Financial Constraints and Selection into Entrepreneurship*

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Abstract

We exploit a reduction in the minimum capital required to incorporate a limited liability company in Norway to study selection into entrepreneurship. We find that lowering the capital requirement from $17,000 to $5,000 roughly doubles the number of incorporations, indicating a large presence of marginal entrepreneurs sensitive to policy-induced reductions in financial constraints. We further study how the marginal entrepreneur differs from the average entrepreneur by contrasting the characteristics of pre- and post-reform entrants. We find no evidence that marginal entrepreneurs are of lower quality: they do not have lower IQ scores, lower prior incomes, or less education. While marginal entrepreneurs do create smaller firms in terms of assets and revenues, there is no clear indication that they have lower profitability. Our findings are consistent with a simple model of selection into entrepreneurship where the entrepreneur's liquidity is uncorrelated with entrepreneurial ability and the constraint that entrepreneurial profits exceed opportunity costs rarely binds.

Keywords: Entrepreneurship, ability, selection, incorporation
JEL codes: G50, G38, G31, J24

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1   Introduction

Entrepreneurship is considered to drive economic growth by both policy makers and economists. A key concern is therefore the extent to which capital market imperfections inhibit entrepreneurial activity. As a consequence, policies aimed at reducing the financial frictions faced by entrepreneurs are ubiquitous across the developed world. However, there is considerable uncertainty regarding whether the *marginal* entrepreneurial entry caused by these policies add any economic value due to a quality-quantity tradeoff (Schoar 2010, Hurst and Pugsley 2011, Guzman and Stern 2020, Bonelli, Liebersohn, and Lyonnet 2021). For example, if entrepreneurial ability is strongly correlated with personal liquidity, then relaxing financial constraints may primarily facilitate the entry of lower-ability entrepreneurs.

In this paper, we exploit a 2012 reform that lowered the required amount of capital to incorporate a limited liability company in Norway. Prior to 2012, all firms needed to be incorporated with at least \$17,000 of equity. In order to lower the hurdles associated with business creation, the government lowered this equity requirement to \$5,000. We find that this reform doubles the amount of incorporations. This effect remains when focusing on the subset of incorporations done by individuals who were not already entrepreneurs, which indicates that there was a substantial mass of "marginal" entrepreneurs sensitive to modest reductions in financial barriers to entrepreneurship.

Levine and Rubinstein (2017) argue that it is the incorporated entrepreneurs, as opposed to sole-proprietors, who drive economic growth. They further hypothesize that true entrepreneurs either incorporate or do not become entrepreneurs. This hypothesis applied to our setting implies that we should not see a substitution away from sole-proprietorship entries in favor of incorporations as a result of the reform, which is what we find. While incorporation rates double, there is no discernible reduction in the amount of new sole-proprietorships. However, we do find a sizable effect of the reform on whether previous sole-proprietors incorporate a business. This indicates an overlap between incorporated entrepreneurs and sole-proprietors and suggests that many sole-proprietors would have become incorporated entrepreneurs had they had more capital.

We develop a simple model of selection into entrepreneurship to guide our further analyses. Our model has the standard feature that individuals only chose entrepreneurship if the expected payoff exceeds that of some outside option, for example, from continuing as an employee. Under the assumption that personal liquidity is positively correlated with entrepreneurial ability, a reduction in the equity requirement leads to an inflow of lower-ability entrepreneurs. However, if personal liquidity is uncorrelated with ability and the joint distribution of liquidity and ability is such that the outside-option constraint rarely binds, then an equity requirement reduction leads to an inflow of equal-ability entrepreneurs.

By combining data from the business registries with tax returns, educational attainment registers, and military enlistment test scores, we test attempt to distinguish between these two hypotheses in our data. We do this by examining differences in the characteristics of entrepreneurs before and after the reform. We find no evidence that the marginal entrepreneur has lower cognitive ability, less education, or had lower income prior to becoming an entrepreneur.

Our next analyses consider ex-post outcomes of firms. Our evidence is mixed. We find no evidence that post-reform entrants are less likely to be economically active six years later. We do, however, find evidence that these firms are considerably smaller in terms of assets and revenues. This asset gap, at about 0.6 log points (or about $100,000), is considerably larger than the pure mechanical effect of reducing the equity requirement from $17,000 to $5,000. Consistent with a sharp reduction in firm size in terms of assets, we also find that post-reform entrants are smaller in revenue. While we do observe that post-reform entrants have lower profitability, these effects gradually materialize across the post-2012 cohorts. These gradual effects make it harder to designate these differences as causally driven by the reform as opposed to nonlinear firm age effects. Hence our findings suggest that alleviating financial barriers leads to smaller but not less profitable firms.

Overall, our findings favor the hypothesis based on a model in which personal liquidity and entrepreneurial ability are uncorrelated and would-be entrepreneurs are constrained by finances as opposed to high outside options. In such a model, policies that alleviate financial frictions and increase entrepreneurial are not necessarily subject to a quantity-quality tradeoff.

Literature. We contribute to a large and growing literature on financial frictions and entrepreneurship (see, e.g., Herkenhoff, Phillips, and Cohen-Cole 2021, Hvide and Møen 2010, Fracassi, Garmaise, Kogan, and Natividad 2016, Cespedes, Huang, and Parra 2019, Andersen and Nielsen 2012, Adelino, Schoar, and Severino 2015, Ring 2023, Schmalz, Sraer, and Thesmar 2017, Hurst and Lusardi 2004, Kerr, Kerr, and Nanda 2015, Corradin and Popov 2015, Chodorow-Reich, Nenov, Santos, and Simsek 2023). In this literature, several papers present results at odds with whether financial frictions matter for entrepreneurship (see, e.g., Hurst and Lusardi 2004, Andersen and Nielsen 2012, Kerr, Kerr, and Nanda 2015, Bos, Breza, and Liberman 2018.) For example, Andersen and Nielsen (2012) find that sole-proprietors who enter entrepreneurship following a liquidity shock underperform. Our findings are not inconsistent with this result due to the potentially large difference between sole-proprietor entrepreneurs and incorporated entrepreneurs (see, e.g., Berglann et al. 2011, Levine and Rubinstein 2017, Bellon, Cookson, Gilje, and Heimer 2021). While several studies document that positive wealth shocks induce entrepreneurial entry, and often improve entrepreneurial outcomes conditional on entry (e.g., Schmalz, Sraer, and Thesmar

2017), these results do not allow us to draw inference on whether the marginal entrant is of high ability. These results could be consistent with lower-quality entrepreneurs entering due to reduced barriers and then, conditional on entry, being able to scale up their business more due to eased financing constraints.

We also contribute to a growing literature on business regulation and entrepreneurship (Djankov, La Porta, Lopez-de Silanes, and Shleifer 2002, Klapper, Laeven, and Rajan 2006, Branstetter, Lima, Taylor, and Venâncio 2014, Kaplan, Piedra, and Seira 2011, Cui and Wei 2022, Barwick, Chen, Li, and Zhang 2022, Fang, Li, Wu, and Zhang 2023). While several papers document that entry regulation hampers business formation, there is no consensus on whether easing these regulations facilitate value-added entrepreneurship. While Djankov et al. (2002) argue that business regulation has negative economy-wide effects, Branstetter, Lima, Taylor, and Venâncio (2014) find that deregulating lowers the quality of new firms in terms of the founders' education levels and the firms' survival probabilities. Cui and Wei (2022) and Barwick et al. (2022), on the other hand, find that deregulation causes the entry of higher-productivity entrepreneurs. Closest to our paper are Cui and Wei (2022) and Barwick et al. (2022) who exploit Chinese reforms that entirely or partially consisted of relaxing capital requirements for incorporating a firm. Our main contribution is to exploit detailed, third-party reported data on the entrepreneurs behind the incorporation that provides proxies for ability along several dimensions (e.g., education, cognitive ability, and past incomes) and data on whether they were previously unincorporated entrepreneurs. Another central contribution (shared with Cui and Wei 2022) is to isolate the effects of a capital requirement reduction from other start-up friendly policies such as easier registration procedures. Further related to our work is Hombert, Schoar, Sraer, and Thesmar (2020) who find no reduction in proxies for entrepreneurial ability following a french reform that limited the downside risk to entrepreneurship. We view our findings as complementary in the sense that we study a reform that relaxes financial barriers as opposed to risk-aversion barriers.

Our paper proceeds as follows. Section 2 introduces a conceptual framework to understand how the reform would affect selection into entrepreneurship. Section 3 discusses the reform and the data. Section 4 provides the reduced-form results and Section 5 provides formal estimates on how the marginal entrepreneurs that entered following the reform differ from the existing entrepreneurs. Section 6 concludes.

4

2 Conceptual framework

The entrepreneurial profit function is given by

$$f(\theta_i, k_i) = \theta_i k_i, \tag{1}$$

where $\theta_i > 0$ is entrepreneurial ability, $k_i > 0$ is invested capital. As in Evans and Jovanovic (1989), an individual enters entrepreneurship only if entrepreneurial profits exceed some opportunity cost, s_i, which can be thought of as income from salaried employment:

$$\theta_i k_i \geq s_i. \tag{2}$$

We impose strict financing constraints: k_i can only be equity. Since the profit function is monotonically increasing in k_i, the entrepreneur would want to invest as much capital as possible. Hence, we interpret k_i as the amount of equity that the entrepreneur is able to furnish, i.e., her liquidity, coming either out of her own savings or from other investors.[1]

Next, we allow for a non-zero correlation between k_i, the entrepreneur's liquidity and ability, θ_i. We further allow for a nonzero correlation between the opportunity cost, s_i, and ability:

$$k_i = k + \kappa \theta_i + \varepsilon_i, \tag{3}$$
$$s_i = s + \sigma \theta_i, \tag{4}$$

where ε_i is an idiosyncratic term. That is, some individuals may have more or less liquidity for reasons unrelated to their ability, θ_i. We may now rewrite the selection equation (2) as

$$\underbrace{\theta_i(k + \kappa \theta_i + \varepsilon_i)}_{\text{Entrepreneurial profit}} \geq \underbrace{s_i + \sigma \theta_i}_{\text{Opportunity cost}}. \tag{5}$$

We now impose the capital requirement,

$$k_i \geq \underline{k}, \tag{6}$$

which in our model with no debt financing is equivalent to an equity requirement.

Under different sets of assumptions, a reduction in the equity requirement may have different implications for whether there is any effect on entry and whether new entrants

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[1]In our setting, equity could be furnished by the entrepreneur taking up a personal loan and then using this as equity in the incorporated firm.

have higher or lower ability.

Case 1 (Ability and liquidity positively correlated.). We illustrate the first case in Figure 1. Each dot represents one potential entrepreneur. With a positive correlation between capital and ability, we easily produce a case in which *a reduction in the equity requirement causes new new entrants to have lower average ability.* This is caused by the positive correlation between liquidity and ability. As we allow lower liquidity entrepreneurs to enter, we automatically select lower-ability entrepreneurs due to the positive correlation. We do not claim that a positive correlation between k_i and θ_i unambiguously causes a reduction in average ability. We see that while the positive liquidity-ability gradient works in the direction of lowering average ability, the selection constraint works in the opposite direction. The lowest-ability entrepreneurs do not enter because their entrepreneurial profits do not exceed their opportunity cost (i.e., selection constraint still binds). However, it appears challenging to change the curvature of the selection constraint or shift the capital requirements in such a way that average ability increases, even for nonlinear relationships between k_i and θ_i.

Figure 1: CONCEPTUAL FRAMEWORK, CASE 1: POSITIVE RELATIONSHIP BETWEEN PERSONAL LIQUIDITY AND ENTREPRENEURIAL ABILITY
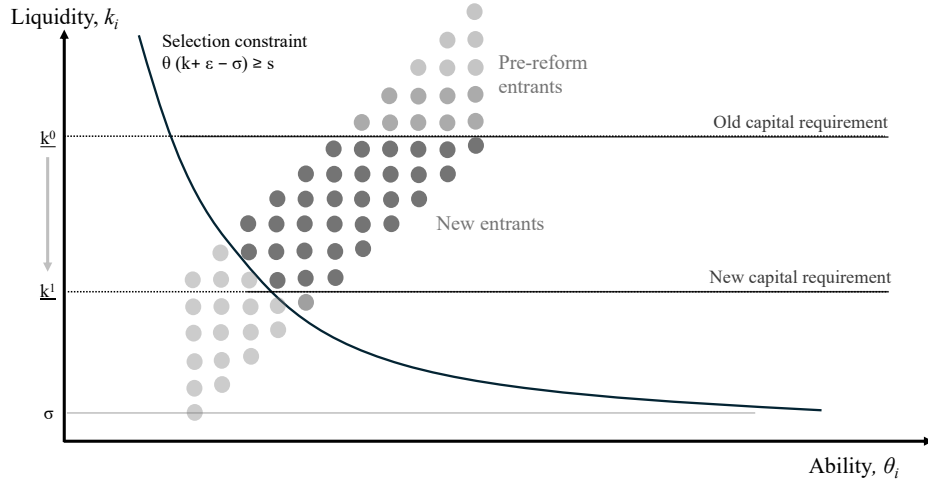
Case 2 (Ability and liquidity uncorrelated). The second case is when ability and personal liquidity are uncorrelated. This mirrors the assumption in Chodorow-Reich et al. (2023), which studies the effect of quasi-experimental variation in liquidity. We describe below how this assumption leads to a case with *entry of new entrepreneurs but that the effect on average entrepreneurial ability is ambiguous.*

Formally, $\kappa = 0$ and thus an individual enters if only if

$$k + \varepsilon_i \qquad \geq \underline{\kappa}, \tag{7}$$

$$\text{and} \quad \theta_i(k + \varepsilon_i - \sigma) \quad \geq s. \tag{8}$$

We see that in this case, lowering the equity requirement induces more entry of low ε_i entrepreneurs. We illustrate this effect in Figure 2, where we lower $\underline{k}$ from $\underline{k}^0$ to $\underline{k}^1$. We see that it is not clear whether new entrants are, on average, of lower ability: it will depend on whether the selection constraint (entrepreneurial profits $\geq$ opportunity cost) ever binds for those who are affected by the reduced capital requirement. Similar to the theoretical framework in Hombert, Schoar, Sraer, and Thesmar (2020), the effect on selection depends on the distribution of ability.

Figure 2: CONCEPTUAL FRAMEWORK, CASE 2: NO CORRELATION BETWEEN PERSONAL LIQUIDITY AND ENTREPRENEURIAL ABILITY
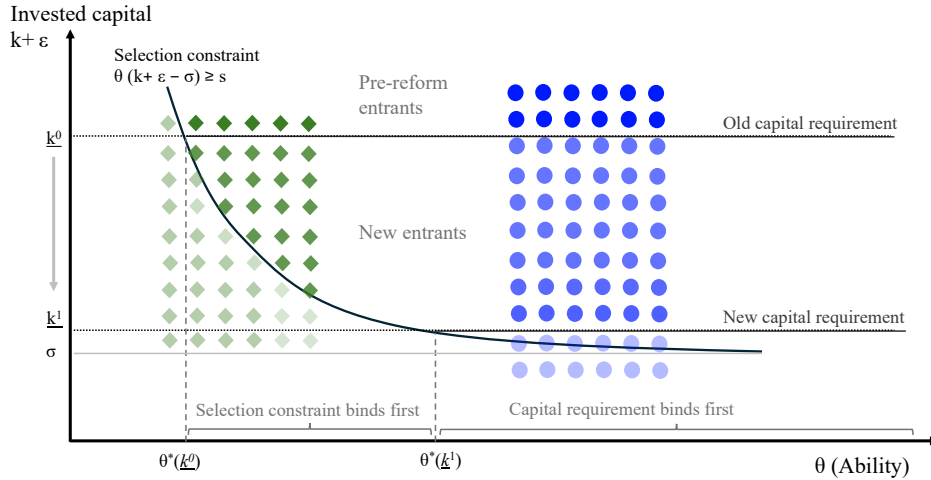
The different sets of scatter points (green diamonds, blue circles) indicate different scenarios for the joint distribution of ε and θ: each point represents one (potential) entrepreneur. The different scenarios are constructed such that ε is idiosyncratic, that is, not correlated with ability, θ.

For example, in the green-diamond scenario, the joint distribution of θ_i and ε_i is such that the effect of the capital requirement reduction is mediated by the selection constraint. In this scenario, average ability is increased. In the blue circle scenario, the effect of the capital requirement reduction is not mediated by the selection criteria, as all entrepreneurs have ability above the threshold, θ^* which both the new capital requirement and the selection constraint binds. In this scenario the average ability of new entrants is the same. Empirically, we may have both scenarios at play, but if the density is higher for the high-

7

ability entrepreneurs (i.e., more blue circles), the effect on average entrepreneurial ability may be statistically negligible. Note that which scenario is at play does not purely depend on the distribution of θ and ε: it depends on their distribution given the parameters of the opportunity costs, s and σ. For example, if $s = 0$, we we would always be in the blue circle scenario in which the selection constraint never binds.

We note that it is also possible to construct Case-2 scenarios in which average ability decreases even if liquidity and ability are uncorrelated. One example is when the distribution of ε becomes bi-modal for large θ.

Empirical implications. Under different assumptions of the simple model above, we can generate different testable hypotheses. (i) We expect *an increase in the number of entrepreneurs* that are *of lower ability* if liquidity is positively correlated with entrepreneurial ability (Case 1). Alternatively, (ii) if liquidity is uncorrelated with entrepreneurial ability and the joint distribution of ability and capital (θ and ε) is such that selection constraint never binds before the capital requirement, then we expect *an increase in the number of entrepreneurs* and no effect on the ability of the average new entrepreneur. Finally, (iii) if liquidity and ability are correlated, as in Case 2, and the selection constraint binds under the lower capital requirement, we expect to see an increase in the number of entrepreneurs and an average ability.

3 Data and empirical setting

3.1 Institutional setting

Since the first securities law in 1910, the Norwegian authorities have required that a minimum amount of equity must be injected into any limited liability company upon incorporation. The purpose was to protect creditors' interests (GOV, 2011). Between 1997 and 2011, the equity requirement was NOK 100,000 ($17,000 using the 2012 exchange rate). This requirement was lowered to NOK 30,000 ($5,000) effective January 2012, and the change was formally proposed by the ministry of justice in September 2011 (GOV, 2011). The main driver for change was that Norway wished to offer competitive economic conditions relative to, e.g., the U.K. which did not have a capital requirement,[2] and to reduce barriers to firm creation.[3] Following new EU rules in the early 2000s, firms in EU–EEA countries were free to incorporate in other EU–EEA countries. Becht, Mayer, and Wagner (2008) show that this lead to substantial increases in U.K. incorporation originating from high-capital-requirement countries. The Norwegian capital requirement reduction was largely a response aimed at limiting the incentives for Norwegian entrepreneurs to incorporate in

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[2]Countries that have a capital requirement include Germany, Spain, Denmark, Sweden, and Ireland.

[3]See Xu (2023) for recent study on the tradeoffs between investor protection and entrepreneurial activity.

other EU-EEA countries.

There are no specific restrictions on the source of the equity: it can come from the entrepreneurs' own equity, or debt, or from outside investors. Hence, for our theoretical model to apply, we need to consider personal liquidity as a broad measure of the amount of equity the entrepreneur can furnish for her firm.

To our knowledge, there are no other large changes to the economic conditions surrounding firm creation during 2012. Other reforms or changes might complicate the interpretation of our findings to the extent that these were the relevant changes to which the new entrants responded. The closest reform, to our knowledge, is the removal of an auditing requirement for small firms. This reform was enacted in May of 2011: small firms who incorporated in May of 2011 or later could opt to not hire an auditor from incorporation onward. To address the concern that it is this reform that drives our results, our initial analyses study entry rates at the quarterly level. This reveals a sharp increase exactly when the capital requirement was reduced (first quarter of 2012) but no noticable increase in the third or fourth quarters of 2011 when firms could opt out of auditing.

3.2   Data

Data from the business registers ("Virksomhets- og foretaks register") provide a panel of firm characteristics such as the date when the unique organization number was assigned (i.e., when the firm was incorporated). Data from the role register ("Rolleregisteret") provide a panel of (de-identified) identifiers for a firm's proprietor, CEO, and board members. Using the stockholder register ("Aksjonærregisteret"), we see the anonymized identifiers of all shareholders (both individuals and other firms). We obtain data on firms' financial characteristics from their tax returns ("Næringsoppgave 2"). The firm data primarily cover the years 2004–2018.

We obtain individual characteristics, such as year of birth, from the central population register. We obtain information on educational attainment as of 2010 from the national education database. We also include data from individuals' tax returns, that, due to the wealth tax, also include information on their real and financial assets. We also include de-identified data on individuals' military enlistment scores. Most males aged 18–19 face mandatory interviews and testing by military enrollment officers. Our data include the cognitive ability scores. Cognitive ability is measured on a 1–9 ("Stanine") scale, calibrated by the authorities such that five corresponds to an IQ of 100 and a unit difference corresponds to an IQ difference of 7.5.

3.3 Definitions and sample selection

To be classified as the entrepreneur behind an incorporated firm, a person must own more than 1% of the shares. In order to link individuals with firms through indirect ownership,[4] we take the following approach. We first limit our data to ownership links of at least 1% of total shares. For shares owned by a second firm, we rank the owners in that second firm, keep the top 10 owners, remove ownership links < 10%, and assign iterated ownership shares to the individuals who own shares in the second firm. That is, if a person owns 10% of firm A which owns 10% of firm B, then that person owns 1% of firm A. We then aggregate ownership shares at the firm-person-year level, allowing for both direct and indirect ownership. We further aggregate ownership shares at the household (spouses) level. An incorporated entrepreneur is also required to be the CEO.

For sole-proprietorships ("enkeltmannsforetak"), we define the entrepreneur as the proprietor ("innehaver"). For partnerships ("DA" and "ANS"), we select the partner that is also the CEO. If there is no partner-CEO, we select the chair of the board or, alternatively, the vice chair. For foreign-incorporated firms, we do not observe ownership, but assign the registered CEO as the entrepreneur. We identify the founding date from when the organization was assigned a unique organization identifier in the business register ("virksomhets- og foretaksregister").

Our data contain 327,125 (domestic) incorporation events. We ignore incorporation events of firms that belong to industry codes typically used by financial holding companies.[5] This leaves 232,116 incorporations. For 132,052 of the events, we can assign an individual as the entrepreneur, and for 47,566 of the events, the entrepreneur was not previously an entrepreneur; i.e., in the previous year, she was neither owner-CEO of an incorporated firm, a sole-proprietor, a CEO or board-member partner in a partnership or the CEO of a foreign-incorporated firm.

4 Reduced-form results

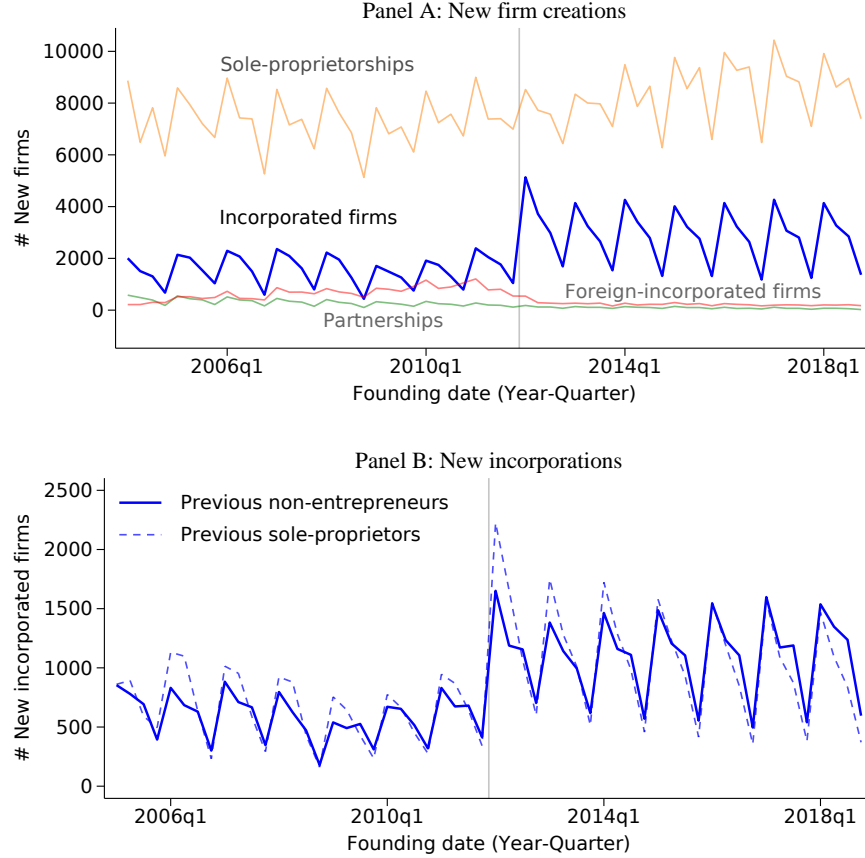### 4.1 The effect on firm creations

Panel A of Figure 3 shows how the number of business creations change over time. We see that immediately after the reform, the number of incorporations immediately doubles and stays at this higher level for the duration of our sample. The immediate response is

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[4]In 2006, Norway introduced a dividend tax for dividends paid from corporations to private shareholders. This created an incentive to own economically active firms through another LLC in order to postpone realizing dividends.

[5]two-digit NACEs codes 64 and 66 (financial and financial services), three-digit nace codes 681, 682, and 701 (real estate investments, real estate leasing and rental, and headquarter services).

reasonable, since entrepreneurs who are building a new firm will want to incorporate in order to expense start-up costs for tax purposes.

Figure 3: FIRM CREATION BEFORE AND AFTER THE REFORM

Panel A reveals no evidence of a substitution away from sole-proprietorship creation towards incorporations, which is consistent with the Levine and Rubinstein (2017) hypothesis that true entrepreneurs either incorporate or do not start a business. We further see no effect on partnerships that also do not benefit from limited liability. We do see a reduction in the registration rates of foreign-incorporated firms. Prior to 2012, one way to achieve the benefits of limited liability without having to put up the required amount of equity was to incorporate a limited liability company abroad (often in the U.K., where there were no capital requirements) and then register this company as a foreign-incorporated company

("NUF") in Norway in order to do business. There were no rules prohibiting firms from taking this approach, even if their business activity was solely based in Norway. Accordingly, as the capital requirement is removed in 2012, we see a reduced entry of foreign-incorporated firms. This reduction, however, is much to small and arises too early to explain the increase in incorporation rates. This indicates that there were many marginal incorporated entrepreneurs for whom the foreign-incorporation route was not an option.

The increase in incorporations visible in Panel A may be driven by serial entrepreneurs or entrepreneurs who are simply expanding their conglomerates by incorporating new subsidiaries. To understand whether there was in fact an increase in entry into incorporated entrepreneurship, Panel B focuses on firms founded by individuals who were not already entrepreneurs in the previous year: they were neither incorporated entrepreneurs (AS), sole-proprietors (ENK), CEO-partner of a partnership (ANS, DA), or CEO of a foreign-incorporated firm (NUF). While this reduces the number of incorporations, there is still a noticeable doubling of incorporation dates. These findings indicate that there was a substantial effect on entrepreneurial entry. This conclusion is robust to also dropping any incorporations by entrepreneurs who were non-CEO owners ($\geq 1\%$ of the shares) in any limited liability company in the previous year (see Appendix Figure OA.1).

While not part of our subsequent analysis sample, here we also consider incorporations done by individuals who were previously sole-proprietors but not incorporated (or partnership or foreign-incorporated) entrepreneurs. These findings (dashed blue line) reveal a similar effect. This is consistent with there being a large mass of marginal incorporated entrepreneurs in the sole-proprietor population. Our results thus indicate that reducing frictions to incorporations do not affect entry rates into sole-proprietorships but does cause exits—in the sense that existing sole-proprietors choose to incorporate. These findings suggest that adding some nuance to the Levine and Rubinstein (2017) hypothesis may be useful, and perhaps should allow for the notion that sole-proprietorship is a potential pathway to incorporated entrepreneurship.

4.2 The characteristics of new entrepreneurs

This section provides graphical reduced-form evidence on how the ex-ante characteristics differ across pre and post-reform incorporations. Later, in section 5, we introduce a simple regression-discontinuity design methodology that allows us to provide more formal estimates.

Figure 3 shows how the characteristics of new entrepreneurs changed around the time of the reform. We are simply providing the mean characteristics of the entrepreneurs by

estimating the following regression equation:

$$y_i = \alpha_{t,n} + \varepsilon_i, \tag{9}$$

where y_i is some characteristic of person i who is not an entrepreneur at time $t - 1$. $\alpha_{t,n}$ are founding year (t) × firm-type (corporation or sole-proprietorship) fixed effects. ε_i is the error term. Given the large effect on entry rates we observed in the previous section, if marginal entrepreneurs are considerably different from the average entrepreneurs, we would expect to see a change in characteristics shortly after the 2012 reform was enacted. For example, if we expect the marginal entrepreneur to differ on some characteristic, y, by -1 and the reform doubled the number of entrants, we would expect to see a drop in the average y by $\frac{1}{2}$ following the reform. We formalize this logic in Section 5.

Figure 4: Characteristics of Entrepreneurs Around the Reform
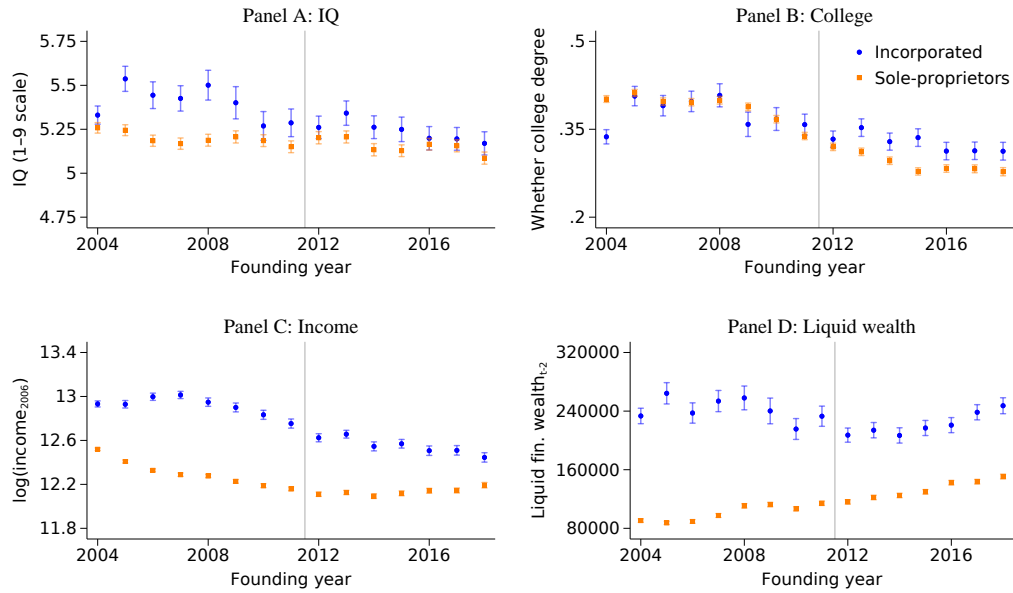
Notes: All panels condition on firms created by individuals who were not entrepreneurs in the prior year. Panel A considers cognitive ability measured on a stanine scale (1 through 9), where 5 is calibrated to correspond to an IQ of 100 and a unit difference in the stanine scale corresponds to an IQ difference of 7.5. Panel B considers a dummy for whether an individual has obtained at least a college degree as of 2010. Income is total taxable personal income measured in 2006 Panel D considers the age of the entrepreneur. Standard errors underlying the 95% confidence bands are clustered at the person (entrepreneur) level.

Panel A considers military-enlistment scores of cognitive ability. The underlying sample largely contains males but does not condition on military enrollment, as virtually all males in our dataset were required to undergo testing at age 18–19 regardless of whether they were selected for military service. We see that incorporated entrepreneurs generally have higher cognitive scores than sole-proprietors. There is some indication that this ability gap

narrows over time, but this narrowing does not coincide with the reform in such a way that we would attribute a causal effect.

Panel B considers educational attainment, measured by whether the individual has obtained a college degree or higher as of 2010. Educational attainment is found to be an important predictor of entrepreneurial success (Bates 1990, Queiró 2022). While the average new incorporated entrepreneur after 2012 appears to be less likely to have a college degree, we also see this tendency, and even more so, among unincorporated entrepreneurs. Hence, it does not appear that reducing barriers to incorporation lead to a in-flux of less-educated entrepreneurs.

Panel C considers personal incomes measured in 2006. Personal income is a useful proxy to the extent that entrepreneurial ability and salary-earning ability are correlated (as in, e.g., Hacamo and Kleiner 2022). We see that incorporated entrepreneurs have significantly higher prior incomes than sole-proprietors, but we do not see any tendency that post-reform entrepreneurs had lower ex-ante incomes.

Panel D considers age at business creation. Using U.S. data, Azoulay, Jones, Kim, and Miranda (2020) find that the subsequently most successful startups were created by older individuals, suggesting that age may proxy for entrepreneurial ability.[6] We do find that incorporated entrepreneurs tend to be older by about 6–7 years, but there is no indication that post-reform entrepreneurs were either younger or older.

We also examine whether are differences in entrepreneurial traits among those who transitioned from sole-proprietor to incorporated entrepreneurship in Appendix Figure OA.2. While we do not see clear evidence that post-reform transitional entrepreneurs were different, the evidence is less conclusive. There appear to be minor falls in IQ and past incomes for those who incorporated right after the reform, in 2012. Through the lens of our theoretical framework. Not too surprisingly, this mixed evidence suggests that personal assets and ability may be more strongly correlated in the population of sole-proprietors as opposed to in the non-entrepreneurial population.

Figure 5 more closely studies distributional changes in cognitive ability scores and liquid financial wealth around the reform. Consistent with no effect on mean ability in the previous figure, we cannot discern any evidence that post-reform entrants tend to be of lower ability in Panel A. We see that the post-reform entrants come from the entire distribution.

In Panel B, we consider the distributions of liquid financial wealth (deposits, bonds, stocks) before and after the reform. Here, we see that most of the new entrants are indeed lower-liquidity individuals, and the modal new entrant has liquid wealth below NOK 10,000 ($1,700).

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[6]See also Ouimet and Zarutskie (2014) whose findings suggest the opposite relationship.

Figure 5: Ability and Liquid Financial Wealth
of Pre- and Post-Reform Incorporated Entrepreneurs
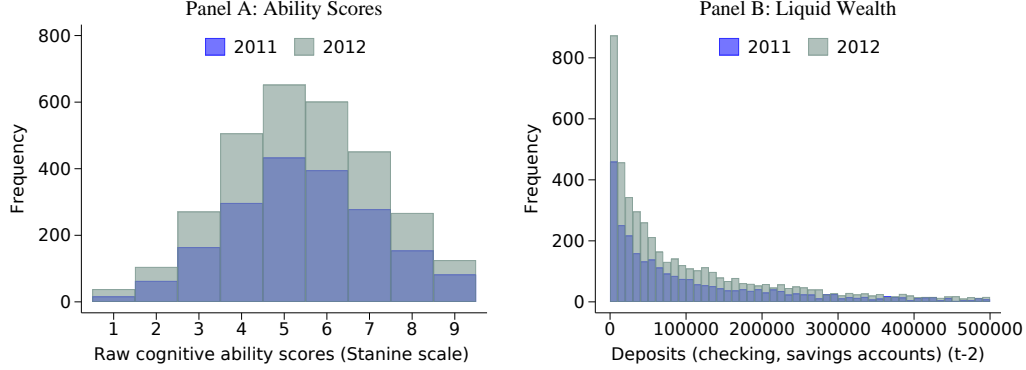
Notes: All panels condition on firms created by individuals who were not entrepreneurs in the prior year. Panel A considers the raw cognitive ability scores, measured on a stanine scale (1 through 9), where 5 is calibrated to correspond to an IQ of 100 and a unit difference in the stanine scale corresponds to an IQ difference of 7.5. Panel B considers liquid financial wealth (deposits, stocks, bonds, mutual fund holdings).

4.3 Firm-level outcomes

We proceed by examining whether post-2012 incorporated firms have differ in terms of financial characteristics, such as size and profitability. We do this by estimating the following regression equation:

$$y_{f,2018} = \alpha_t + \varepsilon_f, \tag{10}$$

where $y_{f,2018}$ is the outcome variable of interest, α_t are incorporation-year fixed effects, and ε_f is the error term. We drop the year 2018 from our regression to ensure that all firms were active for the entire year that the outcome variable was recorded.

To the extent that post-2012 entrepreneurs are less selected (e.g., lower entrepreneurial ability), we would expect to see that their firms are smaller and less profitable. We present our findings in Figure 6 which considers different outcomes measured in 2018. Panel A considers whether a firm had positive and nonmissing revenues as of 2018. This shows no indication of post-2012 firms being less likely to be economically active.

In panel B, we instead consider the log of total book assets, and find a sharp difference. Post-2012 firms have about 0.6 log points less assets, which translates to a level difference of $100,000.[7] This difference is considerably larger than the reduction in the capital requirement from $17,000 to $5,000. This indicates that the reform did only reduce the amount of equity in firms but also other liabilities. In Appendix Figure OA.3, we examine how

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[7] exp(14.1)-exp(13.5)≈600,000, which converts to USD 100,000 using the average USD/NOK exchange rate during 2006 of about 6.—

the amount of long-term debt varies with incorporation date, and find a sharp reduction of about 0.5 log points.

To shed some light on the large different in asset size, we plot the 2011 and 2012 distributions of assets in Figure OA.5. This indicates that lowering the capital requirement lead to a large increase in the frequency of firms on the left side of the asset distribution. Figure OA.6 verifies that the size differences occur at incorporation. At the end of the founding year, post-reform firms are about 0.75 log points smaller in terms of assets and 0.35 log points smaller in terms of revenues. Contrasting these differences with those found for 2018 suggests that the asset size differential slightly shrinks while the revenue gap slightly increases.

Figure 6: Firm outcomes, contrasting pre- and post-reform entrants
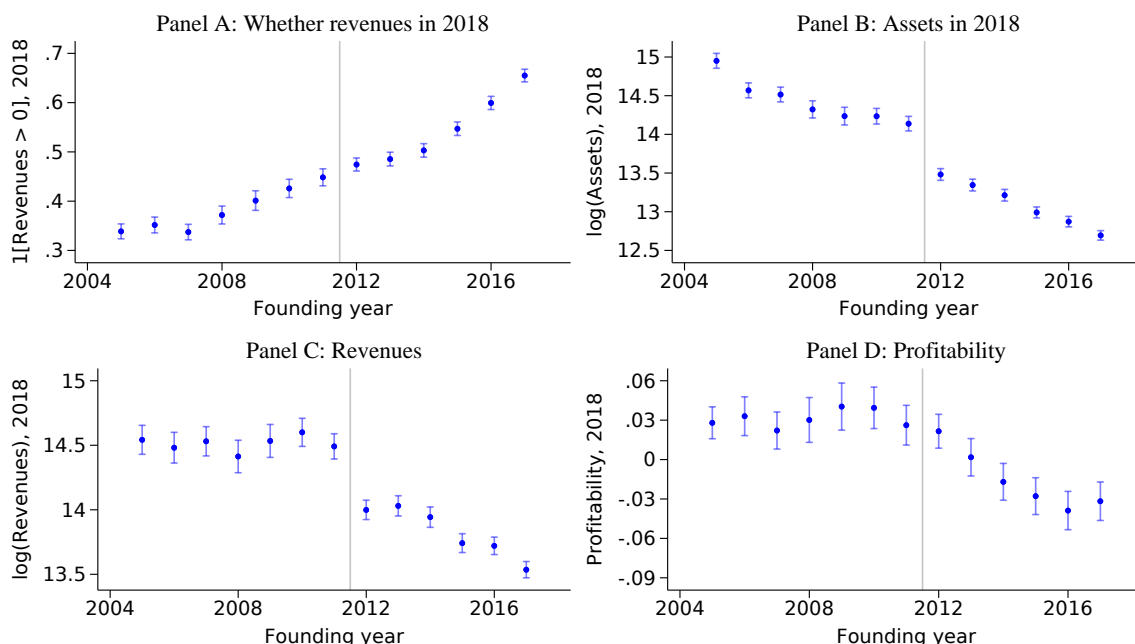
Notes: All panels condition on firms incorporated by individuals who were not entrepreneurs in the prior year. Panel A considers whether a firm has any positive revenues in 2018, where missing values are coded as zeros. Panel B considers the log of assets, panel C considers the log of revenues, and panel D considers profitability. Profitability is measured as $\min(\max(\frac{Operating\ profits}{Assets}, -1), 1)$. All variables are measured in 2018. Standard errors underlying the 95% confidence bands are clustered at the person (entrepreneur) level.

We also find that marginal firms are smaller in terms of revenues. Panel C shows that there is a sharp reduction in revenues for firms incorporated following the 2012 reform. The difference is approximately 0.5 log points or \$130,000. Despite the clear evidence that the marginal firms are smaller, the evidence does not indicate that they are less profitable. Panel D considers profitability (operating income divided by book assets) in 2018, which shows no indication that firms that entered after the capital requirement reduction are less

profitable, which is consistent with our findings of no material differences between marginal and average entrepreneurs in terms of cognitive ability or educational attainment.

One question is whether the lower capital requirements caused increased entry into industries typically populated by smaller firms. To understand whether this drives our results, Online Appendix Figure OA.4 repeats the analyses in Figure 6 while including 5-digit NACE industry code fixed effects in the regression equations. This reveals quantitatively similar results.

The purpose of our analyses on firm outcomes is to examine whether lower capital requirement facilitated the entry of different firms and entrepreneurs. However, there is an important caveat in that this selection effect cannot be cleanly identified due to potential treatment effects of the reform. That is, by imposing less binding constraints on the firm's financing mix (i.e., requiring less equity), some entrepreneurs may be able to optimally choose to commit less personal wealth and thus perform better.[8]

4.4 Entrepreneurial income

We next explore whether there are differences in realized entrepreneurial income, defined as the sum of personal income (salary, dividends, realized capital gains, sole-proprietor income) and allocated retained earnings.[9] To accommodate observations with negative income (e.g., due to large negative profits), we winsorize entrepreneurial income at the bottom 5% level prior to taking logs.

There are at least two reasons for why we might expect that post-reform entrants have lower entrepreneurial incomes. First, if entrepreneurial activities spawned by nonpecuniary motives tend to require less capital, we may expect an increased inflow of non-pecuniarily-motived entrepreneurs. Second, if new entrants are of lower ability, they may generate less cash flows that they can allocate to themselves either via wages or capital income. We report our findings in Figure 7. While our previous finding that post-reform entrants have lower assets but similar profitability should imply that they earn less profits, we do not see clear evidence of a sharp drop in entrepreneurial income (measured in 2018) for post-reform entrants. There is a downward-sloping trend, which appears somewhat more discontinuous around 2012 for incorporated as opposed to sole-proprietor entrepreneurs. This lack of a sharp change in entrepreneurial incomes may be explained by retained earnings (and thus profits) accounting for a relatively small share of total income and that the salaries entrepreneurs pay themselves are similar across cohorts.[10]

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[8]For example, forcing a risk-averse entrepreneur to put up more equity may cause the entrepreneur to undertake less high-return high-risk projects.

[9]We allocate retained earnings using the entrepreneur's ownership share, and we allocate earnings from firms in which the individual is the entrepreneur—that is, she is CEO and owns $\geq 1\%$ of shares)

[10]The mean share of allocated retained earnings relative to total entrepreneurial income is 1.9%, and the

Figure 7: ENTREPRENEUR'S INCOME, CONTRASTING PRE- AND
POST-REFORM ENTRANTS
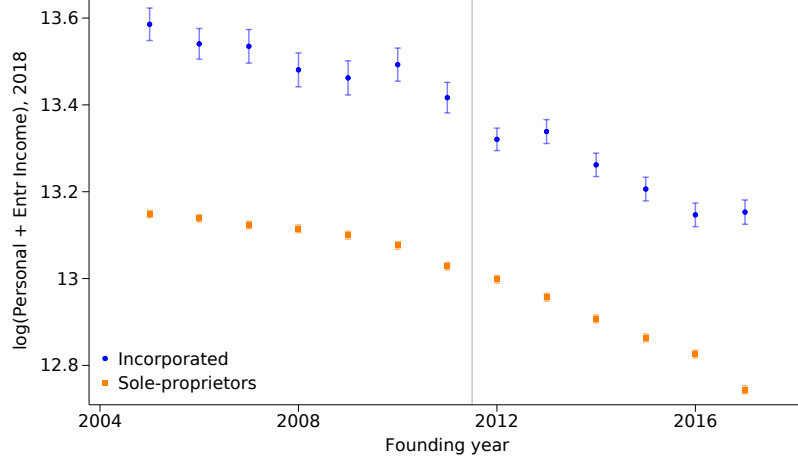
Notes: All panels condition on firms incorporated by individuals who were not entrepreneurs
in the prior year. Scatter points come from estimating the following regression equa-
tion: $\log(\text{personal income}_{i,2018} + \text{allocated retained earnings}_{i,2018}) = \alpha_{t,n} + \varepsilon_i$, where t
indexes firm type $\in$ {incorporated, sole-proprietorship}. If an individual who starts a
firm in t is no longer an entrepreneur in 2018, the left-hand-side variable only contains
personal income as observed in the tax returns. Allocated retained earnings$_{i,2018}$ equal
$\sum_f$ ownership share$_{i,f,2018} \times (\text{net income}_{f,2018} - \text{dividends}_{f,2018})$. Standard errors under-
lying the 95% confidence bands are clustered at the person (entrepreneur) level.

5   Estimates on how marginal entrepreneurs are different

The previous section provides our main findings graphically on how post-reform entrants
differ from pre-reform entrants. This section maps these pre-post differences into estimates
of how marginal entrepreneurs (those who only entered due to the reform) to the existing,
average entrepreneur (who would have entered regardless). The underlying assumptions are
that (i) the post-reform increase in entrepreneurship rates is entirely caused by the entry
of marginal entrepreneurs and (ii) any change in the average characteristic of entrants from
before to after the reform is fully attributable to the entry of marginal entrepreneurs.

5.1   Empirical framework

Differences in average traits of post and pre-reform entrants.   We assume
that there are two types of entrepreneurs, e: always entrepreneurs, A, and marginal en-
trepreneurs, B. Post-reform there are $N_{post} = N_A + N_B$ entrepreneurs and pre-reform there
are $N_A = N_{pre}$. We only consider *entrants*, not existing entrepreneurs. Pre-reform, the

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10th and 90th percentiles are -8.8% and 26.4%.

average characteristic of entrepreneurs is given by

$$\overline{Y}^{pre} = \frac{1}{N_A} \sum_{i \in A} Y_i. \tag{11}$$

Post-reform, the average characteristic is given by

$$\overline{Y}^{post} = \frac{1}{N_A + N_B} \left(\sum_{i \in A} Y_i + \sum_{i \in B} Y_i \right). \tag{12}$$

This implies (see Online Appendix A.1 for a derivation) that

$$\frac{\overline{Y}^{post} - \overline{Y}^{pre}}{\frac{N_{post} - N_{pre}}{N_{post}}} = \frac{1}{N_B} \sum_{i \in B} Y_i - \frac{1}{N_A} \sum_{i \in A} Y_i, \tag{13}$$

which says that the pre versus post-reform difference in means divided by the growth rate of the number of firms (relative to the new total—not the existing one) equals the difference in mean characteristics of the two types of entrepreneurs. Equation (13) can be used the following way. If we find that the pre-post difference in some characteristic is 1, and the number of incorporations go from 2 to 3, then the difference (in means) is $\frac{1}{1/3} = 3$.

We estimate the left-hand-side of equation (13) by first estimating the difference in mean characteristics by way of a regression discontinuity design. This RDD approach essentially formalizes the criteria we used in Section 4: we are more comfortable assigning causality if any effects materialize sharply following the reform and do not appear to be driven by time trends.

Our estimate of $\overline{Y}^{post} - \overline{Y}^{pre}$ is $\hat{\beta}^Y$ from estimating the regression equation

$$Y_i = \alpha + \beta^Y \mathbb{1}[s \geq 2012] + \gamma^- \times s \times \mathbb{1}[s < 0] + \gamma^+ \times s \times \mathbb{1}[s \geq 0] + \varepsilon_i, \tag{14}$$

where Y_i is a characteristic measured in year h, and s is the founding year, normalized to be zero in 2012. To limit the influence of non-linear long-run time trends, we limit the sample to incorporations done within 3 years of the reform, that is during 2009–2014.

The related estimator for the growth rate, $\frac{N_{post} - N_{pre}}{N_{post}}$ is simply $\frac{N^Y_{2012} - N^Y_{2011}}{N^Y_{2012}}$, where this growth rate is based only on incorporation events for which Y is observable.[11] The choice of a simple estimator for the increase in entry is due the graphical evidence in Figure 3 that shows no evidence that the 2011–2012 jump was related to overall trends. Hence, we our

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[11]That is, incorporation events that were followed by exits before $Y_{i,h}$ was measured (e.g., profitability in 2018) do not count toward the growth rate.

19

estimator is

$$\widehat{\Delta Y_h} = \frac{\hat{\beta}^Y}{\frac{N^Y_{2012} - N^Y_{2011}}{N^Y_{2012}}},$$

(15)

where we obtain standard errors from a 200-repetition bootstrap procedure.

5.2 Estimated differences

Table 1: How the Marginal and Average Entrepreneurs Differ

Notes: This table provides estimates of how marginal entrepreneurs differ from average entrepreneurs: The first three rows are the estimated coefficients from equation (14) , the fourth row is the growth rate in incorporations in the sample where the outcome variable is observed, the fifth row provides the estimated ΔY_h, which is our main estimate. Panel A considers ex-ante traits of entrepreneurs: total personal income in 2006, age at incorporation, whether a college degree in 2010, and their military-enlistment cognitive ability (1–9 stanine) score. Panel B considers ex-post outcomes measured in 2018. Wages are the total wage bill (labor costs) for the firm. Entrepreneurial income is the sum of personal taxable income (e.g., salaries, capital income, sole-proprietor income) and allocated retained earnings. Standard errors are obtained from a 200-repetition bootstrap procedure.

	Panel A: Ex-ante characteristics			
	(1)	(2)	(3)	(4)
	log(Personal Income)	Age	College	IQ (1–9)
$\overline{Y}^{post} - \overline{Y}^{pre}$	-0.037	-0.218	-0.020	0.072
	(0.034)	(0.309)	(0.015)	(0.066)
$\frac{N_{2012} - N_{2011}}{N_{2012}}$	0.383***	0.412***	0.392***	0.376***
	(0.014)	(0.014)	(0.015)	(0.019)
$\widehat{\Delta Y}$	-0.096	-0.528	-0.052	0.192
	(0.090)	(0.751)	(0.038)	(0.178)
N	20567	23414	21239	13174

	Panel B: Ex-post outcomes, 2018					
	(1)	(2)	(3)	(4)	(5)	(6)
	Profitability	1[Revenues>0]	log(Assets)	log(Revenues)	log(Wages)	log(Entr Income)
$\overline{Y}^{post} - \overline{Y}^{pre}$	0.00	0.00	-0.62***	-0.47***	-0.32***	-0.07**
	(0.01)	(0.01)	(0.08)	(0.09)	(0.09)	(0.04)
$\frac{N_{2012} - N_{2011}}{N_{2012}}$	0.43***	0.42***	0.43***	0.45***	0.42***	0.41***
	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)
$\widehat{\Delta Y}$	0.00	0.00	-1.43***	-1.05***	-0.77***	-0.17**
	(0.03)	(0.04)	(0.19)	(0.21)	(0.21)	(0.09)
N	13739	23798	13694	11103	8237	22898

Table 1 provides our formal estimates from equation (15). Panel A considers ex-ante

characteristics of the entrepreneurs. All differences are statistically insignificant, consistent with the graphical evidence in Figure 4. These estimates allow us to rule out that, for example, marginal entrepreneurs have IQs that are more than 0.16 stanine points less than the average entrepreneur.[12] This translates into a an IQ (100 scale) difference of 1.2, which suggests that we have sufficient statistical power to rule out material differences in cognitive ability.

Panel B considers ex-post outcomes. We estimate large differences in proxies for entrepreneurial size: assets, revenues, and the total wage bill of the firm. The marginal entrepreneur creates firms that are about 46% smaller in assets ($e^{-0.62} - 1$), 37% smaller in revenues, and 27% smaller in terms of labor costs. The differences in sample size are driven by either data availability (e.g., firm exits cause missing values) or zeros (e.g., zero revenues or zero wage costs for the firm).[13]

6 Discussion

We provide new evidence on how selection into entrepreneurship is affected by a reform that lowered the financial requirements to incorporate. We show that new entrepreneurs were not different in terms of past income, cognitive ability, or education levels. While they do create smaller firms, these firms are not less profitable or less likely to be economically active several years later. Overall, our findings are consistent with a simple model in which marginal entrepreneurs are constrained by their finances and not their ability or outside options. In such a model, policies that reduce financial requirements to enter into entrepreneurship do not lead to a reduction in average entrepreneurial ability.

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[12]0.192-1.96*0.178

[13]Entrepreneurial income is still defined at the person level if the firm no longer exists, in that case we allocate zero retained earnings from the firm. Missing values for entrepreneurial income would arise if the person has no reported personal taxable income.

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A Online Appendix

A.1 Derivations for empirical specification

$$\frac{1}{N_B}\sum_{i\in B}Y_i - \frac{1}{N_A}\sum_{i\in A}Y_i \;=\; \frac{1}{N_B}\left(\overline{Y}^{post}(N_A+N_B) - N_A\overline{Y}^{pre}\right) - \frac{1}{N_A}\sum_{i\in A}Y_i \tag{16}$$

$$= \frac{N_A}{N_B}\left(\overline{Y}^{post}\frac{N_A+N_B}{N_A} - \overline{Y}^{pre}\right) - \overline{Y}^{pre} \tag{17}$$

$$= \frac{N_A}{N_B}\left(\overline{Y}^{post}\frac{N_A+N_B}{N_A} - \overline{Y}^{pre}\left[1+\frac{N_B}{N_A}\right]\right) \tag{18}$$

$$= \frac{N_A}{N_B}\left(\overline{Y}^{post}\frac{N_A+N_B}{N_A} - \overline{Y}^{pre}\left[\frac{N_A+N_B}{N_A}\right]\right) \tag{19}$$

$$= \frac{N_A}{N_B}\left(\overline{Y}^{post} - \overline{Y}^{pre}\right)\frac{N_A+N_B}{N_A} \tag{20}$$

$$= \frac{\overline{Y}^{post} - \overline{Y}^{pre}}{\frac{N_B}{N_A+N_B}} \tag{21}$$

$$= \frac{\overline{Y}^{post} - \overline{Y}^{pre}}{\frac{N_{post}-N_{pre}}{N_{post}}}. \tag{22}$$

1

A.2 Supplementary figures

Figure OA.1: FIRM CREATION BEFORE AND AFTER THE REFORM: EXCLUDING ANY ENTREPRENEUR WHO OWNED PRIVATE EQUITY


Notes: The solid blue line considers only incorporations done by individuals who were not previously entrepreneurs: neither incorporated (AS), sole-proprietor (ENK), CEO-partner of a partnership (ANS, DA), or CEO of a foreign-incorporated firm (NUF). The dashed orange line restricts the sample to incorporations done by individuals who were not entrepreneurs *nor did they own* $\geq 1\%$ of the shares in any limited liability firm (AS).

Figure OA.2: Characteristics of Entrepreneurs Who Transition from Sole-proprietor to Incorporated Entrepreneurship
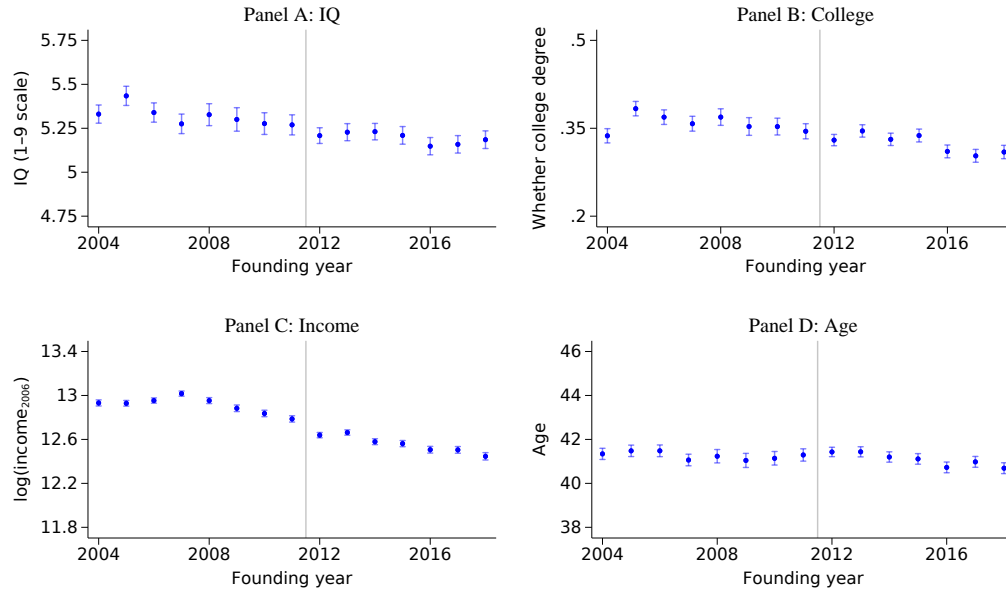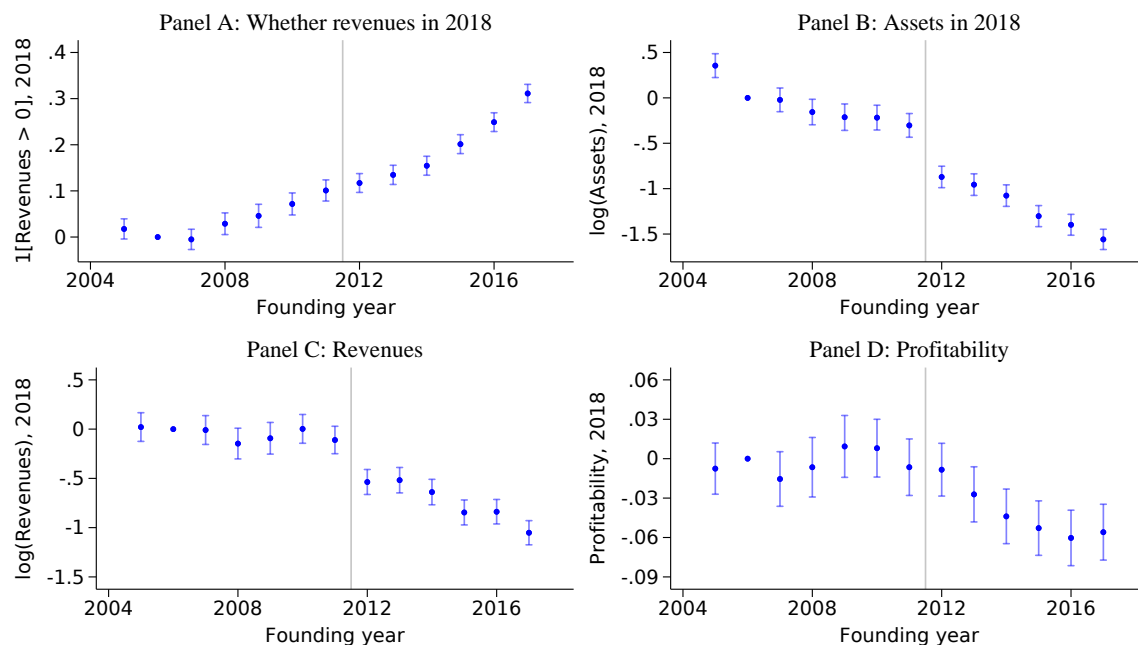

Notes: All panels condition on firms created by individuals who were sole-proprietors but otherwise not entrepreneurs in the previous year. Panel A considers cognitive ability measured on a stanine scale (1 through 9), where 5 is calibrated to correspond to an IQ of 100 and a unit difference in the stanine scale corresponds to an IQ difference of 7.5. Panel B considers a dummy for whether an individual has obtained at least a college degree as of 2010. Income is total taxable personal income measured in 2006 Panel D considers the age of the entrepreneur. Standard errors underlying the 95% confidence bands are clustered at the person (entrepreneur) level.

Figure OA.3: Long-term Debt
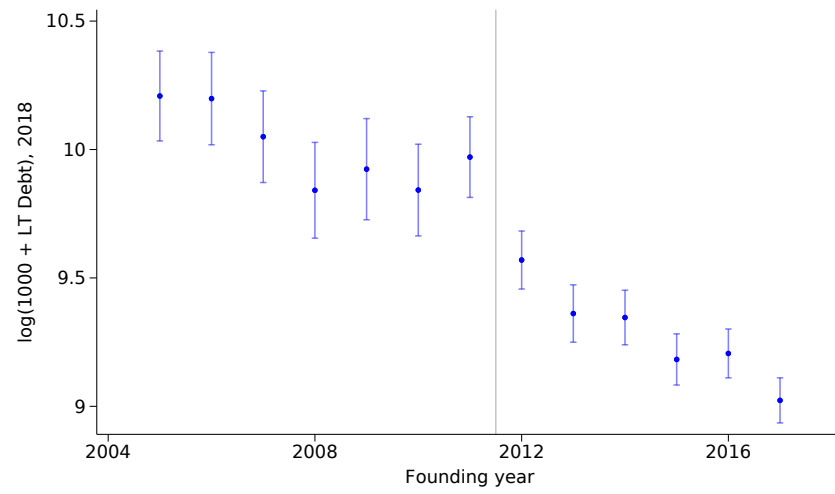
Notes: We condition on firms incorporated by individuals who were not entrepreneurs in the prior year. The outcome variable is long-term debt (i.e., excluding short-term liabilities to tax authorities, suppliers, etc.). All variables are measured in 2018. Standard errors underlying the 95% confidence bands are clustered at the person (entrepreneur) level.

Figure OA.4: FIRM OUTCOMES, CONTRASTING PRE- AND POST-REFORM ENTRANTS WHILE CONTROLLING FOR INDUSTRY FIXED EFFECTS.


Notes: In contrast to Figure 6, the following regression estimates are the result of also controlling for the incorporated firms' 5-digit NACE industry codes. All panels condition on firms incorporated by individuals who were not entrepreneurs in the prior year. Panel A considers whether a firm has any positive revenues in 2018, where missing values are coded as zeros. Panel B considers the log of assets, panel C considers the log of revenues, and panel D considers profitability. Profitability is measured as $\min(\max(\frac{Operating\ profits}{Assets}, -1), 1)$. All variables are measured in 2018. Standard errors underlying the 95% confidence bands are clustered at the person (entrepreneur) level.

Figure OA.5: Distribution of Assets at Incorporation Before and After the Reform
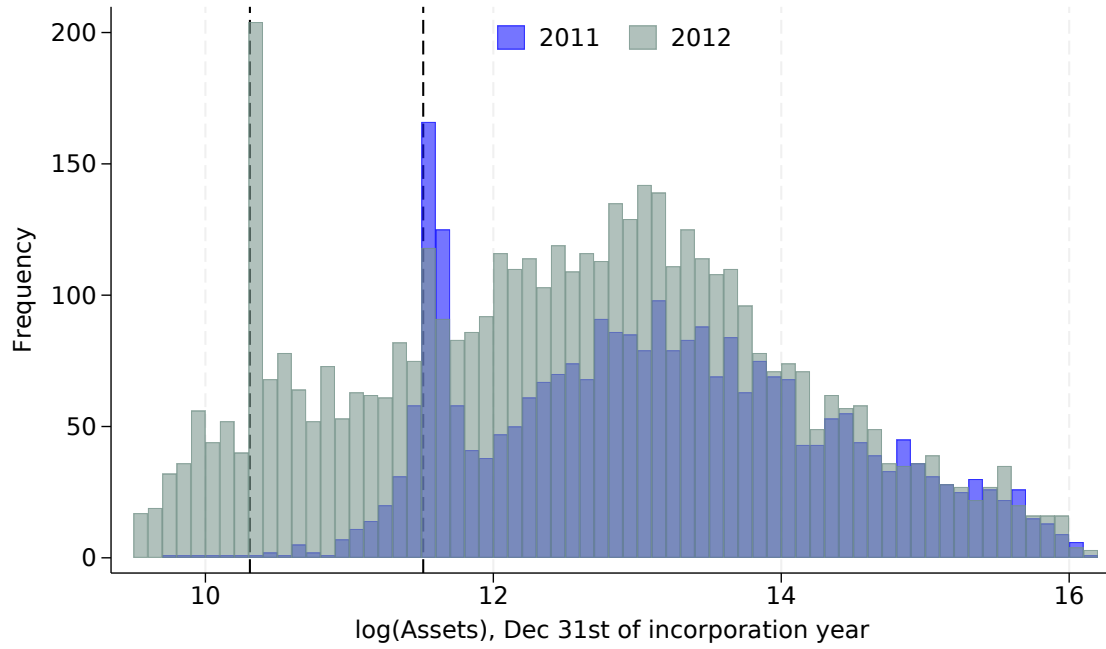
Notes: We plot the distribution of (log) total assets for 2011 and 2012, truncated to restrict the x-axis. The vertical lines indicate the capital requirements for 2012 and 2011, respectively. Note that it is possible to have less assets than (paid-in-capital) equity in the incorporation year, due to, e.g., negative retained earnings. The 2011 mean of log(Assets) is 13.24 and the mean for 2012 is 12.49.

Figure OA.6: Assets and Revenues Right After Incorporation
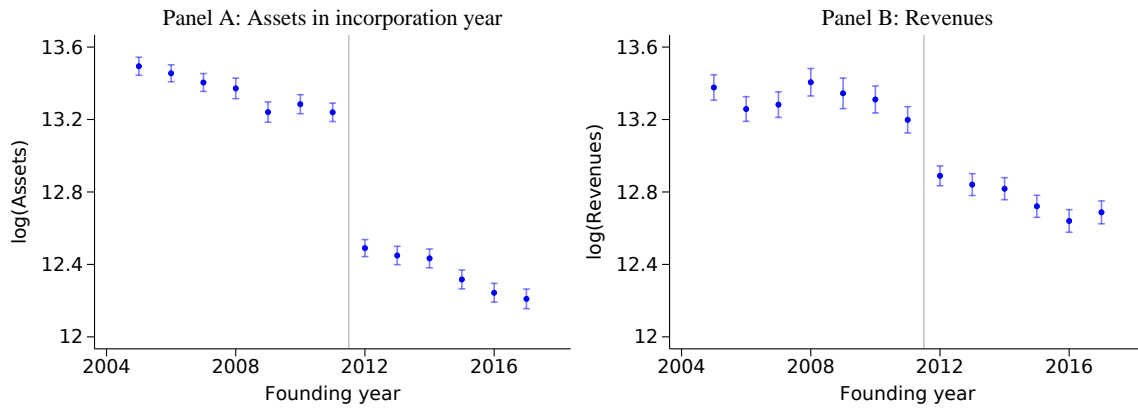
Notes: This figure plots how log(Assets) and log(Revenues), measured at the end of the incorporation year, varies with the incorporation year.

Figure OA.7: Distribution of Equity (Paid-in-Capital) Before and After Reform
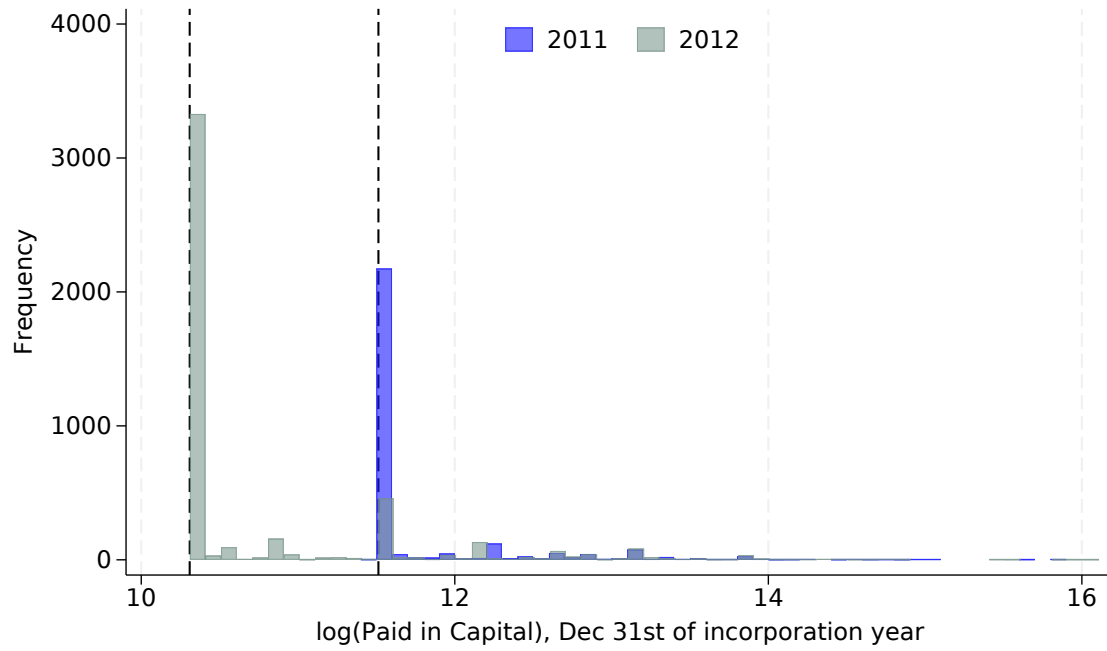
Notes: We plot the distribution of (log) Paid-in-Capital for 2011 and 2012, truncated to restrict the x-axis. The vertical lines indicate the capital requirements for 2012 and 2011, respectively.