

Serial Entrepreneurship and the Impact of Credit Constraints of Economic Development

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Abstract

This paper argues that the impact of credit constraints on the entrepreneurial activity and, via it, on economic development, crucially depends on the serial correlation in arrival of entrepreneurial ideas. Using an occupational choice model, it demonstrates that calibrating the serial correlation to match the amount of repeated entrepreneurship observed in the U.S., as opposed to assuming that arrivals of new entrepreneurial ideas are uncorrelated, reduces the impact of borrowing constraints on output per capita by more than fifty percent. The driving force behind this result is that people with past entrepreneurial experience tend to be richer and, thus, can implement new ideas more efficiently.

Keywords: entrepreneurship, credit constraints, serial entrepreneurship, economic development, persistency

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1 Introduction

Entrepreneurship is potentially an important channel through which financial frictions impact economy's output and TFP: If entrepreneurs have limited access to external financing, some entrepreneurial ideas may be implemented at an inefficient scale or abandoned altogether, thereby adversely impacting the extent of economic activity. The magnitude of this effect has been debated in economic literature; while some studies argue that shutting down financial intermediation (namely, switching from the environment without borrowing limits to the one where entrepreneurs are completely self-financed) leads to an almost 50 percent decline in output per capita (e.g., Buera et. al. 2011), others find more modest effects from the same change (e.g., Bohacek 2007). This paper argues that the impact of credit constraints on the amount of aggregate activity crucially depends on the serial correlation in arrival of entrepreneurial ideas. Such a serial correlation, if present, leads to repeated spans of entrepreneurship, often referred to as *serial entrepreneurship*. Thus, this paper argues that the extent of serial entrepreneurship should be one of the calibration targets in the quantitative analysis attempting to evaluate the impact of credit constraint on economic development.

The effects of serial correlation in arrival of entrepreneurial ideas on the link between financial and economic development are, potentially, twofold: On the one hand, people who have been entrepreneurs in the past tend to be richer. Thus, the more likely it is that they are the ones generating new entrepreneurial ideas, the more likely it is that these ideas are implemented efficiently. Therefore, serial entrepreneurship may mitigate the link between financial and economic development. On the other hand, an increase in the serial correlation in arrival of entrepreneurial ideas impacts wealth accumulation for those who have not generated ideas in the past: The less likely it is that a new

idea arrives to such a person, the less likely it is that he / she would be saving for purpose of running a business in the future, and, hence, the less likely it is that the idea will be implemented efficiently when it eventually arrives. Thus, serial entrepreneurship may also magnify the link between financial and economic development. Using an occupational choice model , I investigate the relative strengths of these two opposing forces and find that the former effect is dominant for a large set of parameter values. More importantly, I find that calibrating the serial correlation to match the amount of repeated entrepreneurship observed in the U.S., as opposed to assuming that arrivals of new entrepreneurial ideas are uncorrelated – as it was done in some preceding papers discussed below – reduces the impact of borrowing constraints on output per capita by about fifty percent.

This paper is closely related to three streams of literature. First, a number of quantitative studies, dating back to Erosa (2001), evaluate the impact of financial development on economic activity (including, but not limited to, Bohacek 2007, Jeong and Townsend 2007, Amaral and Quintin 2010, Buera, Kaboski and Shin 2011). These studies, generally agreeing that financial constraints do have a sizeable impact on aggregate output and productivity, produce a wide range of quantitative predictions with respect to how large this effect is. Looking at these papers as a whole, it is hard to disentangle what features of economic environment make these effects more pronounced, because the model specifications, as well as calibration strategies differ across these papers. In contribution to this literature, the current project systematically studies the impacts of variation in one parameter – serial correlation in arrival of economic ideas – and suggests that some of the differences in quantitative predictions obtained in previous studies could be attributed to different assumptions with respect to the value of this parameter (e.g., arrival of entrepreneurial ideas is i.i.d. across time in Buera, Kaboski and Shin 2011, who

obtain large effects, but is highly persistent in Bohacek 2007, where the effects of credit constraints on output are considerably smaller).

Second, the role of persistency for allocative efficiency of capital was emphasized in recent papers by Buera and Shin (2011) and Allub and Erosa (2013). Buera and Shin (2011) argue that persistency has an impact on the size of welfare losses due to market incompleteness in an environment in which agents cannot insure against idiosyncratic productivity shocks representing their entrepreneurial skills. On the one hand, like in any Bewley-type model, persistency of idiosyncratic shocks magnifies the welfare cost of market incompleteness. On the other hand, persistency in entrepreneurial skills improves efficiency of capital allocation among entrepreneurial firms. They quantitatively study the relative strength of these two forces and show that either one can be dominant, i.e., persistency may increase or reduce the economy's welfare. This paper focuses on a different question and attempts to understand to what extent allocative efficiency of capital is improved due to empirically observed levels of serial correlation in arrival of entrepreneurial ideas. Allub and Erosa (2013) argue that allocative efficiency of capital depends on another persistency component. Rather than looking at the serial correlation of arrival in entrepreneurial ideas, they study the effects of correlation between workers' and entrepreneurs' skills. Intuitively, more skillful workers are capable of accumulating more wealth and can make bigger investments in their firms. Thus, if these workers are also more likely to generate better quality ideas, the best ideas would also receive the most financing. Clearly, the mechanisms in mine and their papers are related, but the exact type of persistency, as well as the focus of the quantitative analysis, is different.

Finally, this paper, as well as the ones mentioned above, complement the literature that attempts to understand how misallocation of resources due to various reasons affects aggregate productivity. Some papers, such as Hsieh and Klenow (2009), Restuccia and

Rogerson (2008) or Guner, Ventura and Xu (2008), consider the impact of abstract distortions. Others, such as Hopenhayn and Rogerson (1993) or Vereshchagina (2005), study the impacts of specific policies, in many cases tied to firms' employment levels. This paper, along with the previous ones, study the extent of misallocation resulting from a specific market friction – lack of external financing – that primarily affects capital, not employment margin.

The rest of the paper is organized as follows. Section 2 documents the evidence from the PSED suggesting that a substantial amount of serial correlation in arrival of entrepreneurial ideas is observed in the data. Section 3 develops a simple occupational choice model used to study the impact of serial correlation. Section 3 calibrates this model and demonstrates that accounting for the amount of serial entrepreneurship observed in the PSED data has significant effects on understanding the impact of financial on economic development. Section 4 discusses some aspects of the analysis that may potentially be important but are not included in the model developed so far; I am currently working on these questions.

2 Evidence on Serial Entrepreneurship

Serial entrepreneurship is a well documented phenomenon. For example, Holmes and Schmitz (1990,1995) document that between 40 and 60 percent of entrepreneurs start more than one business over the course of their lifetime. Lazear (2001) uses a proprietary data set on Stanford Business School graduates and reports that they start, on average 1.34 businesses, while most of people do not start a single business over their lifetime. Chari et al. (2005) analyze the Panel Study of Income Dynamics data and find that those who have become an entrepreneur once are more likely to start entrepreneurial

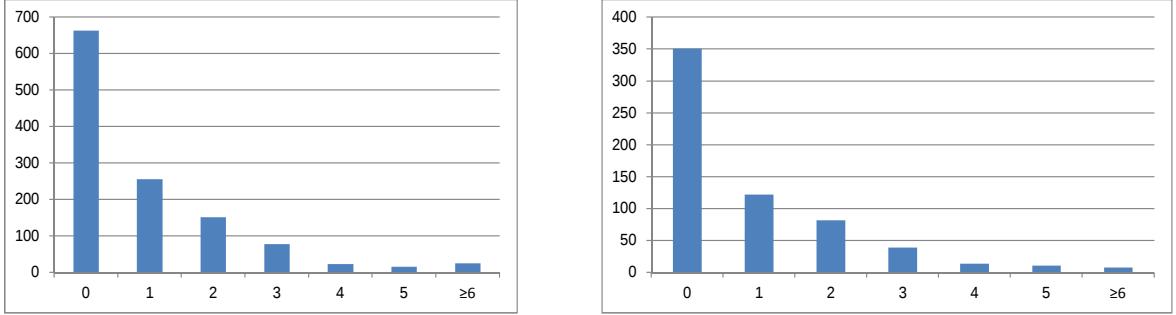


Figure 1: Histogram of businesses owned in the past among all nascent entrepreneurs (the left plot, XX observations total) and solo entrepreneurs (the right plot, XX observations total).

firms in the future than those who have no entrepreneurial experience at all.

I complement this evidence by reporting the results obtained from the publicly available Panel Study of Entrepreneurial Dynamics (PSED) data, which carried out a nationwide survey of nascent entrepreneurs (who are in the process of starting a new firm). Among other things, these entrepreneurs were asked “How many other businesses have you helped to start as an owner or part-owner?” (question AH12). Figure 1 plots the histograms of the entrepreneurs’ answers to this question for all the surveyed entrepreneurs, as well as for those who are starting the current business on their own. In both cases, about half of all entrepreneurs report having owned at least one business in the past (the average age of a respondent is 41 years old). The average number of past start-ups in each group is 1.02 and 0.98, respectively. At the same time, it is well known that the majority of people never become entrepreneurs over their life time. This suggests that entrepreneurial activity is recurrent. One possible reason of such recurrence is that arrival of entrepreneurial ideas is correlated across time (or correlated with other individual characteristics that are highly persistent). In what follows, I argue that accounting for the extent of serial entrepreneurship plays an important role in quantifying

the impact of credit constraints on entrepreneurial activity and, via it, on economy's output and TFP.

3 The Model

Consider an infinite-horizon economy with discrete time $t = 0, 1, \dots$. The economy is populated by two types of agents, s and n . The agents of type s account for a fraction λ of total population and are more likely to generate entrepreneurial ideas. Namely, if an s -agent has no entrepreneurial idea in the current period, he comes up with one with probability p_s in the next period. For an n -agent, such probability of arrival of an entrepreneurial idea equals to $p_n \leq p_s$.

If an agent has an entrepreneurial idea in a given time period, he gets access to production technology $y = zk^\gamma$ which utilizes capital k to produce y units of consumption good ($z > 0$ and $\gamma \in (0, 1)$); capital depreciates at rate δ in the production process. An agent with an idea can either undertake it or become a worker, in which case he earns wage w . All agents without ideas must become workers. All existing entrepreneurial ideas disappear with probability q in the next period. Agents live forever and their preferences are given by $\sum_{t=0}^{\infty} \beta^t u(c_t)$, where β is the time discount factor and $\{c_t\}_{t=0}^{\infty}$ is the agent's consumption profile.

No credit constraints for entrepreneurs: Suppose that all agents have access to risk-free saving technology that pays rate of return r , and that entrepreneurs can borrow needed capital at the same interest rate. Thus, implementing entrepreneurial idea generates income

$$\pi^* = \max_k zk^\gamma - (r + \delta)k = (1 - \gamma)z \left(\frac{z\gamma}{r + \delta} \right)^{\frac{\gamma}{1-\gamma}} \quad (1)$$

and requires investment $k^* = \left(\frac{z\gamma}{r+\delta}\right)^{\frac{1}{1-\gamma}}$. If z is sufficiently high, π^* exceeds w , and all agents with ideas become entrepreneurs. Thus, the total amount of entrepreneurs in the steady state is equal to the amount of entrepreneurial ideas in the population, i.e.,

$$M^* = \frac{p_n}{q + p_n} \cdot (1 - \lambda) + \frac{p_s}{q + p_s} \cdot \lambda. \quad (2)$$

The uncertainty of arrival in entrepreneurial ideas exposes agents to idiosyncratic risks. Namely, their income fluctuates between w and π^* , with transitional probabilities determined by p_s , p_n and q . In the absence of complete insurance markets, the agents rely on self-savings to insure against idiosyncratic risks. In other words, in the absence of borrowing limits to entrepreneurial activity, the model becomes a standard Bewley-type model. The agents' consumption / savings decision is determined using the following dynamic problem:

$$\begin{aligned} V_i^*(a, 0) &= \max_{a' \geq 0} \{u(a + w - a'/(1+r)) + \beta(p_i V_i^*(a', 1) + (1-p_i)V_i^*(a', 0))\} \\ V^*(a, 1) &= \max_{a' \geq 0} \{u(a + \pi^* - a'/(1+r)) + \beta((1-q)V_i^*(a', 1) + qV_i^*(a', 0))\}, \end{aligned} \quad (3)$$

where a is the agent's wealth, and $V_i^*(a, 0)$ and $V_i^*(a, 1)$ are the values of the agent of type $i \in \{s, n\}$ with and without an entrepreneurial idea, respectively. For a given interest rate r , decision problem (3) determines the agents' savings profiles $a'_i(a, 0; r)$ and $a'(a, 1; r)$. These policy rules, in conjunction with the evolution of entrepreneurial ideas, uniquely define the stationary measures of agents with respect to their wealth, $\mu_i(a, 0; r)$ and $\mu_i(a, 1; r)$. In the equilibrium, the interest rate r is determined so that the total amount of savings is equal to the total amount of capital used by entrepreneurs in

production:

$$\sum_{i=s,n} \left(\int a'_i(a, 0; r) d\mu_i(a, 0; r) + \int a'_i(a, 1; r) d\mu_i(a, 1; r) \right) = M^* \cdot k^*(r). \quad (4)$$

For now, the wage rate is assumed to be endogenously given, but, in a more general setting, it may be endogenized via introduction of the labor market on which entrepreneurs hire workers in order to implement their ideas.

Self-financed entrepreneurs: Now suppose that the financial markets are completely absent and everyone relies on basic storage technology to finance entrepreneurial ideas, as well as to smooth consumption over time. Individual wealth a becomes an important factor in deciding whether to implement the idea, and how much to invest in it. Let $V_i(a, 0)$ and $V_i(a, 1)$ be the values of the agent of type $i \in \{s, n\}$ with and without an idea, respectively. The agent without an idea receives wage w , makes consumption / savings choice and draws an idea with probability p_i in the following period:

$$V_i(a, 0) = \max_{a' \geq 0} \{u(a + w - a') + \beta (p_i V_i(a', 1) + (1 - p_i) V_i(a', 0))\}. \quad (5)$$

The agent with an idea can choose between implementing it or not. If the idea is not implemented, the agent receives income w . Alternatively, he can invest $k \leq a$ into his business and then use the business revenue for consumption or savings purposes. Thus, implementing the idea generates revenue

$$\pi(a) = \max_{k \leq a} zk^\gamma - \delta k, \quad (6)$$

and the value of having the idea can be computed as

$$V_i(a, 1) = \max_{a' \geq 0} \{u(a + \max\{w, \pi(a)\} - a') + \beta((1 - q)V_i(a', 1) + qV_i(a', 0))\}. \quad (7)$$

Obviously, there exist threshold wealth levels $\underline{a}$ and $\bar{a}$ such that entrepreneurs implement their existing ideas if, and only if, their wealth exceeds $\underline{a}$, implement the ideas at a suboptimal scale if $a \in (\underline{a}, \bar{a})$ and invest the same amount in their ideas if $a > \bar{a}$. Thus, borrowing constraints adversely affect economic activity via two channels – because some poor agents choose to not implement their ideas at all (extensive margin) or because the ideas are implemented at an inefficient scale (intensive margin). Ultimately, the productivity and output losses due to the absence of financial intermediation depend on the wealth distribution in the population, or, specifically, on the wealth distribution of the agents generating new ideas, which is an endogenous object.

The serial correlation in arrival of entrepreneurial ideas (reflected in p_s and p_n) impacts the extent to which financial intermediation restricts economic activity in a number of ways. First, it affects what kind of agents new ideas arrive to: the higher is the serial correlation, the more likely it is that the new ideas are generated by people with past entrepreneurial experience and, hence, the more efficiently these ideas will be implemented. Second, serial correlation impacts incentives for wealth accumulation: in particular, the agents who are less likely to generate new ideas have less incentives to accumulate wealth for purposes of starting a new business when the idea arrives. Thus, changes in p_s and p_n have a compound effect on the wealth distribution of the agents generating new ideas. Due to the presence of uncertainty, analytical characterization of the decision problems (5) and (7) is not available, so I turn to quantitative analysis to explore the impact of serial correlation in arrival of entrepreneurial ideas on economic

activity.

4 Quantitative exploration

In order to analyze to what extent serial correlation in arrival of entrepreneurial ideas is important for understanding the effects of financial intermediation on economic development, I implement the following exercise. First, I calibrate the model without borrowing limits on entrepreneurial activity to the U.S. data. The calibration procedure leaves the probabilities of arrival of entrepreneurial ideas p_s and p_n undetermined, though stipulates that they must satisfy a certain relationship so that other calibration targets are met. Then, I shut down financial intermediation and analyze the effects on economic activity in the steady state (output, TFP, etc.) for different combinations of p_s and p_n satisfying the aforementioned relationship. Previous studies followed exactly the same approach while quantify the link between financial and economic development but none analyzed the role of serial entrepreneurship in a systematic way. In particular, some of the studies (e.g., Buera et. al. 2011) assumed that the arrivals of entrepreneurial ideas are not serially correlated and found significant output losses due to shutting down financial intermediation. Under this assumption, in a calibrated benchmark economy, the probability of becoming an entrepreneur does not depend on the agent's past entrepreneurial experience, which is contrary to empirical evidence. I investigate whether (and under which conditions) these predictions would change if arrival of entrepreneurial ideas is serially correlated and, in the model without borrowing limits, some serial entrepreneurship is observed.

4.1 Calibration

The model contains three technological parameters (z , γ and δ), two preference parameters (β and σ), four parameters guiding the evolution of entrepreneurial ideas (p_s , p_n , q and λ) and the exogenous wage rate w . I choose a model period to be one year and set capital depreciation to $\delta = 0.06$. Returns to scale γ is chosen so that the economy's capital-output ratio is equal to 3 when interest rate is equal to 4 percent (from the entrepreneur's profit maximization problem it follows that $k/y = \gamma/(r + \delta) = 3$ which implies that $\gamma = 0.3$). The productivity of entrepreneurial ideas z is then chosen to match a relevant moment of the U.S. income distribution. In the benchmark model, agents fluctuate between two income levels, w and π^* , and all those with entrepreneurial ideas receive π^* . In the U.S., entrepreneurs are highly over-represented among the top earners, and, overall, account for about 10 percent of the population. Thus, I stipulate the process for entrepreneurial ideas so that $M^* = 0.1$, and choose z so that the total income of entrepreneurs accounts for 35 percent of total earnings, which is what top 10 percent of earners make in the U.S. Thus, $M^*\pi^*/(M^*\pi^* + w(1 - M^*)) = 0.35$ with $M^* = 0.1$ yields $z = 2.77$ when w is normalized to 1.

The probability of losing an idea is chosen to match the job reallocation rate due to firm closing, implying $q = 0.18$. The rest of the parameters of the process of generating / losing entrepreneurial ideas are only restricted by the requirement that, in the steady state, the total number of entrepreneurial ideas M^* is equal to 0.1. The left plot on Figure 2 demonstrates the combinations of (p_s, p_n) that satisfy this condition for $\lambda = 0.15$. The star marks the case where $p_s = p_n = 0.02$, i.e., there are no differences between s and n types and arrivals of entrepreneurial ideas are not serially correlated. This case corresponds, for instance, to the model considered in Buera et. al. (2011), where new

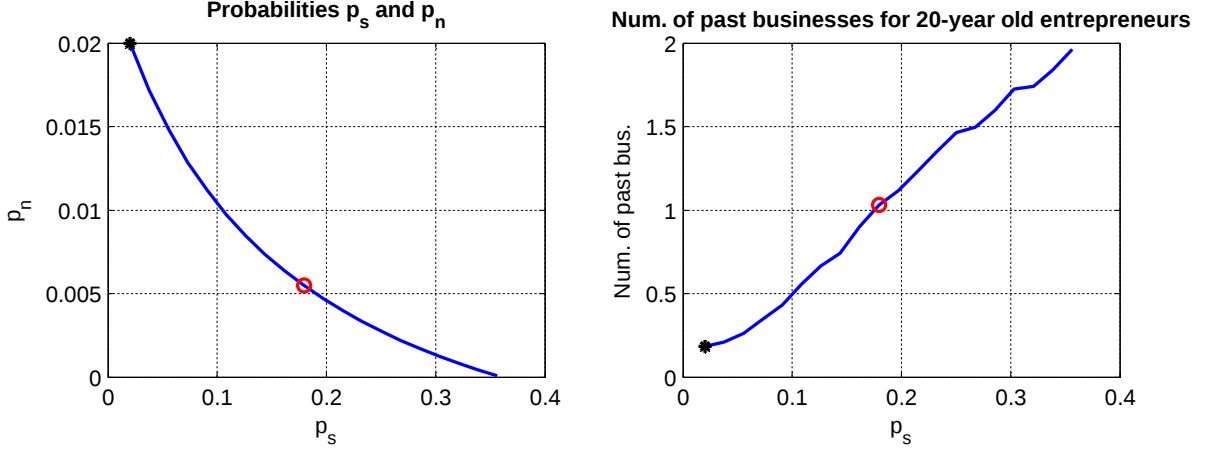


Figure 2: The combinations of (p_s, p_n) that result in $M^* = 0.1$ for $\lambda = 0.15$ (left plot) and the number of businesses owned in the past for entrepreneurs who are in the process of implementing a new idea after 20 years of working life (right plot).

ideas are uniformly distributed across all non-entrepreneurs in the population. As the combination (p_s, p_n) moves south-east along the plotted curve, s -type (n -type) agents become more (less) likely to generate new ideas and the serial correlation increases. The right plot demonstrates the statistics that can be compared to the PSED data presented in Section 2. Namely, it shows, for all values of p_s , the number of businesses started in the past by entrepreneurs who are in the process of starting a new business in the twentieth year of their work life. When $p_s = p_n$, this statistics in the model is considerably smaller than it is in the data, 0.18 versus 1.03. The red circle on both figures marks the level of p_s for which the model and the data coincide. Parameter λ is left undetermined, but comparative statics analysis suggests that it has no significant impact on the comparison between the i.i.d. and the calibrated serially correlated cases.

Finally, I set $\sigma = 1.5$ and choose β in such a way that the economy's equilibrium rate is equal to 4 percent. I consider two different scenarios. First, I assume that the economy with financial intermediation also provides full insurance, in which case $\beta = 1/(1 + r)$.

The apparent advantage of this approach is its simplicity. The disadvantage, apart from being unrealistic, is that switching from full financing to self-financing not only makes entrepreneurs borrowing constrained but also eliminates insurance markets, thereby magnifying the welfare cost resulting from such a change. Thus, I also consider the case in which insurance markets are absent even if entrepreneurs have access to borrowing, and the interest rate is determined in the general equilibrium according to (4). Under this scenario, the time discount rate is calibrated so that the economy's equilibrium rate equals to 4 percent resulting in $\beta = 0.986/(1+r)$. The main analysis is then performed for both scenarios, though it turns out that the main quantitative findings are quite similar in both cases.

Figure 3 illustrates how the key aggregates of the economy change when the financial intermediation is shut down (assuming that full insurance was achieved in the economy without borrowing limits, i.e. $\beta(1+r) = 1$). Regardless of p_s , the economy experiences the decline in entrepreneurial output, total income by workers and entrepreneurs, total capital utilized by entrepreneurs and TFP (all the corresponding aggregates in the unconstrained economy are normalized to one). The magnitude of this effect, however, varies a lot with p_s . For example, entrepreneurial output falls by 27 percent if the arrivals of entrepreneurial ideas are not serially correlated, but only by 12.5 percent if the process of entrepreneurial ideas is calibrated to match the extent of serial entrepreneurship observed in the PSED. Likewise, the effects on total income (workers and entrepreneurs) and TFP are reduced by about a half in the economy with calibrated serial correlations, as compared to the i.i.d. case.

As discussed above, the output loss due to the absence of financial intermediation may occur due to changes along two margins, extensive (due to a reduction in the number of entrepreneurs) and intensive (due to changes in the levels of capital active

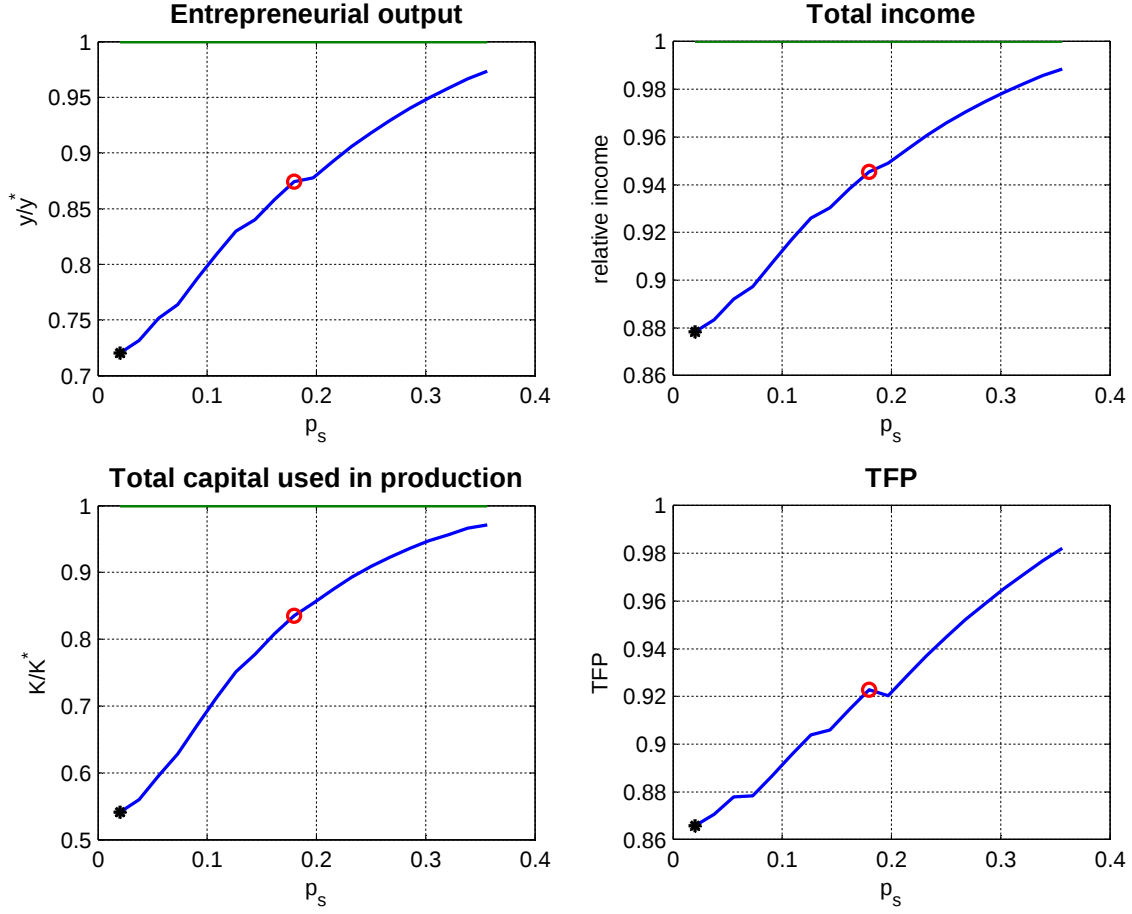


Figure 3: The effects of shutting down the financial intermediation for different levels of p_s , $\beta(1+r) = 1$ and $\lambda = 0.15$.

entrepreneurs invest in their firms). In this calibrated model, the extensive margin is very small because entrepreneurial income is high compared to wage ($\pi^* = 4.86$ versus $w = 1$) and very little wealth is needed to make entrepreneurial idea profitable; the number of active entrepreneurs varies from 10 percent of the population to 9.6 percent of the population as p_s changes. Thus, most of the decline in entrepreneurial output occurs due to the changes along the intensive margin. As evident from the bottom left plot on Figure 3, capital invested in entrepreneurial firms decreases drastically when

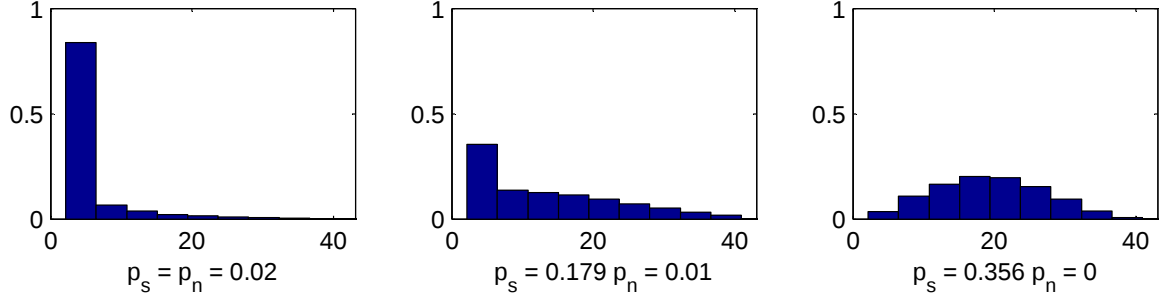


Figure 4: The distribution of capital invested into their business by entrepreneurs who have just generated an entrepreneurial idea, the i.i.d. case is on the left plot and the calibrated case is in the middle.

financial intermediation is shut down. However, this decline is relatively small for higher levels of p_s , where serial entrepreneurship is more pronounced. Figure 4 demonstrates the distribution of capital invested in the ideas that have just been acquired. On the left plot, corresponding to $p_s = p_n = 0.02$, most of the new firms start very small.¹ On the middle plot, for which p_s and p_n are chosen to match the extent of observed serial entrepreneurship, the startups' size is bigger, though many new firms are still considerably smaller than in the first best. Finally, on the right plot, corresponding to the situation where only s -types can generate entrepreneurial ideas, the size distribution of the startups is centered around k^* , and the entrepreneurial output falls by only a few percentage points due to the absence of financial intermediation. The key reason, of course, is that the s -types tend to be richer and, thus, implement their projects more efficiently.

Figure 5 summarizes the results for the economy in which agents cannot insure against idiosyncratic shocks even if there is financial intermediation, i.e., β is calibrated

¹For comparison, in the benchmark economy with financial intermediation, $k^* = 20.1$. In the self-financed economy, the optimal firm size rises to 43.8 since there are no other investment opportunities.

so that the credit market clears at $r = 0.04$. Quantitatively, the results are similar to the ones obtained in the previous scenario. Since β is lower, agents have generally less incentives to save and, thus, the losses due to the absence of financial intermediation are slightly bigger. Comparison of the i.i.d. and the calibrated serially correlated cases result in roughly the same conclusions: accounting for the extent of serial correlation in arrival of entrepreneurial ideas reduces the steady state losses from the absence of financial intermediation roughly by half.

5 Work in progress

The above exercise utilizes a very simple model and demonstrates that accounting for serial correlation in arrival of entrepreneurial ideas may be important for quantifying the link between financial and economic development. It, however, misses on several dimensions that may play contributing roles.

First, I believe it underestimates the effects of credit constraints, as well as the impact of serial correlation on these effects because it assumes that workers' income is exogenous (in some ways, being a worker is treated as home production which generates constant revenue regardless of the stage of economic development). Endogenizing wage rate via labor market where workers provide labor services and entrepreneurs hire them, is the first next step of the analysis. On the one hand, because capital and labor are complementary, it is likely to magnify the impacts of financial development on output and TFP.² Additionally, for the same reason, it is more likely to make serial correlation

²Endogenizing wage rate also results in higher decreasing returns to scale parameter γ for the calibrated economy (about $\gamma = 0.75$). This, in turn, leads to profit being maximized at higher capital levels, which makes the lack of financial intermediation more costly. Additionally, for such high γ the model has richer response along the extensive margin, as the minimal levels of investment needed to deliver a certain profit level increases.

more quantitatively important, because an increase in efficiency of capital allocation due to higher serial correlation would also lead to higher efficiency in labor productivity. My preliminary calculations (using a non-calibrated economy) confirm this intuition. I am currently in the process of fully calibrating this model.

Second, the model considered so far may overestimate the impact of credit constraint on economic development because it completely shuts down any risk-free saving, leaving only the storage technology that pays no interest. This reduces agents' incentives for wealth accumulation and reduces the scale at which ideas are being implemented. To address this, I am planning to introduce a savings market even in the absence of lending to entrepreneurs on which the interest rate will be endogenized.

Finally, I would like to investigate the roles of redistributionary policies in this class of environments. In the absence of borrowing limits on entrepreneurial activity, imposing a tax T on entrepreneurs and paying a subsidy $S = TM^*/(1 - M^*)$ increases welfare because it reduces the extent of uninsured risk. This is a standard implication in Bewley-type models. At the same time, such a redistributionary policy reduces incentives for wealth accumulation, since agents have less need to self-insure, which is likely to adversely affect the efficiency of entrepreneurial activity when entrepreneurs are subject to borrowing limits. Thus, while in a standard Bewley-type model a lump-sum redistributionary policy is welfare-improving, it may lead to a welfare loss in a setting in which some income is generated via entrepreneurial activity and entrepreneurs are subject to borrowing limits. To my knowledge, this observation has not been made in the existing literature and, on its own, may be a central idea of a separate research project. At the same time, I believe the relative strength of the two effects of a redistributionary policy – better insurance vs. less efficient capital allocation in entrepreneurial firms – may depend on the serial correlation in arrival of entrepreneurial ideas. Thus, depending of

the findings, I am planning to either embed this analysis into the framework studied in this paper, or address them in a separate project.

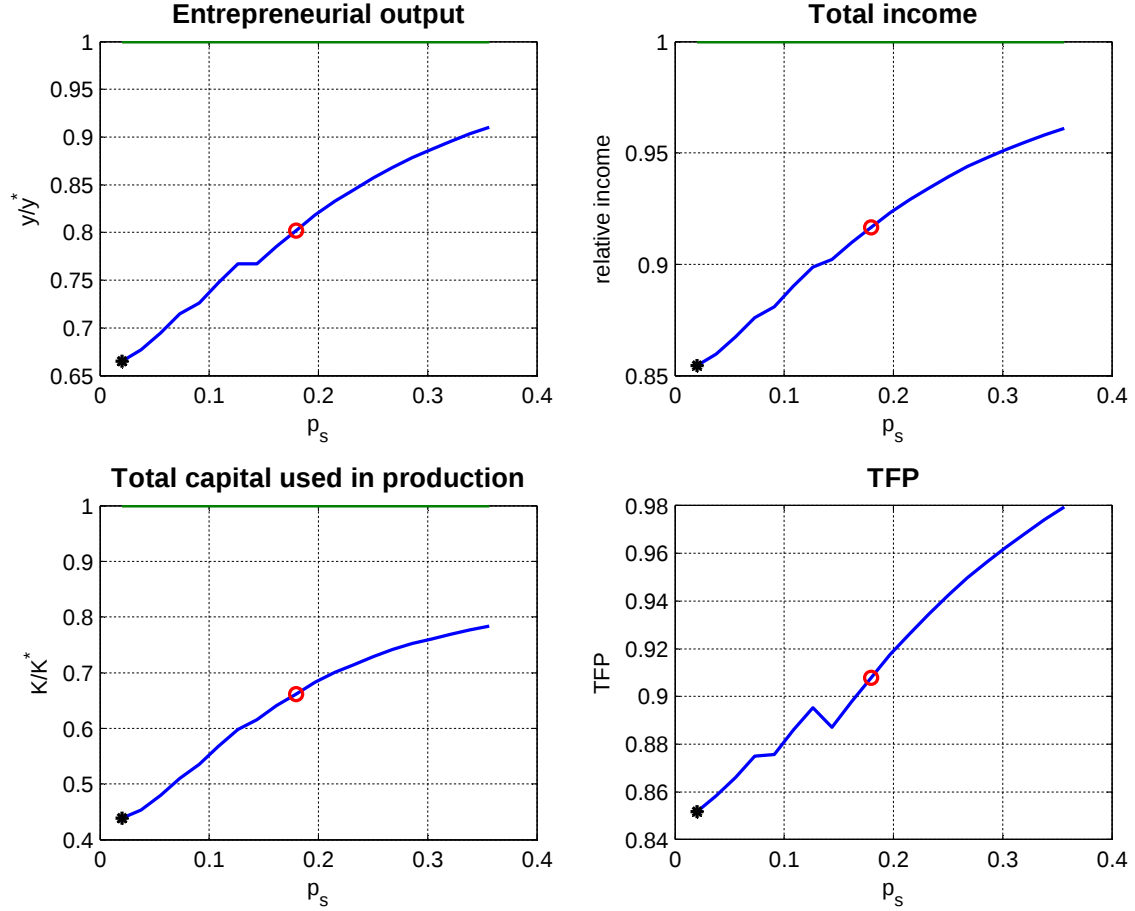


Figure 5: The effects of shutting down the financial intermediation for different levels of p_s , $\beta(1+r) = 0.986$ (no full insurance when entrepreneurs are not constrained) and $\lambda = 0.15$.

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