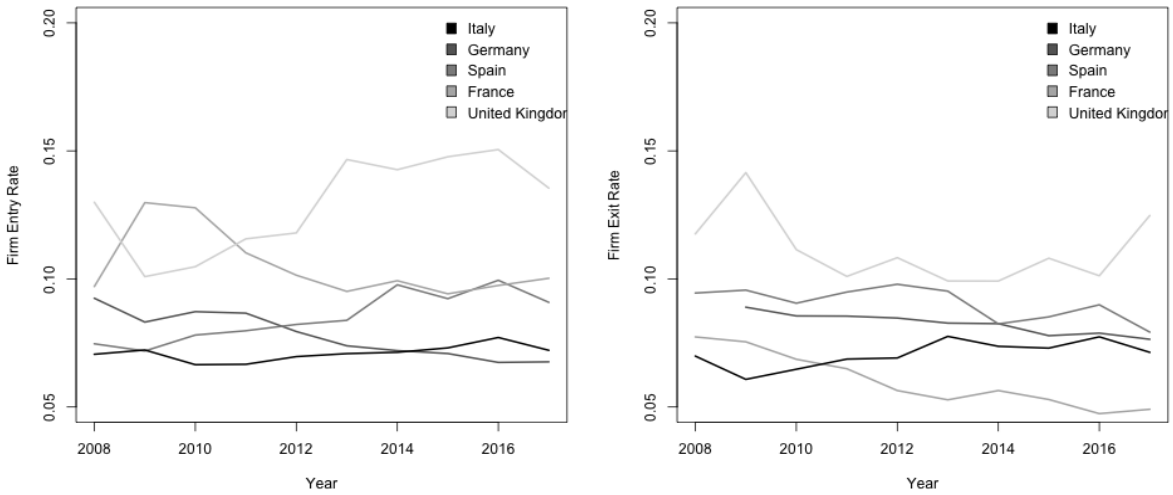
Note: The figure plots the age distribution of each country's residents as of 2017, using Eurostat country level data. Figures report fraction of total population above 25 years old. The population is defined as all the people who reside legally in the country of interest.

First, as shown in Figure 2, such a wide difference is not matched by a comparably large difference in the age profile of the entire population. Moreover, it is also not matched by a similar cross-country difference in the share of old workers. Aiyar and Ebeke (2017, in Figure 1, p.4) show that even though the share of old (55-65 years old) workers in Italy in 2016 is around 15 per cent, it is below the German figure, and in line with the Euro area average. Finally, also firm demographics appears not to be enough to explain all of the large difference. In Figure 3a and 3b we can see that, even though it is true that in Italy the firm entry and exit rates are among the lowest, the differences with Spain, France and Germany are relatively small, with Germany and France recording respectively the lowest entry rate from 2014 onward, and the lowest exit rate from 2011 onward.[7]

[7]Still, firm dynamics differs the most among the aggregate characteristics explored, which makes the firm-level analysis conducted in the following Subsection particularly needed.

(a) Firm entry, Eurostat

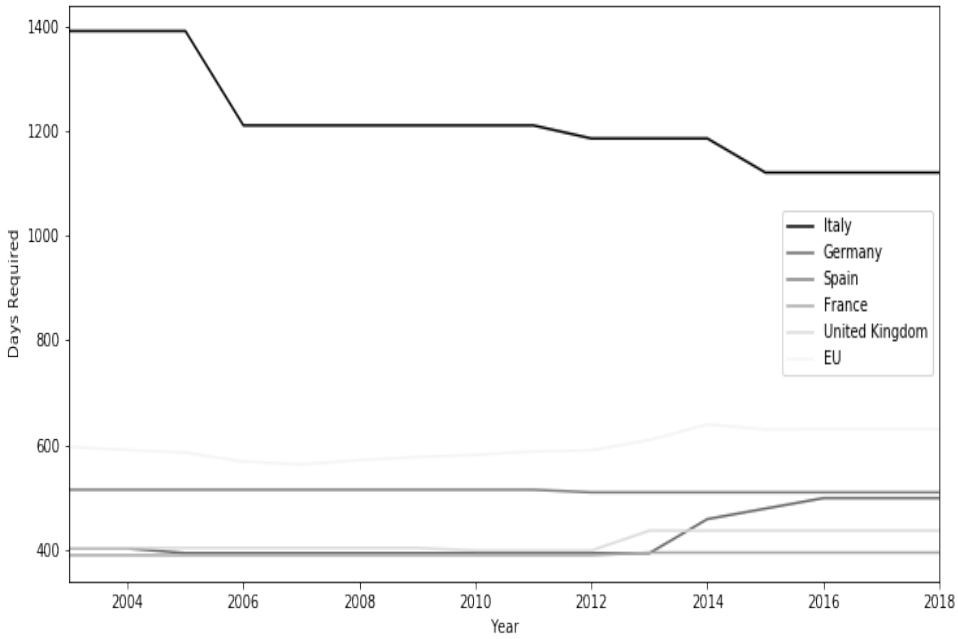
(b) Firm deaths, Eurostat



Note: The Figure compares firm entry rate over time across major European countries in the left panel, and firm exit on the right panel. The rate of entry is defined by Eurostat as number of firm births within the year over total firms at the beginning of the year; the exit rate is defined by Eurostat as number of firm deaths within the year over total firms at the beginning of the year.

The time it takes to enforce a contract is an aspect under which the Italian economy differs as starkly as in the prevalence of old managers. Weak contract enforcement in Italy has been documented in many works (see, for example, Djankov et al., 2003; Giacomelli and Menon, 2016; Drozd and Serrano-Padial, 2018) and can be directly observed employing the Doing Business survey by the World Bank. The Doing Business survey has been recorded since 2003 by the World Bank; it measures the ease of doing business across different countries (see Besley, 2015). Among other data, the survey collects information on the expected time to solve court cases and the costs involved in using the enforcement services provided by a country's legal system.

Figure 4: Expected time to enforce contract



Note: The Figure plots the expected time to enforce a contract in a court, comparing countries and the European Union average. Data are from the World Bank Doing Business Survey. Quoting the World Bank online description, the measure of the expected time is the "number of calendar days from the filing of the lawsuit in court until the final determination and, in appropriate cases, payment".

In Figure 4 I plot the expected time to conclude a commercial dispute in a major city in each country, as of the opinions of a World Bank selected sample of legal experts and judges.[8] Doing this, I can see that the expected time to solve a dispute is about double the European expected time. Such low-quality enforcement may highly increase the value of connections and soft enforcement through relationship capital.[9] The importance of soft enforcement and the high cost of commercial litigation, in turn, could justify an incumbent advantage and explain the age profile discrepancy. If the above is true, we should observe the effects of such incumbent advantage in the ease with which firms managed by senior executives access funding.

Many researchers have documented the relationship between contract enforcement's quality and credit. For example, Jappelli, Pagano, and Bianco (2005) shows that within

[8]The World Bank defines a commercial dispute as a case in which firm A necessitates help from legal enforcement to obtain payment from B, when B committed to such payment in a contract. Cities involved in the surveys are capital cities, in the case of France, Germany and Spain, and an average of major municipalities for the case of Italy. Survey methodology details can be consulted at https://www.doingbusiness.org/en/methodology/enforcing-contracts.

[9]Lippi and Schivardi (2014) present a similar argument in the motivation of their quantitative framework. For a review on the substitutability between formal and informal enforcement, see MacLeod (2007), and for a recent example of a study of how reputation constrains markets when enforcement is lacking see Macchiavello and Morjaria (2015). In a fully dynamic environment, this reasoning is valid under the assumption that the cost of screening new relationships in a weak enforcement setting is higher than the one implied by the higher attractiveness of default for an old agent.

Italy and controlling for geographic heterogeneity, worse judicial efficiency correlates with lower credit supply and higher measures of credit constraints for businesses. More recently, Schiantarelli, Stacchini, and Strahan (2020) shows evidence that Italian the same firm is more likely to default on a bank located in a weak enforcement area and that this behavior worsens credit losses during financial crises. We can observe such a greater cost of crises in the Doing Business survey for Italy as a whole. Indeed, even though the expected time to resolve insolvency is in line with the rest of its European peers, Italian insolvency procedures are extremely wasteful (22 per cent of the assets involved[10] gets lost in 2017, double the Spanish figure), and the recovery rate on the Euro is 63 per cent, 15 per cent lower than the second-worst performer among the five major countries, France.

To check the expected relationship between old managers and access to funding is present for Italy and Italy only, I use a publicly available survey of European manufacturers collected by Bruegel in its expanded version, including balance sheet information. Through this, I show that the expected correlation is present and that, more generally, a trade-off between firm growth and access to financial resources appears at play only in the Italian case.

II.1 Firm-level evidence from EFIGE

The EFIGE (European Firms in a Global Economy) dataset is a detailed survey of 14,759 manufacturers from Austria, France, Germany, Hungary, Italy, Spain, and the United Kingdom (Altomonte and Aquilante, 2012, which also includes extensive description). Data refer to the year 2007 and include information on firms' employment, operation, ownership structure, management structure, credit access and use of external resources. The survey is anonymized and includes sampling weights to be representative of the underlying national population of firms.[11] I employ the version of the dataset augmented with information from Bureau van Dijk's Amadeus, a balance sheets database covering European firms.[12] Following Piguillem and Rubini (2019) and Steinberg (2019), I drop observations for Austria and Hungary, which have the worst data coverage, and I focus on a resulting sample of 13,771 observations.

I describe the sample characteristics in Table 1. The dataset restricts demographic

[10] The World Bank defines the assets involved as the debtor's estate, which encompasses the debtor's assets that are garnishable.

[11] In all the regression results reported, I employ the sampling weights provided, but this choice has no bearing on the significance and overall magnitude of the results reported.

[12] The EFIGE dataset in such form has been employed, among others, by Pellegrino and Zingales (2017) to investigate the reasons for the Italian economic stagnation; by Steinberg (2019) to track the effects of Brexit; by Piguillem and Rubini (2019) to track the interaction between barriers to firm growth and export.

Table 1: Descriptives: EFIGE dataset

	Mean	S.D.	p10	p50	p90	N
CEO Older than 65	0.123	0.328	0	0	1	13,771
Italy	0.307					13,771
France	0.143					13,771
United Kingdom	0.120					13,771
Spain	0.157					13,771
Old Firm	0.357	0.479	0	0	1	13,771
CEO related to Owners	0.668	0.471	0	1	1	13,771
Active Abroad	0.739	0.439	0	1	1	13,771
Owned by Foreigners	0.062	0.241	0	0	0	13,771
Employees	50.495	87.332	12	24	103	8,762
Total Assets	10.845	120.984	0.557	2.418	13.400	12,554
EBITDA	1.444	17.594	0.030	0.281	1.873	9,846
Liquidity	1.544	3.059	0.470	0.990	2.580	11,699
Age Main Bank Rel.	16.739	14.286	4	13	32	6,343
Denied Credit	0.228	0.420	0	0	1	2,585
Increase Scale	0.242	0.428	0	0	1	2,663
Out-Sector Participation	0.013	0.114	0	0	0	2,663
In-Sector Participation	0.006	0.074	0	0	0	2,663
Working Capital	0.535	0.499	0	1	1	2,663
Financing Mix	0.070	0.254	0	0	0	2,663
Managerial Constraint	0.116	0.320	0	0	1	11,456
Financial Constraint	0.325	0.468	0	0	1	11,456

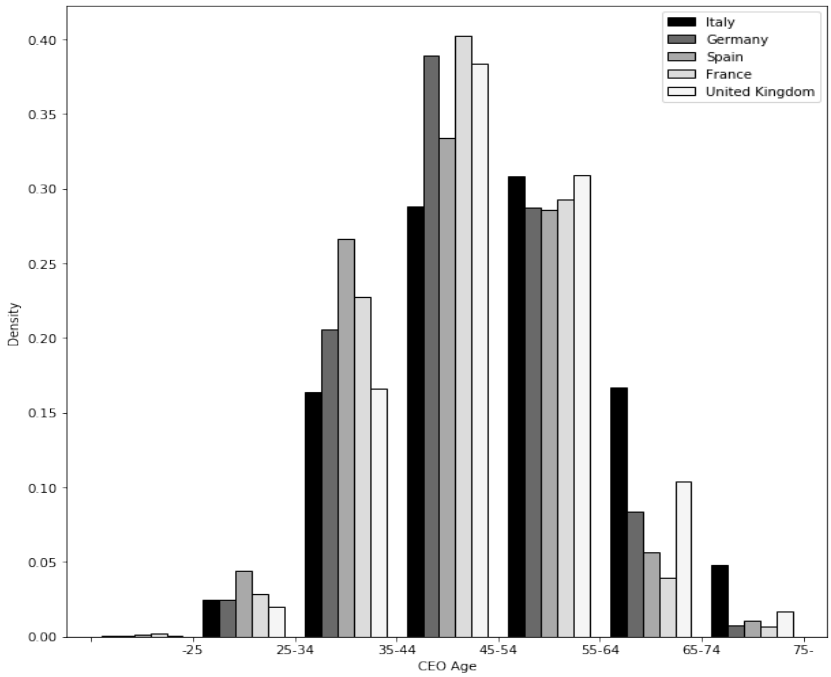
Note: This Table presents descriptive statistics for the EFIGE sample. A data point is an information about the state in 2007 of firm f, incorporated in country c; CEO Older than 65 is a dummy taking value 1 if the firm is led by an over-65 CEO; Italy, France, United Kingdom and Spain are dummies taking the value 1 for firms incorporated in each country (with Germany hosting the residual number of firms); Old Firm is a dummy equal to 1 if the firm was incorporated before 1976; CEO related to the owners is a dummy equal to 1 when the CEO is related to the owners; Active Abroad takes value 1 if the firm is an active exporter; Owned by Foreigners takes value 1 if the firm is owned by foreigners; Employees records the numbers of employees; Total Assets records total assets in millions of Euro; EBITDA records margins in millions of Euro, gross of interests and taxes; Liquidity records fixed assets minus stocks, divided by current liabilities; Age Main Bank Rel. records the age of the relationship between the firm and its main lender; Denied Credit takes value 1 if the firm recently applied for a loan and was denied; Increase Scale, Out-Sector, In-Sector, Working Capital and Financing Mix are dummies tracking the use of firm financing, useful to track the nature of projects in which the firm invests; Managerial and Financial constraint are dummies tracking whether firm's f respondent claimed that lacking managerial/financial resources constrain the growth of the firm.

information on the management to each firm's CEO, which often coincides with the business owner for smaller firms. For the whole sample, I have information regarding the CEO age bracket (10 years brackets), her relationships to the owners, whether foreigners own the firm, whether it is active abroad, and whether the firm was born before 1976 (Old Firm dummy); for about 12,000 observations, I can observe firms' total assets, liquidity

ratio, and the answer to a questionnaire asking the respondent within the firm whether they perceive that management or access to finance constitutes a hindrance to growth;[13] for about 10,000 observations, I can observe the number of employees and EBITDA; for a more restricted subset of the dataset, I can finally observe the age of the relationship with the leading bank (6,000 observations), whether the firm was denied a credit application, and how it used external funding[14] (2,500 observations).

First, I set to verify whether the regularities observed in the aggregate data for managers generally also hold in the firm-level data for CEOs. In Figure 5 I observe that the fatter right tail of the age distribution is common between the two data sources. To verify that firm heterogeneity cannot explain away the large numbers of old CEOs in Italy, as a next step, I explore differences in the relationship between the old age of CEOs and the five country dummies, as I progressively saturate a regression with controls.

Figure 5: Managers age distribution, EFIGE



Note: The figure plots the age distribution of CEOs (including entrepreneurs) from EFIGE dataset. Bars cover 10 years brackets, all data is as of 2007.

The relationship I estimate takes the form

[13]Other possible constraints to firm growth are listed, for example, bureaucracy; these options fall beyond the scope of this paper and are thus not explored as of now. As the survey is anonymous, I cannot access the respondent's role within the firm or any summary statistic or breakdown.

[14]External funding uses records 1) the increase of the scale of production, 2) in or 3) out of sector acquisitions, 4) funding working capital, 5) optimizing the funding mix.

$$\text{(1)} \qquad \text{CEO Older than } 65_{fc} = \alpha + \sum_{c} \beta_c \text{Country Dummies}_{fc} + \Gamma X_{fc} + \epsilon_{fc}$$

where CEO Older than 65_{fc} is a dummy taking value 1 if firm f, located in country c, is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Country Dummies_{fc}, dummies equal 1 if firm f is located in country $c \neq$ Germany. X_{fc} is a matrix of covariates. It includes, at its largest, a dummy equal to 1 if the firm birth is before 1976; a dummy equal to 1 if the CEO is related to the owners; a dummy equal to 1 if the firm is an active exporter; a dummy equal to 1 if foreigners own the firm; the number of firm employees; total assets in millions of Euro; EBITDA; liquidity, calculated as fixed assets minus stocks, divided by current liabilities; region, industry, employee size-class fixed effects (FEs); ϵ_{fc} is the heteroscedasticity robust standard error.

Table 2: Correlation between CEO's old age and Italy

	Dependent variable:			
	CEO Older than 65			
Italy	0.126***	0.129***	0.135***	0.139***
	(13.21)	(12.45)	(13.00)	(7.98)
France	-0.047***	-0.048***	-0.029***	-0.016
	(-6.75)	(-6.27)	(-3.73)	(-1.03)
United Kingdom	0.031***	0.027**	0.048***	0.038*
	(3.32)	(2.57)	(4.59)	(1.95)
Spain	-0.023***	-0.024***	-0.007	-0.007
	(-3.05)	(-3.15)	(-0.84)	(-0.45)
Germany	0.0910***	0.0909***	0.0183***	0.00970
	(16.20)	(15.22)	(2.01)	(0.51)
Industry FE		✓	✓	✓
Region FE		✓	✓	✓
Size Class FE		✓	✓	✓
Survey Controls			✓	✓
Balance Sheet Controls				✓
R^2	0.040	0.044	0.059	0.072
Observations	13,771	13,771	13,771	7,996

Note: This Table presents the results of the estimation of the following regression: CEO Older than $65_{fc} = \alpha + \beta \text{Country Dummies}_c + \Gamma X_{fc} + \epsilon_{fc}$, where CEO Older than 65_{fc} is a dummy taking value 1 if firm f, located in country c, is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Country Dummies_{fc}, dummies equal 1 if firm f is located in country $c \neq$ Germany. X_{fc} is a matrix of covariates; ϵ_{fc} is the heteroscedasticity robust standard error. It includes, at its largest, **Survey controls**: A dummy equal to 1 if the firm birth is before 1976; a dummy equal to 1 if the CEO is related to the owners; a dummy equal to 1 if the firm is an active exporter; a dummy equal to 1 if the firm is owned by foreigners. **Balance sheet controls**: The number of firm employees; total assets in millions of Euro; EBITDA; liquidity, calculated as fixed assets minus stocks, divided by current liabilities; region, industry, employee size-class fixed effects. Control variables' estimated effects are available in the Section IV (Appendix), Table 7.

In Table 2 I present the findings. In the first column, I observe that the fraction of over-65 CEOs is about 9 per cent in Germany, with Spain and France showing younger CEOs on average, the United Kingdom slightly older CEOs, and Italy a striking 22 per cent of over-65 CEOs (13 per cent more than the German's baseline). As sequential robustness tests, I start by adding (column 2) the region, industry, and size class FEs; then the firm-level dummies tracking the firm's foreign operation, ownership structure, and age (column 3); then the balance sheets controls (column 4). Upon the addition of the balance sheet controls, we can see that only the Italian dummy's coefficient stays large and significant. The size and magnitude of this estimate imply that for the firms for which we have balance sheet information, firm characteristics explain to a large extent the correlation between CEOs' old age in all countries except for Italy, substantiating the robustness of the previous stylized fact.

Second, I show multiple pieces of evidence of an old-CEO – access-to-financial-resources trade-off, which is particularly strong in Italy. I start this by estimating the following linear regression for all countries but Italy and, separately, for Italy.

$$\text{CEO Older than } 65_{fc} = \alpha + \beta \text{Managerial Constraint}_{fc} + \omega \text{Financial Constraint}_{fc} + \Gamma X_{fc} + \epsilon_{fc} \tag{2}$$

where α is a common intercept; Managerial Constraint$_{fc}$ is a dummy equal to one if, in answering the survey, the firm's f respondent claimed that lacking managerial resources constrain the growth of the firm; Financial Constraint$_{fc}$ is an equivalent dummy, if financial resources are mentioned as a constraint growth; X_{fc}; the X_{fc} matrix includes the same variables as in Equation 1, plus, whenever I estimate the specification on all countries but Italy, a Country * Industry FE.

Table 3: Correlation between CEO's old age and constraints to firm growth

	Dependent variable:							
	CEO Older than 65							
	Others	Italy	Others	Italy	Others	Italy	Others	Italy
Managerial Constraint	-0.002	0.041*	0.019*	0.044*	0.015	0.046**	0.010	0.048**
	(-0.17)	(1.78)	(1.73)	(1.89)	(1.40)	(2.01)	(0.74)	(1.98)
Financial Constraint	-0.022***	-0.044***	-0.015**	-0.041**	-0.017**	-0.044***	-0.016	-0.049***
	(-3.26)	(-2.69)	(-2.20)	(-2.50)	(-2.43)	(-2.71)	(-1.56)	(-2.84)
Region FE			✓	✓	✓	✓	✓	✓
Size Class FE			✓	✓	✓	✓	✓	✓
State-Industry FE			✓		✓		✓	
Industry FE				✓		✓		✓
Survey Controls					✓	✓	✓	✓
Balance Sheet Controls							✓	✓
R^2	0.001	0.003	0.016	0.018	0.031	0.044	0.054	0.055
Observations	8,436	3,020	8,435	3,020	8,435	3,020	3,223	2,685

Note: This Table presents the results of the estimation of the following regression: CEO Older than $65_{fc} = \alpha + \beta$Managerial Constraint$_{fc} + \omega$Financial Constraint$_{fc} + \Gamma X_{fc} + \epsilon_{fc}$, where CEO Older than 65_{fc} is a dummy taking value 1 if firm f, located in country c, is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Managerial Constraint$_{fc}$ is a dummy equal to one if, in the answer to the survey, firm's f respondent claimed that lacking managerial resources constrain the growth of the firm; Financial Constraint$_{fc}$ is an equivalent dummy, if financial resources are mentioned as a constraint growth. X_{fc} is a matrix of covariates; ϵ_{fc} is the heteroscedasticity robust standard error. It includes, at its largest, **Survey controls** and **Balance sheet controls**, which are the same as in Table 2. Control variables' estimated effects are available in the Section IV (Appendix), Table 8.

Table 3 shows that 1) consistently across finer and finer specifications, Italian firms led by over-65 CEOs are 4 per cent less likely to mention access to finance as a constraint to firm growth, while for all other countries this figure is stable at around 1.5 per cent. 2)

At the same time, Italian firms led by over-65 CEOs are 4 per cent more likely to claim that lacking management is a constraint to growth, with this figure always significant at least at 10 per cent, and with significance increasing with the addition of covariates; for all other countries this figure is stable at around 1.5 per cent, and insignificant but for one specification (column 3). Such estimates suggest that, in the Italian case, some of the old CEOs may be in place at a cost justified by better access to funding for the firm they lead. Nevertheless, such survey answer is qualitative, and the degree of detail is scarce. I thus work to find out whether there is finer evidence of this greater ease in accessing resources for old Italian CEOs.

For a subset of the EFIGE dataset, Bruegel provides information on the age of the firm's primary banking relationship and whether the firm was recently denied a credit application. I use this information to present the second piece of evidence, estimating

$$Y_{fc} = \alpha + \beta \text{ CEO Older than } 65_{fc} + \Gamma X_{fc} + \epsilon_{fc} \tag{3}$$

where Y_{fc} will be first a the age of the main credit relationship of firm f in years; then a dummy equal to 1 if firm f sees a credit application denied; while the other variables have been described before.

Table 4: Correlation between CEO's age of main banking relationship

	Dependent variable:							
	Age Main Bank Rel.							
	Others	Italy	Others	Italy	Others	Italy	Others	Italy
CEO Older than 65	4.541***	4.487***	4.406***	4.311***	2.441**	2.989***	1.754*	2.683***
	(3.54)	(5.49)	(3.77)	(5.32)	(2.27)	(3.78)	(1.67)	(3.19)
Region FE			✓	✓	✓	✓	✓	✓
Size Class FE			✓	✓	✓	✓	✓	✓
State-Industry FE			✓		✓		✓	
Industry FE				✓		✓		✓
Survey Controls					✓	✓	✓	✓
Balance Sheet Controls							✓	✓
R^2	0.006	0.021	0.101	0.045	0.235	0.141	0.175	0.154
Observations	4,483	1,860	4,482	1,860	4,482	1,860	2,680	1,657

Note: This Table presents the results of the estimation of the following regression: Age Main Bank Rel.$_{fc}$ $= \alpha + \beta$CEO Older than $65_{fc} + \Gamma X_{fc} + \epsilon_{fc}$, where Age Main Bank Rel.$_{fc}$ is the age in year of the main credit relationship of firm f located in country c, CEO Older than 65_{fc} is a dummy taking value 1 if the firm is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Managerial Constraint$_{fc}$ is a dummy equal to one if, in the answer to the survey, firm's f respondent claimed that lacking managerial resources constrain the growth of the firm; Financial Constraint$_{fc}$ is an equivalent dummy, if financial resources are mentioned as a constraint growth. X_{fc} is a matrix of covariates. It includes, at its largest, **Survey controls** and **Balance sheet controls**, which are the same as in Table 2. Control variables' estimated effects are available in the Section IV (Appendix), Table 9.

In Table 4 we can see that there is an overall solid and positive relationship between the old age of the CEO and the age of her firm's primary credit relationship. As expected, though, upon the inclusion of controls for firm heterogeneity, we can see that such an effect is more prominent in Italy. In particular, it is about 25 per cent larger (2.4 years more for over-65 CEOs against three years more for over-65 CEOs) if controlling for ownership structure, firm export activity and firm age, and about 60 per cent larger (1.7 against 2.7) upon controlling (and restricting the estimation) for firms' balance sheet characteristics.

Table 5: Correlation between CEO's and being denied a loan application

	Dependent variable:							
	Age Main Bank Rel.							
	Others	Italy	Others	Italy	Others	Italy	Others	Italy
CEO Older than 65	0.006	-0.070*	0.058	-0.079*	0.056	-0.073*	0.053	-0.100**
	(0.16)	(-1.65)	(1.63)	(-1.84)	(1.53)	(-1.70)	(0.93)	(-2.24)
Region FE			✓	✓	✓	✓	✓	✓
Size Class FE			✓	✓	✓	✓	✓	✓
State-Industry FE			✓		✓		✓	
Industry FE				✓		✓		✓
Survey Controls					✓	✓	✓	✓
Balance Sheet Controls							✓	✓
R^2	∼0.000	0.003	0.115	0.032	0.117	0.040	0.121	0.060
Observations	1,842	743	1,841	742	1,841	742	1,060	650

Note: This Table presents the results of the estimation of the following regression: Denied Credit$_{fc}$ = $\alpha + \beta$CEO Older than 65$_{fc}$ + $\Gamma X_{fc} + \epsilon_{fc}$, where Denied$_{fc}$ is a dummy equal to 1 if firm f located in country c has been recently denied a credit application; CEO Older than 65$_{fc}$ is a dummy taking value 1 if the firm is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Managerial Constraint$_{fc}$ is a dummy equal to one if, in the answer to the survey, firm's f respondent claimed that lacking managerial resources constrain the growth of the firm; Financial Constraint$_{fc}$ is an equivalent dummy, if financial resources are mentioned as a constraint growth. X_{fc} is a matrix of covariates. It includes, at its largest, **Survey controls** and **Balance sheet controls**, which are the same as in Table 2. Control variables' estimated effects are available in the Section IV (Appendix), Table 10.

Then, in Table 5 we can see that only in Italy we can observe a negative relationship between the presence of an old CEO and the likelihood of the denial of a credit application. Even if the sample, in this case, is pretty small (700 observations for Italy and 1,800 for the other countries), such correlation's significance increases with finer specifications, economic significance is strong (between 7 and 10 per cent less likely to record an application denial). At the same time, the sign of the correlation for the other countries is reversed, settling on a noisy 5 per cent greater likelihood of application denial for older CEOs' firms. To ensure starkly different patterns in the use of funds do not explain such observation, I use the exact specification as in Equation 3 to show (Table 6) that there

is no significant correlation between having an over-65 CEO and the likelihood of using external resources for specific projects.[15]

Table 6: Correlation between CEO's and use of external financing

	Dependent variable:							
	Increase Scale							
	Others	Italy	Others	Italy	Others	Italy	Others	Italy
CEO Older than 65	-0.072*	-0.011	-0.047	-0.024	-0.049	-0.029	-0.029	-0.031
	(-1.90)	(-0.30)	(-1.28)	(-0.62)	(-1.32)	(-0.73)	(-0.53)	(-0.74)
Observations	1,912	751	1,911	750	1,911	750	1,192	671
	Working Capital							
CEO Older than 65	0.063	0.026	0.105**	0.029	0.112**	0.036	0.100*	0.041
	(1.26)	(0.58)	(2.12)	(0.63)	(2.26)	(0.76)	(1.69)	(0.83)
Observations	1,912	751	1,911	750	1,911	750	1,192	671
	Financing Mix							
CEO Older than 65	-0.021	-0.004	-0.027	0.000	-0.029*	0.001	-0.019	0.010
	(-1.36)	(-0.15)	(-1.60)	(0.00)	(-1.68)	(0.05)	(-1.61)	(0.32)
Observations	1,912	751	1,911	750	1,911	750	1,192	671
Region FE			✓	✓	✓	✓	✓	✓
Size Class FE			✓	✓	✓	✓	✓	✓
State-Industry FE			✓		✓		✓	
Industry FE				✓		✓		✓
Survey Controls					✓	✓	✓	✓
Balance Sheet Controls							✓	✓

Note: This Table presents the results of the estimation of the following regressions: Funding Use$_{fc}$ = $\alpha + \beta$CEO Older than 65$_{fc} + \Gamma X_{fc} + \epsilon_{fc}$, where Funding Use$_{fc}$ is a dummy equal to 1 if firm f located in country c used external resources for specific purposes; these purposes can be increasing the scale of the business, financing working capital, or optimizing the funding mix; CEO Older than 65$_{fc}$ is a dummy taking value 1 if the firm is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Managerial Constraint$_{fc}$ is a dummy equal to one if, in the answer to the survey, firm's f respondent claimed that lacking managerial resources constrain the growth of the firm; Financial Constraint$_{fc}$ is an equivalent dummy, if financial resources are mentioned as a constraint growth. X_{fc} is a matrix of covariates. It includes, at its largest, **Survey controls** and **Balance sheet controls**, which are the same as in Table 2. Control variables' estimated effects are available in the Section IV (Appendix), Table 11.

III Theory

In Section II I show that older managers in Italy have easier access to credit even after controlling for firm type and performance. It is thus reasonable to ask under which conditions this may imply a waste. Also, if waste is implied, is there any space for policy intervention. I.e., can we talk of inefficiency and in which sense? In order to answer

[15] I only use three of the five resource use dummies provided. I focus on dummies recording resource use to a) increase production scale, b) fund working capital, c) optimize the financing mix. I do so as almost no firm in the dataset answers that it used external finances to fund acquisitions.

this question, I present a simple, static general equilibrium model in which some agents face a higher cost for accessing funding. In this setting, I stack the cards in favor of the "intervention" scenario, and I show that, even if we assume that young people are all endowed with better human capital than old people, a case for policy requires further frictions to be added.

III.1 Environment

Consider a static economy where two mass-one continuums of agents - young and old, but these are just labels in my setting - coexist. All of them are risk-neutral. In this economy, firms operate technology with decreasing labour returns and constant returns in managerial quality. Each firm is going to produce output y in quantity

$$y = h^{\mathrm{M}} n^{\alpha} \tag{4}$$

where n is labor, h^{M} is managerial quality - with superscript $\mathrm{M} \in \{O, Y\}$ tracking whether firm's manager is old or young -, and α is the span of control parameter, assumed to be smaller or equal than 0.5.[16]

Output is produced at the end of the single period, but wages must be paid at the beginning. The agents have no individual wealth before production is realized, and there is a risk-neutral, deep-pocketed investor, with an outside option paying 1 \$ for each \$ dollar invested. The economy is non-stochastic, and there is no way to default on the loan. Nevertheless, the marginal cost of lending to older people is 0 on top and above the 1 \$ opportunity cost, while the marginal cost of lending to young people is γ. Such assumption is a reduced form shortcut to represent the relatively smaller cost of dealing with well-known counterparts and matches the evidence I provided.[17] I will focus on the case in which the young agents are more skilled than the old agents, relevant to potential interventions.[18] I.e., I will assume that the young generation's ability is higher than the old generation's ability: $h^O = 1,\ h^Y = x,$ s.t. $x > 1$.

There are thus two market clearing conditions for this economy, one for the good, and one for the labor market. Expressing all quantities in per manager terms, we have:

[16]This assumption is necessary for such a setting to have people willingly pursuing a manager career in equilibrium.

[17]For more empirical evidence of how old owners and managers come with established relationships, which grant considerable advantages in accessing credit, I refer to Engelberg, Gao, and Parsons (2012), Haselmann, Schoenherr, and Vig (2018), Karolyi (2018).

[18]Moreover, Daveri and Maliranta (2007) and Daveri and Parisi (2015) bring evidence that old managers in innovation intensive industries may arm performance.

$$c^{\mathrm{M}} + R^{\mathrm{M}} n c^{\mathrm{W}} = (n)^{\alpha} h^{\mathrm{M}}$$

(5)

$$n = 1$$

where the W apex indicates the worker and R is the gross interest rate required by the bank to pay the stipends in advance, which will equal 1 if $\mathrm{M} = O$ and $1 + \gamma$ if $\mathrm{M} = Y$.

III.2 Manager problem

Each manager must solve the following constrained maximization

$$\underset{n}{\mathrm{Max}} \quad h^{\mathrm{M}} n^{\alpha} - w R^{\mathrm{M}} n \qquad \Rightarrow \; n = \left(\frac{\alpha h^{\mathrm{M}}}{R^{\mathrm{M}} w} \right)^{\frac{1}{1-\alpha}} \quad \text{(F.O.C.)} \tag{6}$$

where n is the amount of workers per manager the firm employs, and w is the equilibrium wage. The solution of the manager's problem allows us to write the profit as a function of the manager's quality, interest rate faced, and market wage

$$\pi \left(h^{\mathrm{M}}, R^{\mathrm{M}}, w \right) = h^{\mathrm{M}} \left(\frac{\alpha h^{\mathrm{M}}}{R^{\mathrm{M}} w} \right)^{\frac{\alpha}{1-\alpha}} (1 - \alpha) \tag{7}$$

For simplicity, I assumed that all young have the same quality $x > 1$, while the old have the same quality 1, only two possible firms' allocations can emerge in equilibrium (considering only pure strategies). In one case, the young agents get to lead the firms, and the firms will have to pay the relationships set up costs with the bank and $R^{\mathrm{M}} = 1 + \gamma$. In this case, the wages and profits implied by the market clearing conditions in 5, and the first-order condition in 6, are

$$w = \frac{\alpha x}{1 + \gamma}, \quad \pi \left(x, 1 + \gamma, w \right) = (1 - \alpha) x \tag{8}$$

while, in the other case, $R^{\mathrm{M}} = 1$, wages and profits are

$$w = \alpha, \quad \pi \left(1, w \right) = (1 - \alpha) \tag{9}$$

In the following, I will study which of these two outcomes emerges in equilibrium in

a market for firms' control.

III.3 Equilibrium in the market for control

Similarly to Caselli and Gennaioli (2005), I am going to assume that firms are associated with licenses. Such licenses are initially with the old agents, and the young can buy them for q dollars. To begin with, I will also assume that the higher cost of dealing with the external investor for the young is the only friction. The contracts between old owner-managers and young aspiring owner-managers allow transferring wealth between the two with no waste. In such a context, the value function of a young agent buying the firm from an old agent, and the one of an old agent selling, are

$$\begin{aligned} V_{\text{Young}}\left(\text{Buying}\right) &= x\left(\frac{\alpha x}{(1+\gamma)w}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha)-q \\ V_{\text{Old}}\left(\text{Selling}\right) &= w+q \end{aligned} \tag{10}$$

while, if the young do not buy and the old does not sell, individual value functions are

$$\begin{aligned} V_{\text{Old}}\left(\text{Keeping}\right) &= \left(\frac{\alpha}{w}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) \\ V_{\text{Young}}\left(\text{Not Buying}\right) &= w \end{aligned} \tag{11}$$

it follows that (details and algebra are shown in the Appendix).

Proposition 1 *There exists a unique competitive equilibrium which involves firms being managed by young agents if $x \geq (1+\gamma)^{\alpha}$, and by old agents if $x < (1+\gamma)^{\alpha}$.*

In order to find the allocation of control rights over firms implied by the equilibrium of this market, it is not necessary to know the exact price of the firms in equilibrium, only the willingness (or not) of the old agents to sell the licenses. The old and the young's value functions in the two equilibria (trade and no trade), together with the value functions in case of deviation from each equilibrium, will pin down this willingness.

Consider the equilibrium without trade, whose wage and profits are given in 9, and the deviations thereof.[19] The payoffs of such deviations can be easily obtained by inputting equilibrium wages in 7

[19]Deviations involve old agents still willing to sell the firm and young agents still willing to buy.

$$
\begin{aligned}
&V_{\text{Young}}\left(\text{Deviation} \mid \text{No-Trade}\right) = x\left(\frac{x}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) - q \\
&V_{\text{Old}}\left(\text{Deviation} \mid \text{No-Trade}\right) = \alpha + q
\end{aligned} \tag{12}
$$

from these, I can derive an upper bound for the price of the firm under no trade, $\bar{q}$ - the most the young would pay for the firm in the no-trade equilibrium - and a lower bound $\underline{q}$ - the least the old would accept in the no-trade equilibrium.

$$
\begin{aligned}
&\bar{q} = \pi_{\text{Young}}\left(\text{Deviation} \mid \text{No-Trade}\right) - w = x\left(\frac{\alpha x}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) - \alpha \\
&\underline{q} = \pi_{\text{Old}}\left(\text{Keeping} \mid \text{No-Trade}\right) - w = (1-\alpha) - \alpha
\end{aligned} \tag{13}
$$

and the equilibrium without trade will exist as long as $\bar{q} < \underline{q}$, i.e.

$$
x < (1+\gamma)^{\alpha} \tag{14}
$$

Conversely, starting from the standpoint of the equilibrium with trade, we have that the wage and profits are given in 8. Deviation in such a case would involve an old agent who is not willing to sell the firm and a young agent not willing to buy. The payoffs of such deviations are

$$
\begin{aligned}
&V_{\text{Young}}\left(\text{Deviation} \mid \text{Trade}\right) = \frac{\alpha x}{1+\gamma} \\
&V_{\text{Old}}\left(\text{Deviation} \mid \text{Trade}\right) = \left(\frac{1+\gamma}{x}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha)
\end{aligned} \tag{15}
$$

in this case, existence requires a non-empty range of prices between the most the young would pay under the trade equilibrium, $\bar{q}$, and the least the old would accept in the trade equilibrium, $\underline{q}$, such that the firm can actually be traded on-path. As

$$
\begin{aligned}
&\bar{q} = \pi_{\text{Young}}\left(\text{Buying} \mid \text{Trade}\right) - w = x(1-\alpha) - \frac{\alpha x}{1+\gamma} \\
&\underline{q} = \pi_{\text{Old}}\left(\text{Deviation} \mid \text{Trade}\right) - w = \left(\frac{1+\gamma}{x}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) - \frac{\alpha x}{1+\gamma}
\end{aligned} \tag{16}
$$

non-emptiness of the price range, i.e $\bar{q} \geq \underline{q}$ is equivalent to the complement of 14

$$x \geq (1+\gamma)^{\alpha} \tag{17}$$

which proves that a unique threshold determines the unique equilibrium in the control market.[20] In allocating control, young and old agents in this economy will trade-off the higher "quality" of the young, unconnected agents against the cost of setting up their relationships with the investor.

III.4 Efficiency of the allocation in the market for control

This framework presents complementarities in the action of trading the firm. If the equilibrium entails trade, trade increases the wages and makes old agents more willing to sell the firm. I will show a region in the parameter space in which promotion would increase the overall economy resources, but the increase in wage upon the trade is not enough to make each old agent willing to trade the firm. In these situations, I will speak about waste. Though, such waste does not imply an inefficiency since, as long as the control market is perfect, a planner could not do better while respecting the same constraints as the agents.

In the following, I will first show the formal result, and I will further comment on its economics before presenting the planner problem.

Proposition 2 *There exist $\bar{x}$: for all $x \in [\bar{x}, (1+\gamma)^{\alpha}]$ the allocation of control rights over firms to the young entails a higher total welfare than the equilibrium allocation without trade.*

Consider the resource constraints under the two different equilibria

$$\begin{aligned} &\text{(Resource Constraint, } RO\text{) } c^Y + c^O = 1 \text{ if } \mathrm{M} = O \\ &\text{(Resource Constraint, } RY\text{) } c^Y + c^O = x - \gamma\frac{\alpha x}{1+\gamma} \text{ if } \mathrm{M} = Y \end{aligned} \tag{18}$$

If the old agents are in control, managers' quality is lower ($h^O = 1$), but there is no transaction cost to access resources necessary to pay wages; if the young are in control,

[20] Again, I stress that this refers only to pure strategies. Mixed strategies are possible even in this simple setting, with a fraction of old and a fraction of young owning the firm. They would, though, require the old and the young to be *both* indifferent between working and managing. Such indifference is possible if and only if x equals $(1+\gamma)^{\alpha}$, so the equilibrium is unique up to a measure zero point in the parameter space.

managers' quality is higher ($h^Y = x$), but the credit friction bites (and I evaluate it at the equilibrium wage: $\gamma\frac{\alpha x}{1+\gamma}$).

By comparing the total resources in RO and RY, it is easy to see that the condition under which total resources are higher under RY is different from $x \geq (1+\gamma)^\alpha$.

$$x\frac{1+\gamma(1-\alpha)}{1+\gamma} \geq 1 \;\Leftrightarrow\; x \geq \frac{1+\gamma}{1+\gamma(1-\alpha)} \tag{19}$$

in the following, I will refer to this threshold as the no-waste threshold.

As $\alpha \leq 0.5$ by assumption, the no-waste threshold is always below the $(1+\gamma)^\alpha$ threshold determining the existence of the equilibrium with trade.[21] This inequality implies that for some x differences in the managerial ability of old and young, allocating control to the young would increase available resources but cannot be supported by free exchange.

Even though this shows that the economy can be far from the unconstrained optimum, it does not *per se* imply that there is meaningful space for policy. The waste stems from the fact that the equilibrium wage in the labor market depends on the allocation of control rights. If γ is small enough/x big enough to make the equilibrium wage with promotion higher than the equilibrium wage without promotion, higher wages implied by the equilibrium with promotion make this same equilibrium easier to sustain. Indeed, higher wages decrease profits and increase the opportunity cost of managing the firm. In this way, my model captures the idea that quicker growth, also pushed by quicker adoption of new skills/practices/technology, implies more "good jobs" than the very top jobs. This availability of "good jobs" makes the leadership turnaround, necessary to adopt the new skills, easier. As this acts through equilibrium prices, no single agent internalizes it in a competitive market for control, so we may have no promotion, even though promotion would increase the resources available to the economy.

On the other hand, as the control market is without friction, agents pursue all the mutually gainful trades with respect to their available alternatives. The waste cannot be undone with ex-post *efficient* taxes and transfers, but only with ex-ante redistribution of the property rights.[22]

To see this formally, I state and prove the following proposition.

Proposition 3 *The equilibrium implied by the market for control is constrained efficient:*

[21] The same statement is valid as long as $\alpha \leq 1$—detailed proof in the Appendix.

[22] A government that could instead commit to tax and throw away resources if the inferior equilibrium emerges could improve the situation. However, such a government would need to commit to a threat that would not be credible as long as it cares about people's welfare before and after the equilibrium is realized.

A planner who cannot undo 1) the resource constraints of the economy, 2) the higher cost at which young owner-managers borrow for paying wages, and 3) the participation constraints of the agents, cannot propose a better allocation to these agents.

In order to prove this, I envision a utilitarian planner[23] facing the following constraints

$$\max_{c^Y,\, c^O,\, \mathrm{M}\in\{Y,O\}} c^Y + c^O$$

$$\begin{aligned}
&\text{(Labor Resource Constraint) } n = 1 \\
&\text{(Resource Constraint) } c^Y + c^O = n^\alpha \text{ if } \mathrm{M} = O \\
&\text{(Resource Constraint) } c^Y + c^O = n^\alpha x - \gamma \frac{\alpha x}{1+\gamma} n^{\alpha-1} n \text{ if } \mathrm{M} = Y \\
&\text{(Participation Constraint } Y) \; c^Y \geq V_Y(\text{Buying}|\ \mathrm{M} = O) = \alpha \\
&\text{(Participation Constraint } O) \; c^O \geq V_O(\text{Selling}|\ \mathrm{M} = O) = x n_{dev}^\alpha(O)(1-\alpha) \\
&\text{(Participation Constraint } Y) \; c^Y \geq V_Y(\text{Not Buying}|\ \mathrm{M} = Y) = \frac{\alpha x}{1+\gamma} n^{\alpha-1} \\
&\text{(Participation Constraint } O) \; c^O \geq V_O(\text{Keeping}|\ \mathrm{M} = Y) = n_{dev}^\alpha(Y)(1-\alpha)
\end{aligned} \tag{20}$$

in the following, I will refer to each constraint by the initial letters, plus the letter labelling whether the control is allocated to old or young agents. Hence, the resource constraint if the old manage the firms will be RO, the participation constraint of the young if the old lead the firms will be $PCOY$, and so on.

Here the first two constraints exactly mirror the ones faced by the market economy. The labor and production markets must be cleared. In the third constraint, instead, the planner faces a $\gamma \frac{\alpha x}{1+\gamma} n^{\alpha-1}$ loss per each agent allocated to firms managed by young managers. I.e. a fraction of the marginal productivity of the workers is lost to the financial friction. This loss mirrors the loss of the economy when the young agents must interact with the bank. Finally, the fourth and fifth constraints imply that even though the planner can redistribute consumption and property rights, it cannot propose a plan entailing less consumption to each agent than they would achieve independently, given their original property rights. This, assuming that they would otherwise hire labor in the way they see fit, i.e. $n_{dev}(Y) = \left(\frac{1+\gamma}{x}\right)^{\frac{1}{1-\alpha}}$ for the deviation from the young managers allocation, and $n_{dev}(O) = \left(\frac{x}{1+\gamma}\right)^{\frac{1}{1-\alpha}}$ vice-versa.

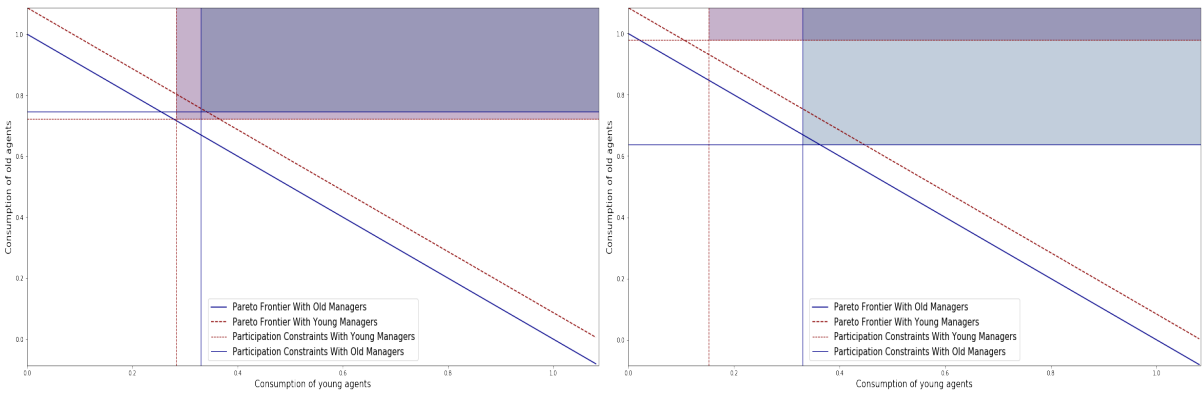
Consider an allocation giving the bare minimum to both young and old so that $PCOY$ and $PCYY$ are respected. Such allocation respects the resource constraint RY if and only if

[23] A planner who applies equal Pareto weights to the young and the old cohort.

$$
\begin{aligned}
&\frac{\alpha x}{1+\gamma} + \left(\frac{1+\gamma}{x}\right)^{\frac{\alpha}{1-\alpha}} (1-\alpha) \leq x \frac{1+\gamma(1-\alpha)}{1+\gamma} \Leftrightarrow \\
&\left(\frac{1+\gamma}{x}\right)^{\frac{\alpha}{1-\alpha}} (1-\alpha) \leq x(1-\alpha) \Leftrightarrow x \geq (1+\gamma)^{\alpha}
\end{aligned} \tag{21}
$$

as this condition is coincident with the equilibrium existence one in 17, the above shows there is no way to improve on the market allocation respecting the participation constraints. I present graphical illustration of attainable and unattainable unconstrained optimum through Pareto-frontier plots in Figure 6a and 6b.

(a) Attainable first best (b) Unattainable first best



Note: The Figure represents two possible Pareto-problems, in the first one the unconstrained optimum is attainable to both the planner and the market, in the second it is not. Consumption of old agents is on the y-axes, and consumption of the young on the x-axes. The red dashed line plots the Pareto frontier if control rights are allocated to the young agents (RY); the blue line plots the Pareto frontier if control rights are allocated to the old agents (RO); the shaded red area represents the allocations that are compatible with the agents' participation constraints if control rights are allocated to young agents (intersection of $PCYY$ and $PCYO$); the shaded blue area represents the allocations that are compatible with the agents' participation constraints if control rights are allocated to old agents (intersection of $PCOY$ and $PCOO$).

Each plot shows on the y-axis consumption of the old and on the x-axis consumption of the young. Consumption to old and young are traded off on the red dashed line (RY) if management is allocated to the young and on the blue line (RO) if management is allocated to the old. Minimum consumption accepted to participate in the allocation is depicted as dashed red lines for the young and blue lines for the old ($PCMY$ and $PCMO$), with shaded areas representing feasible allocations under such constraints. Even if in both cases the "red" allocation is better in terms of total welfare, in Figure 6b the most the young would be willing to pay for the firm is less than the least the old would accept.

Say I want to try and reshuffle consumption with budget-balanced transfers τ_Y, τ_O: $\tau_Y + \tau_O = 0$ in Figure 6b, so to make the red line attainable. The graphical equivalent of the proof above comes by observing that if I move the old participation constraint

down by subtracting τ to the right-hand side of $PCYO$, by balanced-budget, I must add it back to $PCYY$'s right-hand side, moving it to the right, keeping the "red" allocation unfeasible.

III.5 The enforcement friction in the market for control

I will then consider the case in which the exchange of control rights between old and young agents is frictional. In this case, the friction in the market, affecting wages, creates a discrepancy in how the young and the old value the effect of one more dollar of wages when trading the firm, opening the door to constrained inefficiency and possible policies addressing it.

I will assume that the transaction between young and old agents involves an iceberg cost $\phi \in [0, 1]$, such that, if the young pay the price q, the old will only receive $q(1-\phi)$.[24] The value function of a young agent buying the firm from an old agent and the old agent selling will be modified as follows

$$
\begin{aligned}
V_{\text{Young}}\,(\text{Buying}) &= x\left(\frac{\alpha x}{(1+\gamma)w}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) - q \\
V_{\text{Old}}\,(\text{Selling}) &= w + q(1-\phi)
\end{aligned}
\tag{22}
$$

while, if the young do not buy and the old do not sell, individual value functions are the same as in 11. In this case, the iceberg cost creates the possibility of multiple equilibria.

Proposition 4 *Equilibrium existence depends on the relative magnitudes of γ, ϕ, α and x, through the thresholds*

$$
\begin{aligned}
&(A)\ x \geq (1+\gamma)^{\alpha}\left[\frac{(1-\alpha)}{(1-\alpha)(1-\phi)+\frac{\phi\alpha}{1+\gamma}}\right]^{1-\alpha} \\
&(B)\ x < (1+\gamma)^{\alpha}\left[\frac{1-\alpha(1+\phi)}{(1-\alpha)(1-\phi)}\right]^{1-\alpha}
\end{aligned}
\tag{23}
$$

Whenever both (A) and (B) are violated, there exists no equilibrium in pure strategies; when (A) is verified, but (B) is not, then there exists a unique equilibrium in pure strategies, with young agents managing the firms; when (A) is not verified, but (B) is,

[24] There are multiple ways to justify this ϕ term. From steep notary fees if an actual transaction is involved to the risk of not being conferred the agreed-upon stream of utility if we would interpret this transaction as the promotion of a young manager, conditional on the old manager serving on the firm board/being compensated with some perks for stepping down.

then there exists a unique equilibrium in pure strategies, with old agents managing the firms; finally, if both (A) and (B) are verified, multiple equilibria in pure strategies exist.

Again, to pin down the equilibrium allocation of control rights, we need to determine the upper and lower bound for the price at which control of the firm is traded, q.

Consider the equilibrium without trade; in such equilibrium, the wage and profits are given in 9. Each agent is also allowed to deviate. For example, an old agent may still be willing to sell the firm, and a young agent to buy it. The payoffs of such deviations are

$$
\begin{aligned}
V_{\text{Young}}\left(\text{Deviation} \mid \text{No-Trade}\right) &= x\left(\frac{x}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) - q \\
V_{\text{Old}}\left(\text{Deviation} \mid \text{No-Trade}\right) &= \alpha + q(1-\phi)
\end{aligned}
\tag{24}
$$

from these I can derive an upper bound for the q price of deviation, $\bar{q}$, the most the young would pay for the firm, and a lower bound $\underline{q}$, the least the old would accept.

$$
\begin{aligned}
\bar{q} &= \pi_{\text{Young}}\left(\text{Deviation} \mid \text{No-Trade}\right) - w = x\left(\frac{x}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) - \alpha \\
\underline{q} &= \frac{1}{1-\phi}\left[\pi_{\text{Old}}\left(\text{Keeping} \mid \text{ No-Trade}\right) - w\right] = \frac{1}{1-\phi}\left[(1-\alpha) - \alpha\right]
\end{aligned}
\tag{25}
$$

and the equilibrium without trade will exist as long as $\bar{q} < \underline{q}$, which yields condition (B).

Conversely, starting from the standpoint of equilibrium with trade, we have that the wage and profits are given in 8. Deviation in such a case would involve an old agent who is not willing to sell the firm and a young agent not willing to buy. The payoffs of such deviations are

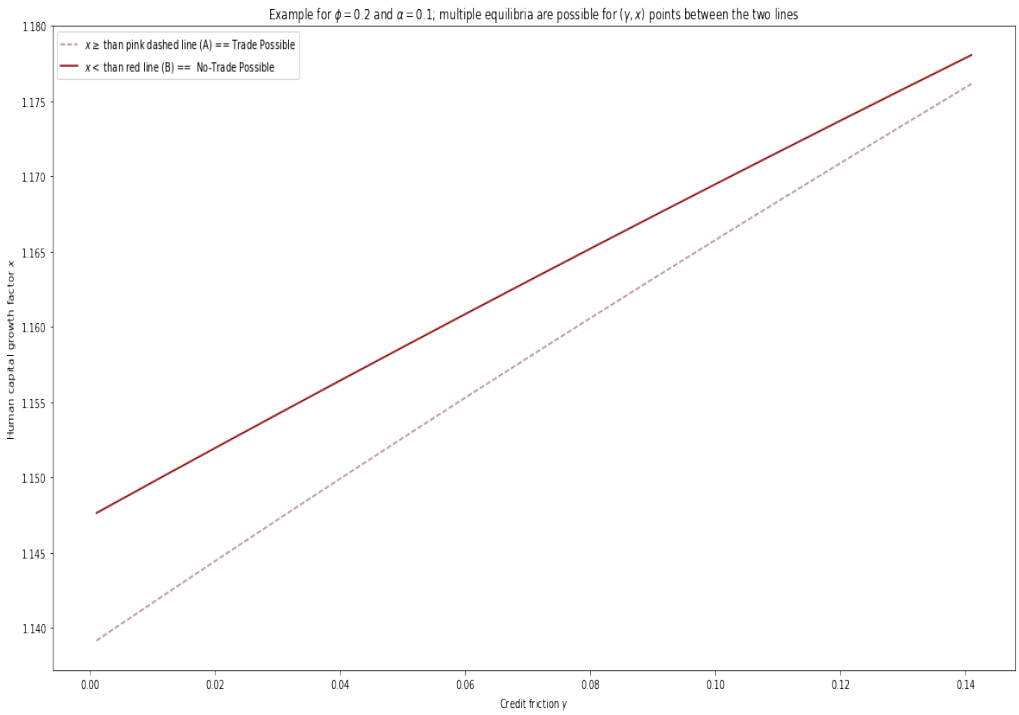
$$
\begin{aligned}
V_{\text{Young}}\left(\text{Deviation} \mid \text{Trade}\right) &= \frac{\alpha x}{1+\gamma} \\
V_{\text{Old}}\left(\text{Deviation} \mid \text{Trade}\right) &= \left(\frac{1+\gamma}{x}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha)
\end{aligned}
\tag{26}
$$

in this case, existence requires a non-empty range of prices between the most the young would pay, $\bar{q}$, and the least the old would accept, $\underline{q}$, such that the firm can be traded on path. As

$$
\begin{aligned}
&\bar{q} = \pi_{\text{Young}}\left(\text{Buying}|\ \text{Trade}\right) - w = x(1-\alpha) - \frac{\alpha x}{1+\gamma} \\
&\underline{q} = \frac{1}{1-\phi}\left[\pi_{\text{Old}}\left(\text{Deviation}\ |\ \text{Trade}\right) - w\right] = \\
&\frac{1}{1-\phi}\left[\left(\frac{1+\gamma}{x}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) - \frac{\alpha x}{1+\gamma}\right]
\end{aligned} \tag{27}
$$

non-emptiness of the price range, i.e. $\bar{q} \geq \underline{q}$ will now yield condition (A).

Figure 7: Possibility of multiple equilibria



Note: *Note*: The Figure shows how the market for control can allow for multiple equilibria. On the y axis we represent the x difference in the human capital of young and old agents. On the x axis we represent the *gamma* friction faced by the young agent in the market for credit. The pink dashed line represents (A) in Proposition 4; all combinations of the x and γ parameters above the pink line are such that the equilibrium with trade of the firm exists. The red line represents (B) in Proposition 4; all combinations of the x and γ parameters below the red line are such that the equilibrium without trade of the firm exists.

As it is possible to see in Figure 7, both (A) and (B) can be met at the same time. Allowing for friction also in the control market, we open the door to a multiplicity of equilibria, hence the possibility of living in an economy "stuck" in the bad one.

III.5.1 Efficiency and the friction in the market for control

As previously mentioned, an increase in wage entails two effects for the old and the young: It decreases firm value and raises the opportunity cost of managing the firm. In addition, though, there is a third effect now for the old agent, and only for her. All else equal, a higher wage implies that a smaller portion of her total income is subject to the transaction cost. Hence, a rise in wages decreases the value of retaining the firm for the old agent more than decreases the value of acquiring it for the young one.

The result of this mismatch is that now multiple allocations in the control market can be consistent with the participation constraints of the agents. This multiplicity implies that welfare-improving policies are possible even if the planner must respect such constraints, as she can play a role in ruling out the Pareto-inferior equilibrium.

The first pre-requisite for this to be possible is that the no-waste threshold does not coincide with either (A) or (B), and that it can be located in the space between (A) and (B) when both (A) and (B) are respected. In this case, there will be two equilibria, both possible, one superior and one inferior in terms of total resources and welfare.

Proposition 5 *The no-waste threshold does not coincide with* (A) *and* (B)*, and can be included within* (A) *and* (B)*.*

Consider the resource constraints under the two different equilibria. Now there is an additional loss component, the ϕ friction. This loss is the larger, the higher the price at which a firm trades; in order to prove my result for all the possible prices, it is then enough to consider the case of the higher possible q in the equilibrium with trade, i.e. $\bar{q} = (1-\alpha)x + \frac{\alpha x}{1+\gamma}$ in condition 27.

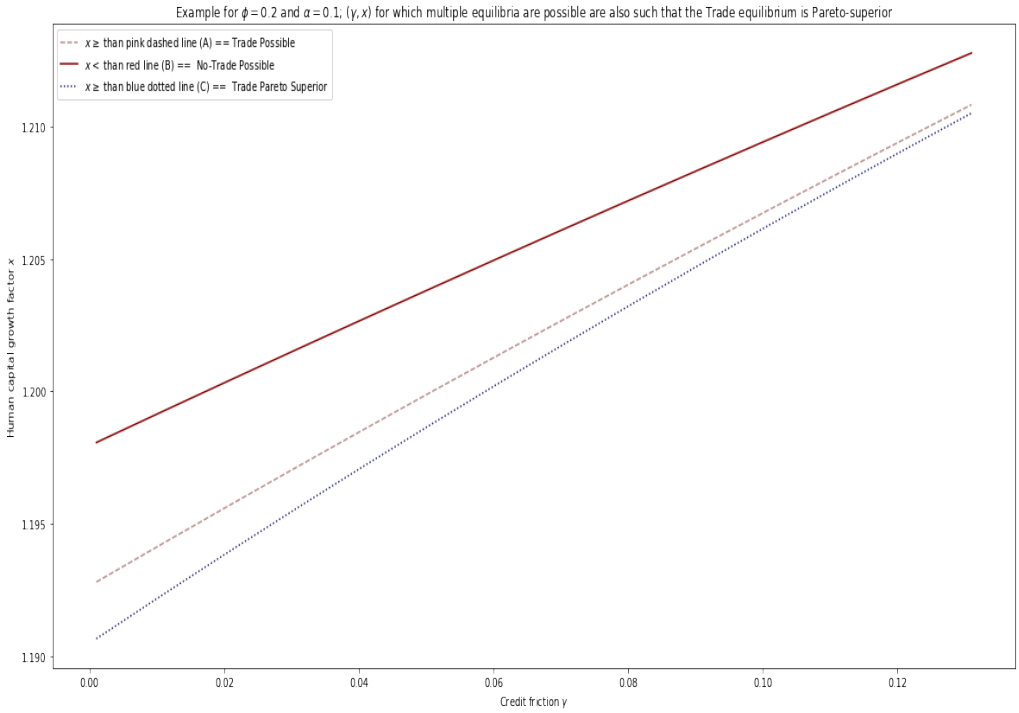
$$\begin{aligned} &\text{(Resource Constraint, } RO) \; c^Y + c^O = 1 \text{ if } \; \mathrm{M} = O \\ &\text{(Resource Constraint, } RY') \; c^Y + c^O = x - \gamma \frac{\alpha x}{1+\gamma} - \phi \bar{q} \text{ if } \mathrm{M} = Y \end{aligned} \tag{28}$$

The no-waste threshold, resulting from the comparison of the unchanged RO with the modified RY', is thus changed in

$$(C) \; x \geq \frac{1+\gamma}{(1-\phi)(1-\alpha)(1+\gamma) + \alpha(1+\phi)} \tag{29}$$

and it is again possible to prove that, for $\alpha < 0.5$, x can respect both (A) and (C). If it is also true that (B) is respected, then the possibility of an inefficient equilibrium without promotion is verified. I verify the possibility of this case within the model graphically and display it in Figure 8.

Figure 8: Multiple equilibria, example where trade is Pareto-dominant



Note: The Figure shows an instance of how the existence of multiple equilibria implies Pareto-superiority of the equilibrium with trade. On the y axis we represent the x difference in the human capital of young and old agents. On the x axis we represent the *gamma* friction faced by the young agent in the market for credit. The pink dashed line represents (A) in Proposition 4; all combinations of the x and γ parameters above the pink line are such that the equilibrium with trade of the firm exists. The red line represents (B) in Proposition 4; all combinations of the x and γ parameters below the red line are such that the equilibrium without trade of the firm exists. The blue dotted line represents (C), the right-hand side of Inequality 29; all combinations of the x and γ parameters above the blue line are such that the equilibrium with trade of the firm is Pareto-superior.

In this case, it is then possible for the planner to improve market allocation.

Proposition 6 *The equilibrium implied by the frictional market for control can be inefficient: A planner who cannot undo 1) the resource constraints of the economy, 2) the higher cost at which young owner-managers borrow for paying wages, and 3) the participation constraints of the agents, can improve on the market allocation.*

$$\max_{c^Y,\, c^O,\, \mathrm{M}\in\{Y,O\}} c^Y + c^O$$

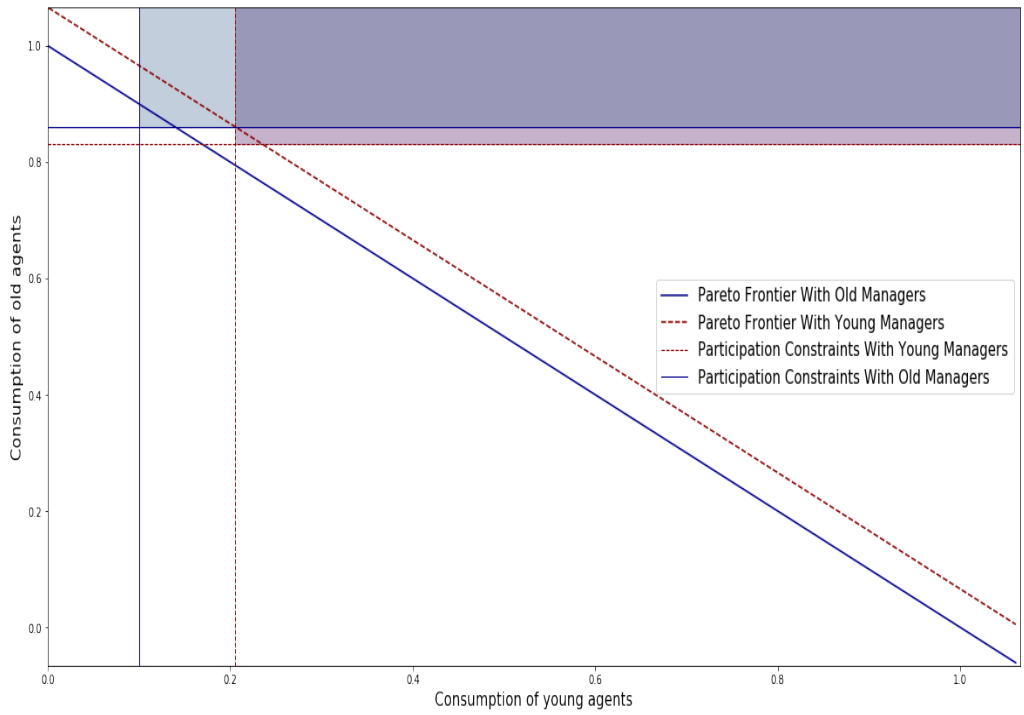
$$
\begin{aligned}
&(LRC)\ n = 1 \\
&(RO)\ c^Y + c^O = n^\alpha \text{ if } \mathrm{M} = O \\
&(RY)\ c^Y + c^O = n^\alpha x - (\gamma - \phi)\frac{\alpha x}{1+\gamma} n^{\alpha-1} n - \phi x n^\alpha (1-\alpha) \text{ if } \mathrm{M} = Y \\
&(PCYY)\ c^Y \geq V_Y(\text{Not Buying}|\ \mathrm{M} = Y) = \frac{\alpha x}{1+\gamma} n^{\alpha-1} \\
&(PCOY)\ c^O \geq V_O(\text{Keeping}|\ \mathrm{M} = Y) = n^\alpha_{dev}(Y)(1-\alpha) \\
&(PCYO)\ c^Y \geq V_Y(\text{Buying}|\ \mathrm{M} = O) = \alpha \\
&(PCOO)\ c^O \geq V_O(\text{Selling}|\ \mathrm{M} = O) = \alpha\phi n^{\alpha-1} + (1-\phi) x n^\alpha_{dev}(O)(1-\alpha)
\end{aligned}
\tag{30}
$$

where I use the same labelling for the constraints as in 20.

Concerning the planner problem in 20, the most important difference regards the RY constraint. I add the loss component to trading the firm ($\phi x n^\alpha(1-\alpha)$). This new loss term interacts with the wage, as captured by the $(\gamma - \phi)$ term multiplying the loss due to interacting with the bank. In this setting, increasing the wage decreases the firm's value, and thus the ϕ loss.[25] As this interaction happens through the price of labor, the planner can internalize it and propose a better allocation to an economy stuck in an inferior equilibrium. I show an example of this in Figure 9, where both the equilibria with trade and no trade are possible, and the planner can pick the superior one.

[25] The shift in the participation constraint of the old under $M = O$ is not particularly relevant for my results.

Figure 9: Multiplicity and space for policy



Note: The Figure shows an example in which the first best is attainable, may not be picked by the market, but can always be achieved by the planner within the constraints of the economy. Consumption of old agents is on the y-axis, and consumption of the young on the x-axis. The red dashed line plots the Pareto frontier if control rights are allocated to the young agents (RY); the blue line plots the Pareto frontier if control rights are allocated to the old agents (RO); the shaded red area represents the allocations that are compatible with the agents' participation constraints if control rights are allocated to young agents (intersection of $PCYY$ and $PCYO$); the shaded blue area represents the allocations that are compatible with the agents' participation constraints if control rights are allocated to old agents (intersection of $PCOY$ and $PCOO$).

I will not directly address how such a policy should be designed in this work. Instead, my focus here was on presenting a clear and straightforward case for the cases in which we can argue for *constrained inefficiency*. To think about policy design through the lenses of a similar model would instead require moving a step further, explicitly addressing the issues of beliefs and coordination behind how each decentralized equilibrium can emerge when both ϕ and γ are at play. This extension could be achieved building on the work on fiscal policy and multiplicity by Ennis and Keister (2005).

IV Conclusion

This paper analyzes aggregate and firm-level data on the major European economies, France, Germany, Italy, Spain, and the United Kingdom. I show that the age distribution of Italian managers has a fat right tail when compared to other European major economies'; such discrepancy is not matched by similar discrepancies in the age profile

of the population, in the entry and exit rate of firms, and the age profile of the working population. Moreover, I document how Italy is the worst-performing country in terms of quality of enforcement, concerning the expected time to solve a commercial dispute and the cost of insolvency. Building on previous literature showing that weak enforcement makes credit access more difficult, I show in Bruegel's EFIGE manufacturer dataset that only in Italy a trade-off between the age of CEOs and access to financial resources appears to be at play, as we would expect if the weak enforcement caused an increase in the value of connections and reputation built over time.

Motivated by this evidence, I study the trade-off between adopting a new vintage of human capital (promoting young leadership) and better access to financial resources through the static general equilibrium model of a market firms' control rights. I use the model to derive optimal policy conclusions. I show that the difficulty of accessing financing is not enough to justify direct help to the newcomers even if we assume that their human capital endowment is better. The assumption that the contracting friction directly affects the control market is necessary to argue for such policy.

Appendix

Further proofs and algebra

1. $\bar{q}$ (**No-Trade**) $< \underline{q}$ (**No-Trade**) **implies** $x < (1+\gamma)^{\alpha}$

By plugging expressions in 13, I obtain:

$$
\begin{aligned}
& x\left(\frac{x}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha)-\alpha<(1-\alpha)-\alpha \\
& x^{\frac{1}{1-\alpha}}\left(\frac{1}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}}<1 \\
& x<(1+\gamma)^{\alpha}
\end{aligned}
\tag{31}
$$

2. $\bar{q}$ **(Trade)** $\geq \underline{q}$ **(Trade) implies** $x > (1+\gamma)^{\alpha}$

By plugging expressions in 16, I obtain:

$$
\begin{aligned}
& x(1-\alpha) - \frac{\alpha x}{1+\gamma} \geq \left(\frac{1+\gamma}{x}\right)^{\frac{\alpha}{1-\alpha}} (1-\alpha) - \frac{\alpha x}{1+\gamma} \\
& x^{\frac{1}{1-\alpha}} \left(\frac{1}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}} \geq 1 \\
& x \geq (1+\gamma)^{\alpha}
\end{aligned} \tag{32}
$$

3. **The no-waste threshold (inequality (19)) is weakly below the threshold for the equilibrium allocation of firms to the young (inequality (17)) for all (weakly) decreasing return to scale technologies**

First, we can see that both thresholds are increasing in γ. Second, we can notice that both thresholds are also increasing in α. Third, we can easily check that the thresholds coincide for $\alpha = 0$ and $\alpha = 1$

$$
\begin{aligned}
& (1+\gamma)^{\alpha} = 1 = \frac{1+\gamma}{1+\gamma(1-\alpha)} \text{ for } \alpha = 0 \\
& (1+\gamma)^{\alpha} = 1+\gamma = \frac{1+\gamma}{1+\gamma(1-\alpha)} \text{ for } \alpha = 1
\end{aligned} \tag{33}
$$

then, by monotonicity, if we prove that for a certain α threshold (19) is below threshold (17), we know that the same statement holds true for all γ and for all $\alpha \in (0,1)$. Indeed, pick $\alpha = 0.5$, we can see that

$$
(1+\gamma)^{0.5} > 0.5 \; \forall \; \gamma > 0 \tag{34}
$$

which concludes the argument.

4. $\bar{q}$ (**No-Trade**) $< \underline{q}$ (**No-Trade**) **when** $\phi > 0$ **implies** $x < (1+\gamma)^{\alpha}\left[\frac{1-\alpha(1+\phi)}{(1-\alpha)(1-\phi)}\right]^{1-\alpha}$

By plugging expressions in 25, I obtain:

$$
\begin{aligned}
& x\left(\frac{x}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha)-\alpha \geq \frac{1}{1-\phi}\left[(1-\alpha)-\alpha\right] \\
& x^{\frac{1}{1-\alpha}}\left(\frac{1}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) \geq \frac{(1-\alpha)-\alpha\phi}{1-\phi} \\
& x^{\frac{1}{1-\alpha}}\left(\frac{1}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}} \geq \frac{1-\alpha(1+\phi)}{(1-\alpha)(1-\phi)} \\
& x \geq (1+\gamma)^{\alpha}\left[\frac{1-\alpha(1+\phi)}{(1-\alpha)(1-\phi)}\right]^{1-\alpha}
\end{aligned}
\tag{35}
$$

5. $\bar{q}$ (**Trade**) $\geq \underline{q}$ (**Trade**) **implies** $x > (1+\gamma)^{\alpha}\left[\frac{(1-\alpha)}{(1-\alpha)(1-\phi)+\frac{\phi\alpha}{1+\gamma}}\right]^{1-\alpha}$

By plugging expressions in 27, I obtain:

$$
\begin{aligned}
& x\frac{(1-\alpha)(1+\gamma)-\alpha}{1+\gamma} \geq \frac{1}{1-\phi}\left[\left(\frac{1+\gamma}{x}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha)-\frac{\alpha x}{1+\gamma}\right] \\
& x\frac{(1-\alpha)(1+\gamma)(1-\phi)-\alpha(1-\phi)+\alpha}{1+\gamma} \geq \left(\frac{1+\gamma}{x}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) \\
& x\left(\frac{x}{1+\gamma}\right)^{\frac{\alpha}{1-\alpha}} \geq \frac{(1+\gamma)(1-\alpha)}{(1-\alpha)(1+\gamma)(1-\phi)+\alpha\phi} \\
& x > (1+\gamma)^{\alpha}\left[\frac{(1-\alpha)}{(1-\alpha)(1-\phi)+\frac{\phi\alpha}{1+\gamma}}\right]^{1-\alpha}
\end{aligned}
\tag{36}
$$

Tables

Table 7: Correlation between CEO's old age and Italy

	Dependent variable:			
	CEO Older than 65			
Italy	0.126***	0.129***	0.135***	0.139***
	(13.21)	(12.45)	(13.00)	(7.98)
France	-0.047***	-0.048***	-0.029***	-0.016
	(-6.75)	(-6.27)	(-3.73)	(-1.03)
United Kingdom	0.031***	0.027**	0.048***	0.038*
	(3.32)	(2.57)	(4.59)	(1.95)
Spain	-0.023***	-0.024***	-0.007	-0.007
	(-3.05)	(-3.15)	(-0.84)	(-0.45)
Old Firm			0.061***	0.072***
			(8.47)	(6.95)
CEO related to Owners			0.041***	0.039***
			(6.30)	(4.22)
Active Abroad			0.023***	0.007
			(3.19)	(0.58)
Owned by Foreigners			-0.061***	-0.077***
			(-6.97)	(-7.18)
Employees				0.000
				(1.61)
Total Assets				-0.000**
				(-2.26)
EBITDA				0.001
				(1.04)
Liquidity				0.010***
				(3.21)
Germany (constant)	0.0910***	0.0909***	0.0183***	0.00970
	(16.20)	(15.22)	(2.01)	(0.51)
Industry FE		✓	✓	✓
Region FE		✓	✓	✓
Size Class FE		✓	✓	✓
R^2	0.040	0.044	0.059	0.072
Observations	13,771	13,771	13,771	7,996

Note: This Table presents the results of the estimation of the following regression: CEO Older than $65_{fc} = \alpha + \beta \text{Country Dummies}_c + \Gamma X_{fc} + \epsilon_{fc}$, where CEO Older than 65_{fc} is a dummy taking value 1 if firm f, located in country c, is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Country Dummies_{fc}, dummies equal 1 if firm f is located in country $c \neq$ Germany. X_{fc} is a matrix of covariates. It includes, at its largest, a dummy equal to 1 if the firm birth is before 1976; a dummy equal to 1 if the CEO is related to the owners; a dummy equal to 1 if the firm is an active exporter; a dummy equal to 1 if the firm is owned by foreigners; the number of firm employees; total assets in millions of Euro; EBITDA; liquidity, calculated as fixed assets minus stocks, divided by current liabilities; region, industry, employee size-class fixed effects; ϵ_{fc} is the heteroscedasticity robust standard error.

Table 8: Correlation between CEO's old age and constraints to firm growth

	Dependent variable:							
	CEO Older than 65							
	Else	Italy	Else	Italy	Else	Italy	Else	Italy
Managerial Constraint	-0.002	0.041*	0.019*	0.044*	0.015	0.046**	0.010	0.048**
	(-0.17)	(1.78)	(1.73)	(1.89)	(1.40)	(2.01)	(0.74)	(1.98)
Financial Constraint	-0.022***	-0.044***	-0.015**	-0.041**	-0.017**	-0.044***	-0.016	-0.049***
	(-3.26)	(-2.69)	(-2.20)	(-2.50)	(-2.43)	(-2.71)	(-1.56)	(-2.84)
Old Firm					0.032***	0.117***	0.012	0.115***
					(4.18)	(6.42)	(1.19)	(6.09)
CEO related to Owners					0.051***	0.027	0.077***	0.016
					(7.47)	(1.58)	(6.87)	(0.89)
Active Abroad					0.029***	0.017	0.003	0.007
					(3.66)	(0.90)	(0.22)	(0.34)
Owned by Foreigners					-0.040***	-0.210***	-0.043***	-0.233***
					(-4.12)	(-9.86)	(-3.68)	(-9.35)
Employees							0.00003	0.0003
							(0.50)	(1.46)
Total Assets							-0.00001**	-0.0002
							(-2.35)	(-0.52)
EBITDA							0.000007	-0.001
							(0.02)	(-0.20)
Liquidity							0.003	0.040***
							(0.91)	(3.14)
State-Sector FE			✓		✓		✓	
Industry FE				✓		✓		✓
Region FE			✓	✓	✓	✓	✓	✓
Size Class FE			✓	✓	✓	✓	✓	✓
R^2	0.001	0.003	0.016	0.018	0.031	0.044	0.054	0.055
Observations	8,436	3,020	8,435	3,020	8,435	3,020	3,223	2,685

Note: This Table presents the results of the estimation of the following regression: CEO Older than $65_{fc} = \alpha + \beta$Managerial Constraint$_{fc}$ + ωFinancial Constraint$_{fc} + \Gamma X_{fc} + \epsilon_{fc}$, where CEO Older than 65_{fc} is a dummy taking value 1 if firm f, located in country c, is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Managerial Constraint$_{fc}$ is a dummy equal to one if, in the answer to the survey, firm's f respondent claimed that lacking managerial resources constrain the growth of the firm; Financial Constraint$_{fc}$ is an equivalent dummy, if financial resources are mentioned as a constraint growth. X_{fc} is a matrix of covariates. It includes, at its largest, a dummy equal to 1 if the firm birth is before 1976; a dummy equal to 1 if the CEO is related to the owners; a dummy equal to 1 if the firm is an active exporter; a dummy equal to 1 if the firm is owned by foreigners; the number of firm employees; total assets in millions of Euro; EBITDA; liquidity, calculated as fixed assets minus stocks, divided by current liabilities; region, industry, employee size-class, and country*industry fixed effects; ϵ_{fc} is the heteroscedasticity robust standard error.

Table 9: Correlation between CEO's age of main banking relationship

	Age Main Bank Rel.							
	Else	Italy	Else	Italy	Else	Italy	Else	Italy
CEO Older than 65	4.541***	4.487***	4.406***	4.311***	2.441**	2.989***	1.754*	2.683***
	(3.54)	(5.49)	(3.77)	(5.32)	(2.27)	(3.78)	(1.67)	(3.19)
Old Firm					12.043***	8.117***	8.839***	8.620***
					(19.72)	(11.12)	(13.05)	(11.18)
CEO related to Owners					2.373***	1.652***	1.718***	1.629***
					(4.76)	(2.90)	(3.18)	(2.65)
Active Abroad					-0.689	0.951	-0.997*	1.196*
					(-1.17)	(1.48)	(-1.70)	(1.69)
Owned by Foreigners					-4.015***	-1.705	-3.823***	-2.327
					(-3.98)	(-0.79)	(-3.02)	(-0.99)
Employees							-0.001	-0.013*
							(-0.17)	(-1.68)
Total Assets							-0.006	-0.013
							(-0.90)	(-1.05)
EBITDA							0.059	0.062
							(0.84)	(0.51)
Liquidity							0.089	0.745
							(0.75)	(1.04)
State-Sector FE			✓		✓		✓	
Industry FE				✓		✓		✓
Region FE			✓	✓	✓	✓	✓	✓
Size Class FE			✓	✓	✓	✓	✓	✓
R^2	0.006	0.021	0.101	0.045	0.235	0.141	0.175	0.154
Observations	4,483	1,860	4,482	1,860	4,482	1,860	2,680	1,657

Note: This Table presents the results of the estimation of the following regression: Age Main Bank Rel.$_{fc} = \alpha + \beta$CEO Older than 65$_{fc} + \Gamma X_{fc} + \epsilon_{fc}$, where Age Main Bank Rel.$_{fc}$ is the age in year of the main credit relationship of firm f located in country c, CEO Older than 65$_{fc}$ is a dummy taking value 1 if the firm is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Managerial Constraint$_{fc}$ is a dummy equal to one if, in the answer to the survey, firm's f respondent claimed that lacking managerial resources constrain the growth of the firm; Financial Constraint$_{fc}$ is an equivalent dummy, if financial resources are mentioned as a constraint growth. X_{fc} is a matrix of covariates. It includes, at its largest, a dummy equal to 1 if the firm birth is before 1976; a dummy equal to 1 if the CEO is related to the owners; a dummy equal to 1 if the firm is an active exporter; a dummy equal to 1 if the firm is owned by foreigners; the number of firm employees; total assets in millions of Euro; EBITDA; liquidity, calculated as fixed assets minus stocks, divided by current liabilities; region, industry, employee size-class, and country*industry fixed effects; ϵ_{fc} is the heteroscedasticity robust standard error.

Table 10: Correlation between CEO's and being denied a loan application

	Denied Credit							
	Else	Italy	Else	Italy	Else	Italy	Else	Italy
CEO Older than 65	0.006	-0.070*	0.058	-0.079*	0.056	-0.073*	0.053	-0.100**
	(0.16)	(-1.65)	(1.63)	(-1.84)	(1.53)	(-1.70)	(0.93)	(-2.24)
Old Firm					0.004	-0.015	0.022	-0.007
					(0.21)	(-0.37)	(0.72)	(-0.17)
CEO related to Owners					0.007	-0.079**	-0.009	-0.082*
					(0.31)	(-1.97)	(-0.30)	(-1.95)
Active Abroad					0.028	-0.023	0.035	-0.041
					(1.18)	(-0.52)	(0.87)	(-0.86)
Owned by Foreigners					0.035	0.097	0.034	0.037
					(0.82)	(0.63)	(0.70)	(0.23)
Employees							0.000	0.000
							(1.04)	(0.72)
Total Assets							-0.000	0.003
							(-0.70)	(1.38)
EBITDA							-0.014***	-0.019
							(-2.76)	(-1.52)
Liquidity							-0.020**	-0.146***
							(-2.38)	(-3.58)
State-Sector FE			✓		✓		✓	
Industry FE				✓		✓		✓
Region FE			✓	✓	✓	✓	✓	✓
Size Class FE			✓	✓	✓	✓	✓	✓
R^2	∼0.000	0.003	0.115	0.032	0.117	0.040	0.121	0.060
Observations	1,842	743	1,841	742	1,841	742	1,060	650

Note: This Table presents the results of the estimation of the following regression: Denied Credit$_{fc} = \alpha + \beta$CEO Older than 65$_{fc} + \Gamma X_{fc} + \epsilon_{fc}$, where Denied$_{fc}$ is a dummy equal to 1 if firm f located in country c has been recently denied a credit application; CEO Older than 65$_{fc}$ is a dummy taking value 1 if the firm is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Managerial Constraint$_{fc}$ is a dummy equal to one if, in the answer to the survey, firm's f respondent claimed that lacking managerial resources constrain the growth of the firm; Financial Constraint$_{fc}$ is an equivalent dummy, if financial resources are mentioned as a constraint growth. X_{fc} is a matrix of covariates. It includes, at its largest, a dummy equal to 1 if the firm birth is before 1976; a dummy equal to 1 if the CEO is related to the owners; a dummy equal to 1 if the firm is an active exporter; a dummy equal to 1 if the firm is owned by foreigners; the number of firm employees; total assets in millions of Euro; EBITDA; liquidity, calculated as fixed assets minus stocks, divided by current liabilities; region, industry, employee size-class, and country*industry fixed effects; ϵ_{fc} is the heteroscedasticity robust standard error.

Table 11: Correlation between CEO's and use of external financing

	Increase Scale							
	Else	Italy	Else	Italy	Else	Italy	Else	Italy
CEO Older than 65	-0.072*	-0.011	-0.047	-0.024	-0.049	-0.029	-0.029	-0.031
	(-1.90)	(-0.30)	(-1.28)	(-0.62)	(-1.32)	(-0.73)	(-0.53)	(-0.74)
Observations	1,912	751	1,911	750	1,911	750	1,192	671
	Working Capital							
CEO Older than 65	0.063	0.026	0.105**	0.029	0.112**	0.036	0.100*	0.041
	(1.26)	(0.58)	(2.12)	(0.63)	(2.26)	(0.76)	(1.69)	(0.83)
Observations	1,912	751	1,911	750	1,911	750	1,192	671
	Financing Mix							
CEO Older than 65	-0.021	-0.004	-0.027	0.000	-0.029*	0.001	-0.019	0.010
	(-1.36)	(-0.15)	(-1.60)	(0.00)	(-1.68)	(0.05)	(-1.61)	(0.32)
Observations	1,912	751	1,911	750	1,911	750	1,192	671
Region FE			✓	✓	✓	✓	✓	✓
Size Class FE			✓	✓	✓	✓	✓	✓
State-Industry FE			✓		✓		✓	
Industry FE				✓		✓		✓
Survey Controls					✓	✓	✓	✓
Balance Sheet Controls							✓	✓

Note: This Table presents the results of the estimation of the following regressions: Funding Use$_{fc}$ $= \alpha + \beta$CEO Older than 65$_{fc} + \Gamma X_{fc} + \epsilon_{fc}$, where Funding Use$_{fc}$ is a dummy equal to 1 if firm f located in country c used external resources for specific purposes; these purposes can be increasing the scale of the business, financing working capital, or optimizing the funding mix; CEO Older than 65$_{fc}$ is a dummy taking value 1 if the firm is led by an over-65 CEO; α is a common intercept, coinciding with the excluded country dummy, Germany; Managerial Constraint$_{fc}$ is a dummy equal to one if, in the answer to the survey, firm's f respondent claimed that lacking managerial resources constrain the growth of the firm; Financial Constraint$_{fc}$ is an equivalent dummy, if financial resources are mentioned as a constraint growth. X_{fc} is a matrix of covariates. It includes, at its largest, a dummy equal to 1 if the firm birth is before 1976; a dummy equal to 1 if the CEO is related to the owners; a dummy equal to 1 if the firm is an active exporter; a dummy equal to 1 if the firm is owned by foreigners; the number of firm employees; total assets in millions of Euro; EBITDA; liquidity, calculated as fixed assets minus stocks, divided by current liabilities; region, industry, employee size-class, and country*industry fixed effects; ϵ_{fc} is the heteroscedasticity robust standard error.

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