Workplace Flexibility and Entrepreneurship[*]

Sumit Agarwal   Tien Foo Sing   Changcheng Song   Jian Zhang

December 2018

Abstract

Working at home benefits workers with low fixed costs and the ability to engage in joint market and household production. We evaluate a large-scale reform in Singapore that allows the possibility of business creation at one's residential property and study whether the option of home-based entrepreneurship spurs entrepreneurial activities. Difference-in-difference estimate shows that the reform leads to a significantly higher level of business creation, implying that entry regulation with high fixed costs is an important factor that deters entrepreneurship. The effect is more pronounced for low-income individuals and industries with high starting capitals. Additional new firms in response to the reform have a higher survival rate, and the effect is also more pronounced for low-income individuals and industries with high starting capitals. These results suggest that financially constrained entrepreneurs benefit more from the reform. The reform also encourages entrepreneurs to become serial entrepreneurs, and they open a larger business with similar survival rate for their second firm. These results show that the home office scheme effectively spurs entrepreneurial activities and attract more entry into self-employment without significantly lowering the average quality of the pool.

JEL code: M13, L26

Key words: Entrepreneurship, Home-Base Work, Experimentation

I. Introduction

Entrepreneurship has long been recognized as a key mechanism for enhancing economic development. The value of supporting entrepreneurship is again confirmed as small businesses acted as one of the most powerful generators of new jobs in the path of global economic recovery from the "Great Recession". Therefore, designing and evaluating policies to remove barriers to entry and foster entrepreneurship intrigues both policy makers and academics. A large body of studies are devoted to investigating factors that discourage entrepreneurship, which include regulation limit, access to capital and downside risk such as career concerns. At the same time, previous literature has documented substantial non-pecuniary benefits of self-employment such as enjoyment, control and flexibility, which explain the existence of significant earning differential between self-employment and paid employment (e.g. Hamilton, 2000;Hurst and Pugsley, 2012).

In this paper, we evaluate a large-scale reform that involves both dimensions of reducing the barrier and increasing non-pecuniary benefits to promote entrepreneurship, which is named "Home Office Scheme" and implemented in Singapore in late 2001. The reform is aimed at providing workplace flexibility for potential entrepreneurs and allowing them to set up new business in their homes. The reform provides substantial incentive to promote business creation in three aspects. The forefront benefit is that it reduces the fixed monetary cost that entrepreneurs used to face, including renting office space and commuting expenditure etc. Second, the option of workplace flexibility further enhances the non-pecuniary benefits of being an entrepreneur and allows for engagement in joint market and household production. Third, prior literature has found that social status of entrepreneurs and possible shame from a business failure is an important driving force for the interest in entrepreneurship (Begley and Tan,2001). The reform in this study helps obscure salience of possible business failure and thus avoid experiencing the consequent shame and humiliation. In other words, it reduces the cost of experimentation and enables entrepreneurs to work on an idea with fewer concerns about the possibly negative consequences. This is indeed supported by anecdotal evidence that entry into entrepreneurship increased following the reform[1].

The identification of the reform's impact requires an estimate of the counterfactual level of entrepreneurial activities to filter out the effect of other potential macroeconomic shocks. Our empirical strategy exploits the variation in exposure to the scheme across industries. To ensure that the newly created business do not cause disturbance to the residential neighborhood, the scheme stipulated a negative list of industry type that are prohibited from home-based operation, which constitutes our control group. In contrast, the treatment group contains industries that are allowed under the scheme. Thus, the way that the reform was implemented lends itself to examination with a standard difference-in-difference estimation design.

We start our analysis by verifying the validity of our empirical design. We first confirm the identification assumption that both treatment and control groups should display similar changes in entrepreneurial activity in absence of the program. In addition, we show that the way of classifying treatment and control group is not related with industry-level response to fluctuations in the overall

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[1] According to Skyline Singapore, "more than 3,000 homeowners have jumped on the bandwagon within the first month to run businesses such as computer design, IT accounting, management consultancy and software programming."

economy. The difference-in-difference estimate suggest a positive and significant impact of the reform on new firm formation: firm creation grows by 23 percentage points more following the reform for the treated industries than the control group.

To investigate the possible channels, we show that the effect is more pronounced for low-income individuals, for whom entry regulation with high fixed costs is most likely to be the foremost barrier to entrepreneurship. The effect is more pronounced for industries that require high starting capital. However, we find no evidence that the treatment industries attract more married entrepreneurs who benefit more from the engagement in joint market and household production. Moreover, the reform encourages failed entrepreneurs to start a new business in the future. There, our results imply that entry regulation with high fixed costs is a barrier for firm creation, and support that reducing entry cost is important to encourage firm creation. These results also suggest that financially constrained entrepreneurs benefit more from the reform. We do not find evidence to support the explanation of the non-pecuniary benefits or obscuring salience of possible business failure.

The effective policy to promote entrepreneurship should not only be a short-term endeavor of facilitating entry but also the one that creates a healthy entrepreneurial ecosystem. We go beyond the focus on the level of entrepreneurial activities and investigate the welfare implication of the reform. In particular, we explore whether the home office scheme leads to a significant change in the quality of newly built firms. Survival analysis indicates that the newly created firms, while they start out in relatively small size, are as likely to exit in the first two years. More interestingly, they exhibit higher level of survival rate in the long horizon. The increase in survival is more pronounced among low-income individuals and industries that require high starting capital, suggesting that financially constrained entrepreneurs benefit more from the reform. Using a difference-in-difference design, we show that, in the long run, the home office scheme encourages the entrepreneurs to start a second firm, and the second firm is larger with a similar survival rate. The evidence indicates that the home office scheme effectively spurs entrepreneurial activities and attract more entry into self-employment without significantly lowering the average quality of the pool.

To the best of our knowledge, we are among the first to document that policy allowing for workplace flexibility can promote entrepreneurship and facilitate firm formation. Relative to the survey data in previous studies, the firm registry data is with little measurement error and allows us to draw conclusions at a more comprehensive scale. This approach significantly extends the existing literature, which focuses on the general relationship between working place flexibility on productivity and work-home balance (e.g., Kelly et al., 2014; Bloom et al., 2015). The breath of our dataset allows us to investigate the impact on public transportation commuting activities, which connects our study to the urban economic literature. Working from home greatly reduces the community activity and lower emissions (Bento, Cropper, and Mushfiq Mobarak, 2005).

We are contributing to the growing literature on barriers that discourage entrepreneurship and policy designed to facilitate entry. Limited access to finance is also viewed as a top factor that dissuades business creation and growth (Evans and Leighton, 1989;Holtz-Eakin et al., 1994;Hurst and Lusardi, 2004) and numerous studies document that relaxing financial constraint is successful

in increasing entrepreneurship (Bertrand et al., 2007;De Mel et al., 2008;William R. Kerr, 2010; Kerr, Lerner, and Schoar, 2011; Andersen and Nielsen 2012; Adelino et al., 2015; Schmalz, Sraer, and Thesmar 2017). Besides financial constraints, entry barriers in regulation are also important factor. Existing studies have suggested evidence that country-level variation in entry regulation affect the entry rates across countries (Djankov et al., 2002; Klapper et al., 2006). Other studies focus on country-level reform on entry regulation and investigate how it affect with workers drawn into entrepreneurship (Mullainathan and Schnabl, 2010;Bruhn, 2011;Branstetter et al., 2014). In our paper, the reform allowing for home-based entrepreneurship in this paper is also equivalent to a form of monetary transfer to entrepreneurs in terms of reducing the operating cost of business creation (e.g. renting office space, commuting expenditure). Our study thus complements these studies by examining how removing barriers that reduce a significant amount of operating cost can increase firm creation. We document that these types of subsidies indeed spur entrepreneurial activities in the relevant industries. Our results implies that regulation entry barrier with high fixed cost is an important factor that deters entrepreneurship. Removing entry barrier benefits all entrepreneurs and encourages marginal entrepreneurs to start their business. More importantly, removing entry barrier provides additional benefit to financially constrained individuals since they can use the savings from fixed cost to increase investment.

Our paper is also related to the literature that takes the experimental view of entrepreneurship. Entrepreneurship is fundamentally about experimentation because the knowledge and skill set required are unlikely to be known in advance (Kerr, Nanda, and Rhodes-Kropf, 2014). Recent studies (Manso, 2016;Dillon and Stanton, 2017) have taken the theoretical approach to quantify the option value of experimenting entrepreneur ideas. The experimental perspective suggests that the foremost hurdle to entrepreneurship is the friction that discourages experimenting with ideas. These frictions include regulation barriers (Klapper, Laeven, and Rajan, 2006), technology (Ewens et al., 2017), financing risk (Nanda and Rhodes-Kropf 2013) or downside career concern (Hombert et al., 2017; Gottlieb et al., 2017). Our results suggest that allowing for workplace flexibility facilitate entrepreneurship by enabling entrepreneurs to experiment with ideas without incurring high level of fixed cost. This finding has important normative implications for government to design program and policy to reduce the cost of experimentation in general.

The remainder of the paper is organized as follows. Section II introduces the home-based entrepreneurship reform and III presents our data and empirical strategy. Section IV reports the results on the effect of the reform on entrepreneur activities. Section V presents the aggregate impact on house price and commuting activities. Section VI concludes.

II. The Home-based Entrepreneurship Scheme and Institution Details

Singapore developed a unique dual residential housing system: public housing is developed and managed by the Housing Development Board while private housing is generally administered by the Urban Redevelopment Authority. We evaluate a program implemented by Ministry of National Development of the Singapore government and aimed at reducing costs for potential entrepreneurs to start a new business. Specifically, under the scheme, small-scale businessmen and professionals

are allowed to set up new business in their homes. These changes take two steps: starting from November 2001, the Urban Redevelopment Authority launched a pilot Home-Based scheme allow small-scale businesses to operate from homes located in selected mixed zone areas. Later in 10 June 2003, the Housing & Development Board (HDB) and the Urban Redevelopment Authority (URA) jointly introduced the new Home Office Scheme that apply to all residential units. The general goal was to generate incentives for would-be entrepreneurs to create their own business.

The Singapore's office rents are relatively expensive in the world. According to one market research[2], in 2000, the monthly average price of office rent is 4.37 US dollar per sq ft per month. Assume that a small firm requires at least 100 sq ft, the rent cost would be about 437 US dollar per month. The scheme will also help to reduce the commuting time and transportation cost. Thus, the home office scheme will help to reduce a significant amount of operating cost for a small firm.

Under the Home Office Scheme, registration for home office authorization is easily done online, and entrepreneurs are able to commence their businesses immediately upon successful registration. Hence, this scheme is particularly suitable for startups that wish to minimize time and costs in setting up an office. In addition, business owners need not worry about the expiry of their home office authorization as the permit is valid for as long as the business remains in operation. Two important notes are worth mentioning with regards to the reform. First, business registration was forbidden under residential address prior to the scheme. The new policy furnishes entrepreneurs with the flexibility to conduct business from their homes. Second, the scheme also stipulated that homeowners must ensure that their small businesses do not cause disturbance to the neighbors or the residential neighborhood. As the enforcement, the policy requires all applications to go through the approval process and the use of residential property should not fall into a negative list of industry type that are not permitted. The list of non-permissible business enables us to get an estimate of the counterfactual level of entrepreneurial activities in the absence of the program.

III. Data and Empirical Strategy

We now describe the sources of our data and the construction of our main variables.

III.A. Sample and Data Sources

We use data primarily from two sources in this study. The basic data is obtained from the *Accounting and Corporate Regulatory Authority(ACRA)*, which is the regulation body to overview business entities. According to section 5 of the *Business Names Registration Act*, generally, all forms of businesses must be registered with the ACRA. Therefore, our registry data contains the universe of firm that are created from 1990 to 2015 in Singapore. For each newly built firm, the data include firm name, the industry that the firm operates in, the registry date as well as firm's legal status (Sole Proprietorship, Partnership or Company). It also provides the cease date for each firm which we use to conduct the survival analysis. More importantly, it provides the name and national identification number of the founders, which enables us to merge with the demographics

data discussed below. To avoid any contamination of other relevant policies in the event window that may promote new firm formation, we focus our analysis on the period of January 1999 to March 2005. The ending period is chosen because an Act permitting registration of Limited Liability Partnership comes into operation in April 2005.

The second data source is a unique personal database containing demographic information on more than 2 million individuals in Singapore, constituting nearly 60% of Singaporean residents as of 2012 (Agarwal et al., 2016). The dataset contains demographic information such as gender, date of birth, race, marital status, housing address (public or private), and postal code. Using the unique personal identification numbers, we are able to cleanly match the firm registry database with the personal demographics database to obtain, with a high degree of accuracy, the demographic profile (including age, race, marital status, and gender) of every individual registered with each new firm. Compared with the survey approach to obtain demographic and personal information of the entrepreneurs in previous studies (e.g. SINE survey in Landier and Thesmar, 2009), our merged dataset contains a richer set of debtor demographic variables with less measurement error(i.e. Hurst, Li and Pugsley (2014) document evidence of underreporting by self-employed in U.S. household survey data).

III.B.1 Empirical Strategy

The biggest obstacle in evaluating the impact of the program on outcome variables is to get an estimate of the counterfactual level in the absence of the program in order to separate the effect from any other shock to macroeconomic fundamentals. An important aspect of the policy for our purpose is that it explicitly lays down the list of industries that are prohibited from home-based operation. This enables us to circumvent the obstacle by exploiting variation in exposure to the home office scheme and define the treatment and control groups using a standard difference-in-difference analysis. Specifically, firms that operates in the non-permissible sectors are ineligible for home office application and, therefore, can serve as a control group for the treatment group.

Our main difference-in-difference specifications to estimate the effect of the reform is as follows

$$Y_{j,t} = \alpha_0 + \alpha_1 \times T_j \times I(Post)_{j,t} + \alpha_2 \times X_{j,t} + \alpha_3 \times T_j \times Macro_t + \delta_t + \theta_j + \varepsilon_{j,t}, \quad (1)$$

$$Y_{j,t} = \alpha_0 + \alpha_{1\_pre} \times T_j \times I(Pre)_{j,t} + \alpha_{1\_post} \times T_j \times I(Post)_{j,t} + \alpha_2 \times X_{j,t} + \alpha_3 \times T_j \times Macro_t + \delta_t + \theta_j + \varepsilon_{j,t}, \quad (2)$$

Where $Y_{j,t}$ is represent industry-level outcomes like log number of newly created firms for industry j in month t. T_j takes a value of 1 for industries in the treatment group, those falling out of the forbidden list in the Home Office Scheme, and 0 for the control group. $I(Post)_{j,t}$ takes the value of 1 for the month after December of 2001 (the program period) and zero otherwise. $X_{j,t}$ contains time-varying industry-level controls including industry productivity defined as the change in value added per work in each industry. $Macro_t$ denotes variables to account for the macroeconomic environment. The standard errors are clustered at the industry level. The coefficient α_1 measures the effect of the program on the treatment group relative to the control group. Moreover, Equation

(2) implements a test of the validity of our difference-in-difference design, which requires α_{1_pre} tobe statistically and economically insignificant from zero. $I(Pre)_{j,t}$ is a binary variable that equals to 1 for one-year period before the announcement (January 2001 to November 2001)

We also decompose the post-period dummy to study the dynamics of the response at the two stages of the reform.

$$Y_{j,t} = \alpha_0 + \alpha_{1\_post\_1} \times T_j \times I(Post\_Stage\_1)_{j,t} + \alpha_{1\_post\_2} \times T_j \times I(Post\_Stage\_2)_{j,t} + \alpha_2 \\ \times X_{j,t} + \alpha_3 \times T_j \times Macro_t + \delta_t + \theta_j + \varepsilon_{j,t}, \quad (3)$$

where $I(Post\_Stage\_1)_{j,t}$ is a binary variable that equals 1 for the observations in first stage of reform period (December 2001 to June 2003) and zero otherwise; $I(Post\_Stage\_2)_{j,t}$ is a binary variable that equals 1 for the observations in second stage of reform period (July 2003 to March 2005) and zero otherwise.

III.B.2 Discussion of Identification Validity

We face two major concerns in the identification of our estimate. First, the identification of difference-in-difference estimate in the paper hinges on the validity of parallel trend assumption that requires that in the absence of the program, the difference between treatment and control group would display similar pattern in outcome variable during the period of the program. We provide evidence of this assumption by plotting the number of firm creation in Figure 1. As can be observed, there are no differential trends when we compare the treatment with the control group before the program. The second concern goes to the assumption that the way of classifying treatment and control group is not related with industry-level response to fluctuations in overall economy. If the assumption is violated, we might observe that industries in the treatment and control groups display different evolution even without the reform. To mitigate this concern, we include the interaction term of treatment group dummy and macroeconomic variables, $T_j \times Macro_t$, to capture the impact on outcome variables due to variation in the industry-level response to macroeconomic fluctuations. Another concern is that the Singapore government tends to choose the industries with high aggregate demand in the home office scheme. We argue that the concern is less of an issue for two reasons. First, as stipulated in the announcement, the negative list of industry type was specified in order to make sure that disturbance was minimized to the neighbors or the residential neighborhood due to the scheme. As the enforcement, the policy requires all applications to go through the approval process and the use of residential property should not fall into a negative list of industry type that are not permitted. Second, in Figure 1 we show that there are no significant differences in entrepreneurial activities between the treatment and control group during pre-policy period. Therefore, the demand in the treatment and control group during pre-policy period are likely to follow common trends.

[Insert Figure 1,2 here]

III.C. Summary Statistics

Table 1 presents the summary statistics for our sample. Panel A tabulates the mean, median, standard deviation, and quantile distribution of new firm creation for month-level aggregate accounts. Panels B and C report similar statistics for the variables that describe characteristics for newly created firms and entrepreneurs, the latter of which exclude foreigners due to data availability. From this table, we can see that number of new business created at the monthly frequency is 6,705 and the mean number of employment at origination is 3.3. On average, 7.4% of newly created business survived within the 2 years after origination, which is slightly higher to that reported in (Hombert et al,2017). After merging with the Singaporean demographics database discussed in III.A., we are left with statistically large sample that enables us to depict the characteristic of entrepreneurs. The typical entrepreneur in the sample is best characterized as the middle-aged female and this observation is largely consistent with prior studies.

To ensure that we have a valid counterfactual in analysis of program evaluation, we construct a matched sample of treatment and control industries that are observationally similar. Specifically, we calculate propensity score using a logistic regression based on industry-level characteristics, which include productivity, risk, average firm size, capital contributed at origination and the intensity of entrepreneurial activities (Monthly Business Creation). Panel A of Table A2 presents the logistic regression result. Then the matching is conducted according to the nearest-neighbor method using the propensity score. Panel B of Table A2 compare these industry-level variables for matched treatment and control industries and the difference becomes both statistically and economically insignificant.

[Insert Table 1 and A2 here]

IV. Results

We start our formal analysis by first estimating the impact of the reform on new business creation. Subsequently, we analyze heterogeneity in the response across different types of firms. We next examine the welfare implication of the reform and check the robustness of main finding with a falsification test.

IV.A. Effect on New Firm Creation

IV.A.1 Baseline Estimation

We start our analysis by first validating our research design. Specifically, we interact the pre- and post-reform period dummy D(Pre) with the treatment group indicator T as in Equation (2) and the estimate is shown in Column (1), Table 2. The coefficients on the interaction term of D(Post) and T suggests that the firm creation for the treatment group during the pre-reform period is on average 2.4 percentage points lower than the control group, which is small and statistically insignificant. This confirms the validity of the difference-in-difference design. However, the coefficients on the interaction term of D(Post) and D(Treatment) display a both statistically and economically significant effect: firm creation grows by 23 percentage points more following the reform for the

treated industries than the control group. In particular, we estimate equation (1) using the log of number of new firm created in industry j at month t as the outcome variable.

Table 2, Column (2) estimates our main specification (Equation (1)) with only month and industry fixed effects and again we find positive and significant α_1, which indicate that the reform indeed spur entrepreneurial activities. We go on to examine the sensitivity of α_1, to the inclusion of other controls. Column (3) and (4) further include industry controls and account for industry exposure to macroeconomic fluctuations. The inclusion of these additional controls barely affects the estimate of α_1. The fact that our estimate appears stable across specifications suggests that, to the extent that the observable characteristics in our data are representative of unobservable, the estimate of α_1, is not due to an omitted variable bias (Altonji et al. 2005).

The home office scheme is implemented in two phases: first in selected areas and then apply to all residential units. So we also investigate the dynamics of the impact at different stages by decomposing the post-reform period and interacting with dummy for treated industries. The estimated results are shown in Column (5) to (7) with controls included progressively. We find that the growth rate of newly created firms firm for the treated industries is significantly higher than the control group at both stages. Intuitively, we expect a bigger impact for the second phrase as it is implemented at a much larger scale. The evidence is consistent with this notion that the impact of the second stage exhibit much larger impact relatively. Overall, the result suggests that there are no significant differences in entrepreneurial activities between the treatment and control group during pre-policy period, and the number of new firms for the treatment group outrace only after the implementation of the home office scheme.

One concern of the above analysis is the measurement of business registration. For example, people might run un-registered business from home before the reform and then register after the reform. However, the institutional setting in Singapore suggests there is less incentive to do so. Registering with ACRA cost between 100 Singapore dollars to 300 Singapore dollars, depends on business types. However, if individuals choose to carry on business without registration, they will be subject to a fine up to \$10,000 or imprisonment for a term not exceeding 2 years or both. Moreover, they cannot enjoy government grant or tax exemptions for start-ups. They cannot open business account in the bank to apply for loans from banks. Thus, the low cost of registering a firm and high penalty provide less incentive to run un-registered business in Singapore.

To further address the above concern regarding measurement, we empirically explore variations in the entrepreneur's integrity or incentive to run un-registered business. If the policy only formalizes the un-registered business, we should expect the impact on business creation to be driven by entrepreneurs who are more unethical or incentivized. We first focus on the extent to which such illegal activities can be discovered and punished by examining the distance between the company's address and its nearest police station. In addition, we utilize a proprietary dataset that complies all lawsuits in Singapore and construct an integrity measure for entrepreneur's integrity. Specifically, we view the entrepreneur as being with less integrity (or compliant with law) if he/she was defendant in any lawsuit after the sample period (2005 or later). Our ex-post approach is to avoid the confounding impact on business creation later.

[Insert Table 2 and A3 here]

IV.A.2 Robustness Check

In this section, we perform several robustness tests. We first verify the impact of home office scheme on the probability of newly created business having home as the office. We identity the home-office firm in the following two ways. First, we rely on the residence information available in the Singaporean demographic datasets and check the match with office address. Since the Singaporean demographic datasets cannot track the dynamics of home address, we also try to infer residence information from a large Singapore house transaction dataset of non-HDB. Using either approach leave us to face the tradeoff between coverage and precision. Then we apply equation (1) to estimate the impact on home-based business creation. Table A4 presents the OLS results. In Panel A, the coefficients on the interaction term of D(Post) and D(non-religious) suggests, the home office scheme leads to a significantly higher probability of new home-office business. The estimate using the house transaction is positive but not statistically significant possibly due to lack of enough coverage.

To address the concern that our baseline results in Table 2 are potentially driven by small and insignificant sectors due to the equal weight, we perform a weighted least squares regression by using the industry size as the weight. In a similar vein, we also re-estimate the main analysis by excluding those minor businesses in the forbidden list. Second, we consider the potential confounding impact of Dot.com Bubble Burst by excluding high-tech-related industries. Third, to ensure that our results can be generalized to the full sample, we repeat the estimation in Table 2 on the unmatched sample. In particular, we include all 81 industries in the analysis. The results are presented in Table A5. Throughout the robustness checks, we a qualitatively and quantitatively similar effect in the new firm formation and leave the details to the online Appendix.

We also perform a falsification test to further examine the robustness of the results. We examine the impact of the home office scheme by randomly assigning 81 industries into treatment and control group. This specification checks the validity of our design to identify the effect and exclude the possibility that we are establishing a spurious relation between the reform and entrepreneurial outcome. Table A6 reports the result for the falsification test. Specifically, instead of using the non-permissible list of sectors to define the treated industries, we create an indicator variable and randomly assign all industries into treatment and control group. We re-estimate the equation (1) based on this randomized sample. A positive and significant relationship would raise the concern that the documented impact is driven by simple spurious variation. However, the coefficients on interaction term in Table A4 are indistinguishable from zero and indicate that the identification of our main findings is not due to random variation.

[Insert Table A4-A6 here]

We address the "infra-marginality" concern, that is the marginal propensity cannot be determined by examining the average outcome given potential omitted-variables problem (Anwar and Fang, 2006). In particular, for each industry in the treatment group, we adjust the growth rate based on

that in control industries and plot the distribution of the adjusted monthly growth rate in firm creation in treated industries between pre-reform (January 1999 to November 2001) and post-reform period (December 2001 to March 2005) in Figure 3. As can be seen, the mode of distribution falls in the range of (0,30%], and more than 30% of industries in the treatment group experience higher growth rate by less than 30% after the reform, relative to the control group. These results suggest that the finding we document in IV.A.1 is unlikely to be driven by outliers.

[Insert Figure 3]

IV.B. Heterogeneity Test

Who are the marginal entrepreneurs attracted by the home office scheme? In this subsection, we test the heterogeneous effect of the home office scheme by firm size and prior experience of entrepreneurs.

Firm Size -- While the idea of home office benefits entrepreneurship by reducing fixed costs of starting a new business, it should work for sectors that conduct small-scale business without high level of personnel. This is also to comply with the requirement in the policy that the newly established businesses must not cause disturbance to the neighbors or the residential neighborhood. Therefore, we expect that the positive effect of the reform on entrepreneurship is mainly driven by firms with relatively small scale. To test this hypothesis, we classify our full sample of newly created business into two groups based on the size at registration. The new business is considered to be large (small) if the number of individuals is more than (equal or less than) three. We estimate our main specification for the two subsamples respectively and the results are shown in Panel A of Table 3. The coefficients on the interaction term at the most saturated specification is 0.230 (significant at the 1% level) for small-scale firms and -0.002 (insignificant) for firms with large number of employees. The evidence that the increase in new firm creation is mostly concentrated among small-scale business lends further support for the impact of home office scheme in driving the difference-in-difference estimate.

Prior Experience -- Novice vs Experienced Entrepreneurs We investigate heterogeneity of the response to the entrepreneurship stimulus program among different entrepreneurs. In particular, we compare the new business creation induced by Home Office Scheme among novice and experienced entrepreneurs. Novice sample include first-time entrepreneurs who do not have prior business experience. Prior studies document evidence of performance persistence in entrepreneurship: entrepreneurs with a track record of success are much more likely to succeed (i.e. Gompers et al.,2010). We further classify the sample of experienced entrepreneurs into Failures and Non-Failures depending on the status as of December 1998, which is right prior to the beginning of sample period. We run regression of Equation (1) to obtain estimates of α_1 for the three subsamples separately and report the results in Table 4. The results show that the home office scheme leads to a significantly higher entry into self-employment among first-time entrepreneurs than the counterparts. Decomposition based on past performance in Column 3 to 6

suggests that the reform seems to strengthen the 'performance persistence' effect and more successful experienced entrepreneurs get drawn into as a result.

[Insert Table 3,4 here]

In sum, we show that firm creation is more pronounced among small-scale businesses and novice entrepreneurs. These results suggest that marginal entrepreneurs are likely to open small-scale businesses and novice entrepreneurs. They are consistent with the prediction about the selection of marginal entrepreneurs based on the model of Evans and Jovanovic (1989). Details about the model is described in Appendix A.

IV.C. Possible Explanations

Why does home office scheme help to increase the firm creation? There are three possible explanations. First, the home office scheme reduces the entry cost that entrepreneurs used to face, including renting office space and commuting expenditure etc. Second, the option of workplace flexibility further enhances the non-pecuniary benefits of being an entrepreneur and allows for engagement in joint market and household production. Third, prior literature has found that social status of entrepreneurs and possible shame from a business failure is an important driving force for the interest in entrepreneurship (Begley and Tan,2001). The reform in this study helps obscure salience of possible business failure and thus avoid experiencing the consequent shame and humiliation. In other words, it reduces the cost of experimentation and enables entrepreneurs to work on an idea with fewer concerns about the possibly negative consequence.

According to the experimental perspective, the foremost hurdle to entrepreneurship is the cost related to experiment with new business ideas or projects. Allowing for workplace flexibility to promote entrepreneurship by reducing the entry costs of starting a new business, which includes expenses on renting office space and commuting expenditure etc. If the home office scheme increases the firm creation due to reducing the entry cost, the positive effect of the reform on the propensity to start a business is expected to be more prevalent among individuals with financial constraint where such fixed costs are more likely to be the barrier for individuals to enter entrepreneurship. We conduct two sets of analysis to examine the role of financial constraint. First, we follow the idea in Hurst and Lusardi (2004) to exploit the difference in starting capital that entrepreneurs contribute at firm origination across sectors. Specifically, for each industry, we obtain the median contributed amount among businesses that started over the period of 1980 to 1998 (prior to our sample period).

Second, we use the community and their housing type to proxy for their financial constraint and study the impact of the scheme on the selection of new entrepreneurs based on these proxies. We collect the data on all communities where entrepreneurs live in our sample and use the community-level median income as the proxy for entrepreneur's financial constraint. Then we construct the industry-level measure of entrepreneur's income by taking the average among firms created prior to our sample period. In Table 5, we report the heterogeneous effects by interacting treatment dummy, reform period indicator and financial constraint measure all together. The results show

that the effect of home office scheme is relatively bigger when there is higher level of financial constraint: high-starting capital industries and entrepreneurs with lower income (not statistically significant) than the counterparts.

In Figure 4, we plot the coefficients of the DID estimates on business creation in Table 2 at each quantile of the two measures for financial constraints: capital contribution and income. The results are consistent with Table 5: The effect of home office scheme is driven by the industries with higher level of financial constraint.

While the Singaporean demographics data does not provide us with the exact annual income for each individual, we take advantage of the special feature in Singapore to construct the individual-level measure of financial constraint. In Singapore, there are two main types of residential property: public housing and private housing. Public housing, or HDB apartments, because of heavy subsidy by the Singapore government, is offered with the strict eligibility criteria - only citizens with a family that have an income below the stipulated cap. Thus we can rely on the property type (HDB or private) to proxy for the individual's wealth. We use the ratio of HDB resident as the dependent variable in Column (1) of Table 6 and check whether the home office scheme changes the pool of new entrepreneurs by adding significantly more people with financial constraint[3]. We find that, compared to the control industries, the treatment industries attract more entrepreneurs living in the subsidized public housing (HDB). These results imply that entry regulation with high fixed costs is a barrier for firm creation, and support that reducing entry cost is important to encourage firm creation. These results also suggest that marginal entrepreneurs include financially constrained entrepreneurs, and they benefit more from the reform. They are consistent with the prediction about the selection of financially constraint entrepreneurs based on the model of Evans and Jovanovic (1989). Details about the model is described in Appendix A.

If the home office scheme increases the firm creation due to reducing the non-pecuniary benefits, we should observe that the treatment industries attract more married entrepreneurs who benefit more from the engagement in joint market and household production. Similarly, we study the impact of the scheme on the selection of married entrepreneurs and present the results in Column (2) of Table 6. The coefficient is not statistically significantly from zero and with small economical magnitude. Therefore, we do not find evidence to support the explanation of the non-pecuniary benefits.

The third possible explanation is that the scheme helps obscure salience of possible business failure. This is especially relevant in the setting of Singapore as prior study has shown that 'social status of entrepreneurship' and 'shame from business failure' is what distinguish between East Asian and Anglo-Saxon cultures and do predict interest in entrepreneurship better in former case. Since there is no readily available measure to quantitatively pin down the extent of such salience, we design a test in the following spirit. Due to the workplace flexibility offered under the home-office scheme, entrepreneurs enjoy the reduction of failure salience if they created the business in the treated

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[3] In Table A7 we provide further evaluation of the policy by examining its impact on the composition of new entrepreneurs. We find that newly created firms induced by the reform involves more "discouraged workers", namely the ratio of entrepreneurs young/old and minority group but we find no significant change in the composition of entrepreneurs by gender.

industries during the reform but failed afterwards. Therefore, we would expect that home-office scheme help facilitate future (second) firm creation among those entrepreneurs, especially when the first business is created in the treated industries. We focus on entrepreneurs whose first business was established during our sample period (January 1999 - March 2005) but failed afterwards. We then adopt a difference-in-difference design and compare the probability of second business creation between entrepreneurs who open the first business in the treated industry and control industry, before and after the reform. The results are reported in Table 7. In Column 1 the estimated effects on *D(FirstBusi_Post)* is significant, suggesting that entrepreneurs with first business (but failed later) created post-reform in the control industries significantly increase the propensity to start a new business in the future, compared to those with first business (but failed later) before the reform. We do not find a statistically significant coefficient on the interaction term, *D(FirstBusi_Post)*D(FirstBusi_Treated Industries)*. Therefore, we do not find evidence to support the explanation that the reform help to obscure salience of possible business failure.

One concern is that individuals open business at home for tax benefit and it might provide different interpretation of our results. However, the tax benefit seems to be small in the setting of Singapore. First, the rule of tax filing and punishment to tax invasion is independent of whether the firm is registered at home or not. All firms need to report their profit to Inland Revenue Authority of Singapore (IRAS). Reporting one's income erroneously is treated as a serious offence punishable by law, regardless of it being intentional or not. The list of penalties includes a penalty and/or imprisonment. Second, income tax rate is relative low in Singapore and tax payable for most people is moderate due to personal tax relief. For example, the marginal tax rate for those with annual income of 80,000 Singapore dollar is 7%, and the average tax rate is 4.2%. The median income from work is about 48,672 Singapore dollar in 2016. The top 22.5% of taxpayers paid 90.4% of total personal income tax in the year 2016. For those with annual income less than 80,000 Singapore dollar, the average tax payable is only 549.9 Singapore dollars in 2016.[4] Therefore, there is little tax benefit to start home based business.

In sum, we show that the effect is more pronounced for low-income individuals but find no evidence that the treatment industries attract more married entrepreneurs who benefit more from the engagement in joint market and household production. Thus, our results imply that entry regulation with high fixed costs is a barrier for firm creation, and support that reducing entry cost is important to encourage firm creation. We do not find evidence to support the explanation of the non-pecuniary benefits or obscuring salience of possible business failure.

IV.D. Quality of the Start-ups

Removing barriers to entrepreneurship has been a major objective for policy-makers to design programs. However, evaluating the welfare implication of the policy crucially depends on how individuals self-select into the entrepreneurship because there exists a substantial amount of

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[4] Authors' calculation based on data from IRAS. https://www.iras.gov.sg/irashome/Publications/Statistics-and-Papers/Tax-Statistics/

heterogeneity for would-be entrepreneurs (Hombert et al,2017). We now explore whether the home office scheme leads to a significant change in the quality of newly built firms. We measure the quality of the firms by two different ways: survival rate for the first firm and the characteristics of the next firm. The first measure we focus on is how well the start-ups can survival in the following years. A high attrition rate (or low survival rate) indicate relative lower firm quality, or in other words, evidence that is less in favor of the welfare-enhancement of this policy.

IV.D.1 Survival Rate

We first use a Cox-proportional hazard model to explicitly incorporate the history for each firm before they are terminated. In the model we track all newly created firms during the sample period and consider two states depending on whether the firm is ceased or still alive. Regressions are estimated using month, firm's region and industry fixed effects. In Table 8 we present the estimate of hazard ratio using all newly created firm in our sample. As is evident in Panel A, the difference-in-difference result suggests that the exit rate of newly created firms after the home office scheme decreases by 29% relative to that of the comparable start-ups in the control industries. In Column (4) and (5), we report the estimates for firms created in the pre- and post-policy period separately. Before the policy, new firms in the treated industries are 3.5 % more likely to exit than the control groups, consistent with existing cross-country evidence on small ventures. However, the start-ups induced by the reform exhibit lower cease rate by 21.5%.

We further assess the robustness of our results and investigate how the policy influences the firm's probability of exit in different time horizons. Specifically, we run OLS using dummies for start-up's survival during the first till five years. We present the estimates in Panel B. As can be observed, the coefficients on the interaction term are all positive and significant except for the first two years. In other words, the additional firms created by the reform are as likely to exit during the first two years but exhibit much higher survival rate in a longer time horizon. The estimates are, once again, economically meaningful. For example, if we consider 5-year survival, the rate for the additional firms created by the reform is higher in absolute terms by about 5.4%, which is equivalent to 6.9% increase relative to the sample mean as reported in Table 1. Similarly, Figure 5 displays the survival curve for treated and control group during the five-year period since creation. As the figure illustrates, following the home office scheme, the survival rate of treated firms become significantly higher especially when we consider the longer time horizon. Overall, we show a consistent result that the additional start-ups exhibit higher survival rate due to the benefit in fixed cost reduction.

The home office scheme affects firm survival through two channels. The first is a selection channel. Since the scheme will attract both marginal entrepreneurs and financially constrained entrepreneurs, firm survival depends on the ability of these marginal entrepreneurs. The second is a treatment effect. Since the scheme reduces the fixed cost, the payoff of an entrepreneur is higher and the choice to become a worker is less attractive.

To better differentiate between *ex ante* selection and treatment effect brought by the reform, we perform the firm's survival test across different industries similar as Table 5. Specifically, we separate all firms into groups with/without financial constraint based on the two measures we use

in Section IV.C. The results are tabulated in Table 9. We find that the positive effect of home office scheme on the quality of start-ups mainly concentrates among firms with financial constraints. These results suggest that the treatment effect is stronger for financially constrained entrepreneurs: the home office scheme not only motivates individuals with financial constraint by reducing the entry costs but also exerts positive influence on the firm's future performance as reflected by higher survival rate.

[Insert Table 8 here]

IV.D.2 Measurement

One concern of the survival analysis is the measurement of business closure. For example, if people who cease operating a business from a separate office are more likely to report a business closure to the registry than people who cease operating a business from their home, our survival results just reflect reporting bias rather than quality of business. We discuss the institutional setting of business closure in Singapore in more detailed. And these institutions suggest that the reporting is independent of whether the firm is registered at home or not.

Every person, before carrying on business in Singapore, must register with ACRA except for those who are exempted under the Business Names Registration Act. When registering with ACRA, one can choose from the following main business types in Singapore: Sole-Proprietorship, Partnership, Limited Liability Partnership (LLP) and Company[5]. The procedures to close a business entity depend on business types. For sole-proprietorships, partnerships and LPs, they must renew their registration every one or three years and pay the renewal fee. Carrying on the business after the expiry date is an offence under which the defaulter is liable to a fine, or imprisonment, or both. If they intend to close a business, they have the incentive to simply not renew their registrations to avoid renewal fee and other reporting costs.

For companies, they must file Annual Returns (AR)s and hold Annual General Meetings (AGMs). If the company fails to hold its AGM or file ARs on time, ACRA may offer companies an opportunity to pay a late lodgement fee, penalty, or consider persecuting the directors of the company in court. If they intend to close a business, they have the incentive to report to ACRA to avoid the cost of filing ARs and holding AGMs.

Therefore, the institutional setting in Singapore suggest that there are incentives to report the business closure on time and the reporting bias is likely to be small. Even if there are reporting biases, it is independent of whether the firm is registered at home or not.

We also address such measurement concern by comparing the occurrence of firm's extreme failure between treatment and control group. Namely, we merge with the Singapore lawsuits datasets and

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[5] Limited Liability Partnership is only available for registration starting from April 2005, which is beyond our sample period.

identify firm's failure that comes with lawsuit cases or personal bankruptcy filing. While the exit dummy may suffer from measurement error, the observation of firm's exit alongside with concurrent lawsuit cases of the entrepreneurs will very likely reflect firm's performance. We re-estimate the specification as in Table IV.D.1 and the results are reported in Table A8. The pattern is consistent with what we observe in Table 8: the coefficients on the interaction term are all positive and significant except for the first two years, indicating that the performance of additional firms created by the reform are comparable during the first two years but become much better in a longer time horizon.

[Insert Table A8 here]

IV.D.3 Explanations

Why does the home office scheme increase the quality of new start-ups in terms of survival rate? First, the scheme reduces the fixed cost of rent and transportation for the start-ups and thus helps them to survive with low cost. Second, the scheme might attract individuals with more resources to start new business. However, we show that in Part IV.C. that the effect of home office scheme is relatively higher among entrepreneurs living in poor communities, and the treatment industries attract more entrepreneurs living in the subsidized public housing (HDB). Thus, our results do not support the explanation. Third, the scheme might encourage individuals to choose industries with high productivity and low risk. We investigate this hypothesis and present the heterogeneous effect of the scheme across different industry in Table A10. In particular, we compute the industry-level average of quarterly change in value added over the period of 1992 (the earliest date we have for industry productivity) to 1998 and define an industry to be with high/low productivity if its average in that period is above/below the median of the distribution. Similarly, we define the risk of an industry by calculating the average 1-year survival rate among businesses created before our sample period and comparing with the median of sample distribution. Panel A and B in Table 10 shows the comparison of estimated effects between these two types of industry classification, and indicates that business creation in high-productivity industry responded more strongly to the reform. The results confirm our notion and show that the response of new firm creation to the Home Office Scheme is particularly concentrated in industry high productivity and low risk.

[Insert Table A10 here]

IV.D.4 Additional Measure – Future Business Creation

The additional dimension to measure the quality of the start-ups is to look at the characteristics for the next firm in the long run. According to the experimental view, the first business creation often provides a good setting for the entrepreneur to experiment with new business ideas or projects, and allows them to learn from managing their own firms. Thus, the characteristics of the second firm also reflect the quality of the first firm after the scheme. We use the difference-in-differences approach and rely on the control group of entrepreneurs- those with first business creation in untreated industries- to identify the effect of business creation experience during home-office scheme period on the future entrepreneurial activities. Specifically, we focus on entrepreneurs

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whose first business was established during our sample period (January 1999 to March 2005) and carry out the DID regressions to study the impact of the reform on the creation of the second business. We compare the probability of second business creation between entrepreneurs who open first business in the treated industry and control industry, before and after the reform. The results are presented in Panel A of Table 10. The coefficient of the interaction term is positive and significant at the 1% level. The results show that entrepreneurs who open the first business in the treated industry after the reform are more likely to open the second business. Our findings imply that the reform encourages serial entrepreneurship.

We further restrict our sample to serial entrepreneurs, that is, those who established their second business. We carry out the DID regressions by examining second business's characteristics: (1) number of employees at origination; (2) survival rate (within 2 years). We progressively control for time, region and industry-fixed effects of the first and second business to remove the potential influence of time, region and industry-invariant city-level characteristics. We also further include time-varying industry control variables such as industry productivity. The estimations are tabulated in Panel B of Table 10 and the coefficient estimate on the interaction term, *D(FirstBusi_Post)*D(FirstBusi_Treated Ind)*, implies the impact of the home-office scheme on the quality of future business creation. In Models (1) and (2), we examine the number of employees whereas Models (3) and (4) focus on the survival rate. We can see that when the first business was created during the post-reform period and belonged to the treated industries, it leads to a significantly larger second business among serial entrepreneurs relative to the counterfactuals and — adding various control variables neither affects this relationship nor changes its level of significance. However, the survival rate remains similar between the two types of entrepreneurs. The results suggest that the home office scheme encourages serial entrepreneurs to open a larger business with similar survival rate.

[Insert Table 10 here]

Overall, we find that although the additional start-ups are likely to have financial constraint, they exhibit higher survival rate, choose industries with higher productivity and lower risk. Moreover, when the first firm is established after the scheme in the treatment industries, the entrepreneurs are more likely to start a second firm, and the second firm is larger with a similar survival rate. The evidence in this section indicates that the home office scheme effectively spurs entrepreneurial activities and attract more entry into self-employment without significantly lowering the average quality of the pool.

IV.E. Aggregate Impact on House Price

In this section, we explore the impact of the reform on regional variables such as house prices to shed light on a broader set of economic outcomes. To do this, we use an empirical design to exploit regional heterogeneity in exposure to the reform. The key idea is that entrepreneurs are shaped by contextual influences and their choice of which sector to operate is likely to be influenced by neighborhood environment (i.e. Kacperczyk, 2013; Dilaver, Bleda, and Uyarra, 2014). Therefore, regions with more residents who started business in the treated industry are expected to have more exposure to the program. To do this, we obtain a large and proprietary data on private housing

transactions recorded in the caveats during our sample period and investigate the impact of home office scheme on house price in regions with higher/lower exposure. Specifically, we first, for each postcode, calculate the ratio of residents who started business in the treated industry over the period of 1980 to 1998 and then define postcode as one with treatment if its ratio is higher than the median of sample distribution. This approach is similar to that used by Mian and Sufi (2012) in their study of the effects of the "Cash-for-Clunkers" program and Agarwal et al. (2017) to evaluate the Home Affordable Modification Program.

We follow Agarwal et al.(2018) adopt the following region-level specification:

$$Ln(P)_{i,p,t} = \alpha_0 + \alpha_1 \times T_p \times I(Post)_t + \alpha_2 \times X_i + \delta_p + \theta_t + \varepsilon_{i,p,t}, \quad (3)$$

Where the left-hand side variable is the log unit sale price(S$ per squared meter) for the transaction involving house i located in postcode p at time t. T_p is a dummy equal to 1 if the postcode(building) is with treatment under the Home Office Scheme. *Post* is a dummy equal to 1 for the observations after the reform (200112-200503), otherwise 0. X_i include controls for the following house characteristics: unit size(m^2), indicator for condominium, dummy for high flow (level 9 or above), dummy for freehold and dummy for new sale. Table 11 presents the OLS estimate. As the estimate show, the home office scheme induces a positive effect on house price growth locally: after the home-office scheme, house price experienced a 1.7 % in regions with higher level of exposure than comparable houses located in other areas. In Column 3 and 4, we include the interaction term of D(Post) and Pre and find the positive impact only emerges disappears after the reform. Finally, we conduct a falsification test by restricting the sample to be January 1999 - Nov 2001 and the effect on house price become small and statically insignificant.

[Insert Table 10 here]

V. Conclusion

Entrepreneurship has long been embraced as a critical contributor to innovation, job creation and growth of overall economy (e.g. King and Levine, 1993; Guiso, Sapienza, and Zingales, 2004). Reducing the impediments to new business creation and promoting the entrepreneurial ecosystem has become the focus of both policy makers and academics in the policy design and analysis. Such policies come with a variety of forms including funding support, training, access to mentoring and expertise. In this paper, we examine a policy reform that facilitates entry into entrepreneurship by allowing for workplace flexibility. The availability of the option of home-based entrepreneurship reduces the fixed costs of starting a new business, and at the same time, enables would-be entrepreneurs to engage in joint market and household production. Relying on the difference-in-difference strategy, we find that the policy leads to a significant increase in the level of new firm creation, especially in the sector of small-scale business. Moreover, the effect is more pronounced for low-income individuals, for whom the access to capital is most likely to be the foremost barrier to entrepreneurship.

We also go beyond the focus on the level of entrepreneurial activities and investigate the welfare implication of the reform. While the additional firms induced by the policy start out relatively small at creation, they do not quickly fail but are as likely to exit during the first two years. More interestingly, our findings suggest that newly created firms exhibit much higher survival rate in a longer time horizon. Our results imply that regulation entry barrier with high fixed cost is an important factor that deters entrepreneurship. Removing entry barrier benefits all entrepreneurs and encourages marginal entrepreneurs to start their business. More importantly, removing entry barrier provides additional benefit to financially constrained individuals since they can use the savings from fixed cost to increase investment. Although we study the effect of an entrepreneurial policy reform in Singapore, our results propose a broader link that applies to all relevant settings. Our result highlights the importance of providing flexibility and also the necessity of accounting for heterogeneity in would-be entrepreneur's ability in designing policies of entrepreneurship promotion.

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Figure 1 Business Creation: Treated vs Control

The figure plots the 12-month moving average of the number of business created in the treated and control industries from January 2000 to March 2005 (1999 does not appear because of the 12-month average). The vertical lines correspond to the reform period (1st stage, December 2001 to June 2003; 2nd stage, July 2003-)
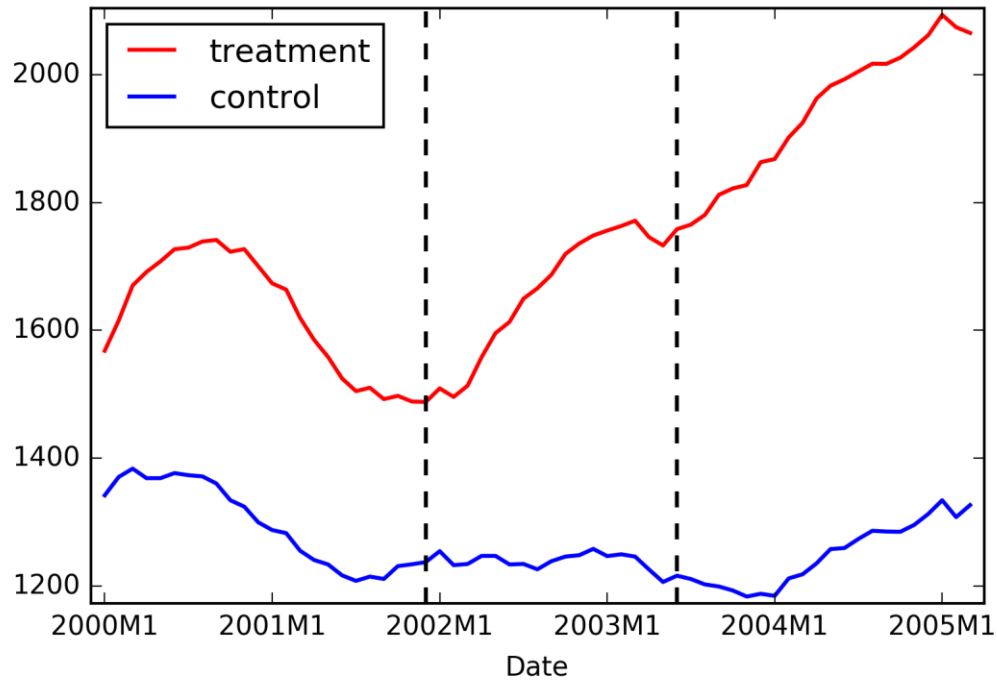
Figure 2 Distribution of Firm Creation in Treated vs Control Industries

The figure plots the regional distribution of *Treated Firm Creation Intensity*, defined as the ratio of number of firm created in treated industries to the total number in both treated and control industries within a Singaporean district, during our sample period (January 1999 to March 2005).
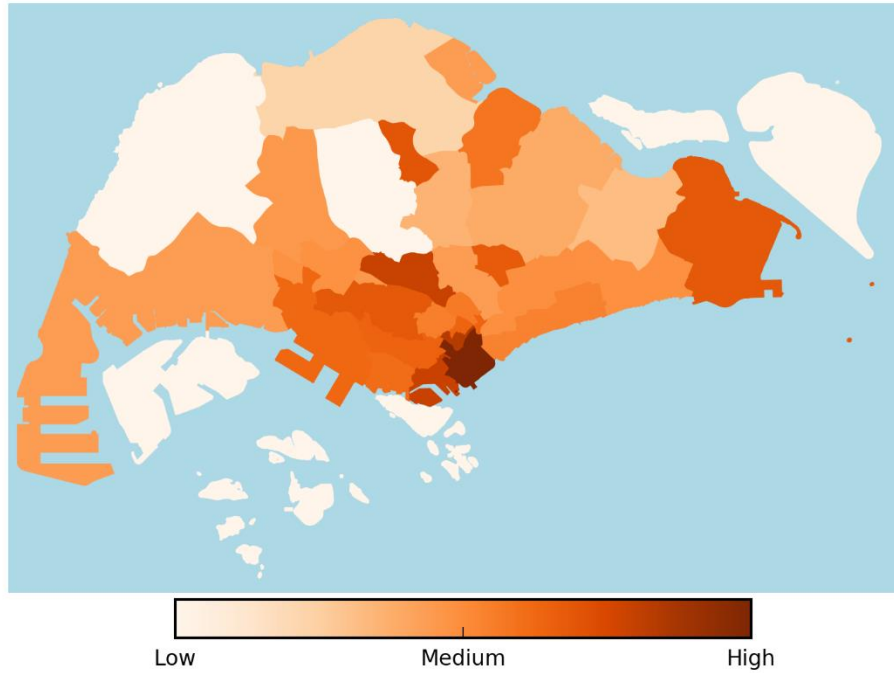
Figure 3 Distribution of Growth Rate in Firm Creation

The figure plots the distribution of the monthly growth rate in firm creation in treated industries between pre-(January 1999 to November 2001) and post-reform period (December 2001 to March 2005). The growth rate is adjusted based on that in control industries.
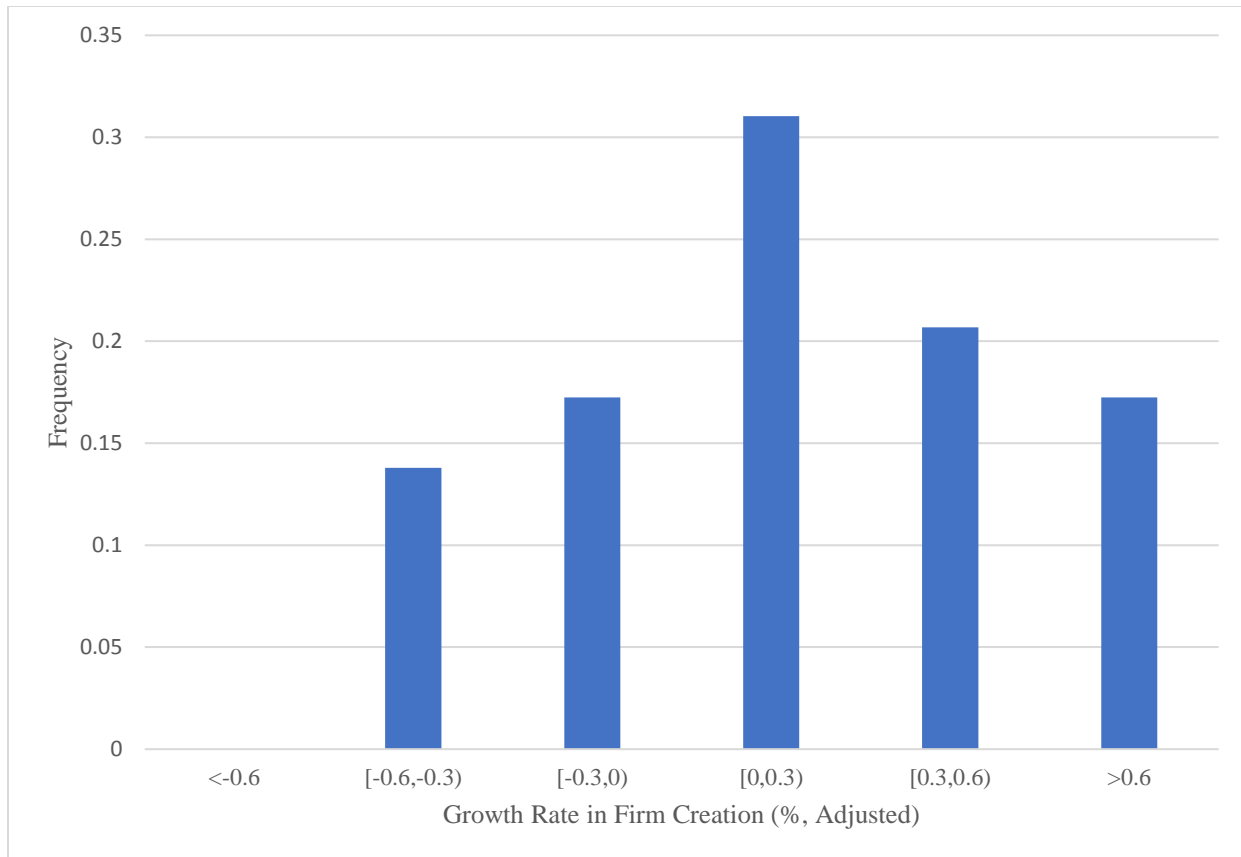
Figure 4 Business Creation and Financial Constraint

The figure plots the DID estimates on business creation in Table 2 at each quantile of the two measures for financial constraints: capital contribution and income, along with their 90 percent confidence interval.
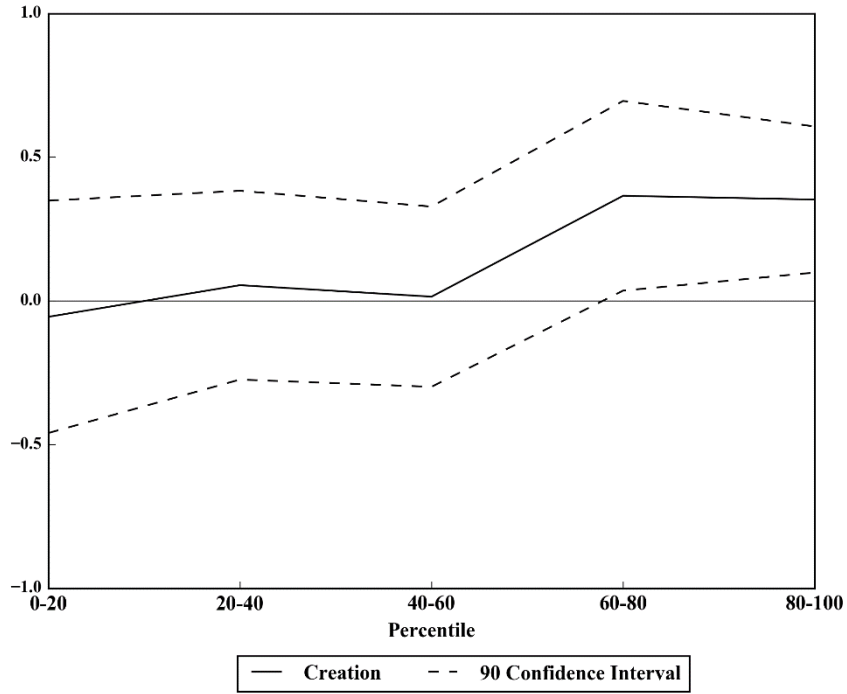
Panel A Capital Contribution
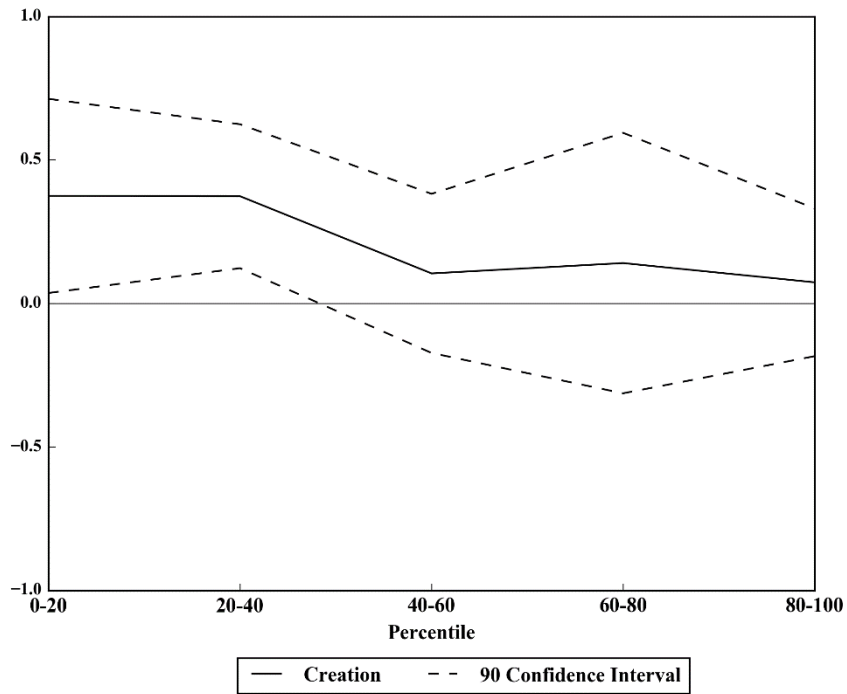
Panel B Income

Figure 5 Survival Rate of New Business Created

The figure plots the Kaplan-Meier survival curve by treated and control group during pre-(January 1999 to November 2001) and post-reform period (December 2001 to March 2005).

Kaplan-Meier estimate: Pre-reform

Kaplan-Meier estimate: Post-reform
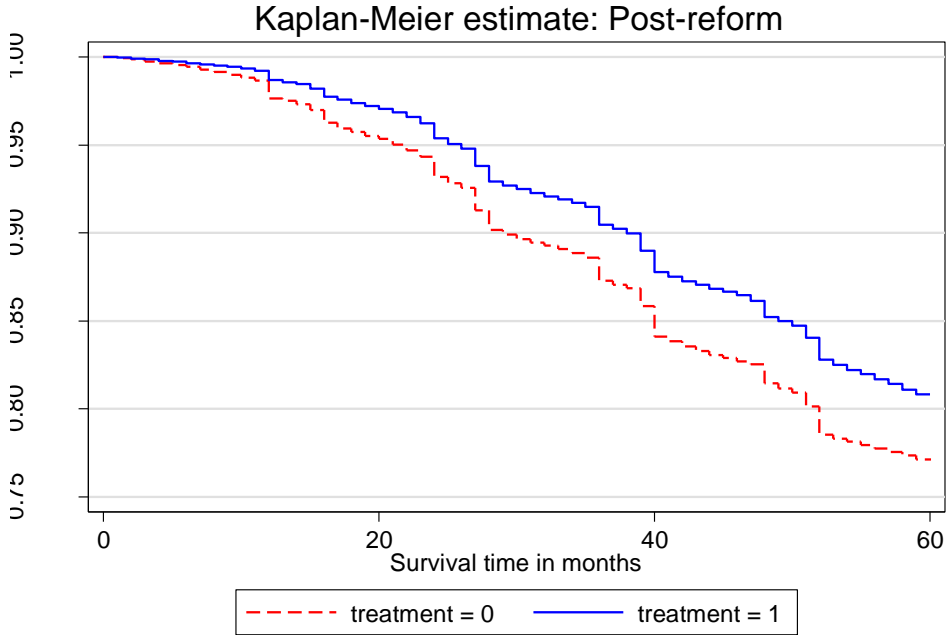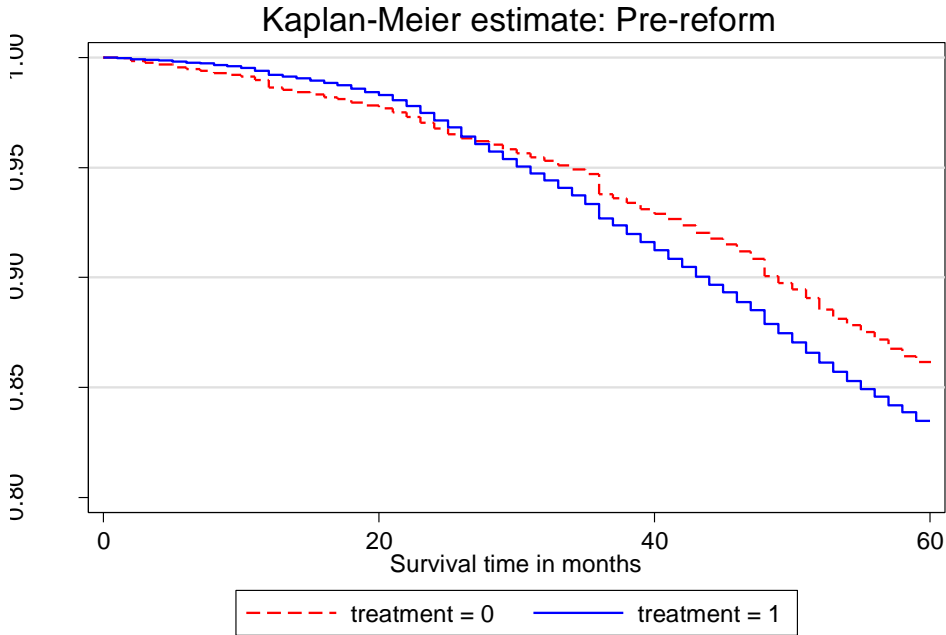
Table 1 Summary Statistics

The table report summary statistics for all new firms created during the sample period. Panel A report the industry-level statistics on business creation while Panel B and C presents the firm-level statistics on business's characteristics and entrepreneur demographics.

	N	mean	sd	p25	p50	p75
Panel A Industry-level						
Number of firms created (monthly)	6075	37.23868	90.12133	1	9	35
Panel B Firm Characteristics: Full Sample						
Entrepreneur plus employee at creation	124204	3.302	3.762	1	2	4
Employee at creation	124204	0.782	1.308	0	0	1
Survive during the first year	124204	0.954	0.21	1	1	1
Survive during first two years	124204	0.926	0.262	1	1	1
Survive during first three years	124204	0.882	0.322	1	1	1
Survive during first four years	124204	0.833	0.373	1	1	1
Survive during first five years	124204	0.782	0.412	1	1	1
Panel C Entrepreneur Demographics: Singaporean Sample						
Age	85770	39.535	8.714	33	39	45
Ratio of Young/Old	85770	0.224	0.373	0	0	0.5
Male	85770	0.666	0.401	0.5	1	1
Married	85770	0.585	0.439	0	0.667	1
Chinese	85770	0.898	0.289	1	1	1
Malay	85770	0.048	0.204	0	0	0
India	85770	0.039	0.184	0	0	0
Others	85770	0.014	0.106	0	0	0
Non-Chinese	85770	0.102	0.289	0	0	0

Table 2 Home Office Scheme and Business Creation

The table investigates the impact of the home-office scheme on firm creation based on the matched sample. The sample includes 58 industries, January 1999 - March 2005, monthly. The sample period is selected to avoid the confounding effect of 97-98 Asian financial crisis and Singapore's Limited Liability Partnership Act of 2005 implemented in April 2005. *Pre* is a dummy equal to 1 for the observations during the period from 200101-200111, otherwise 0. *Post* is a dummy equal to 1 for the observations after the reform (200112-200503), otherwise 0. *Post_1_Stage* is a dummy equal to 1 for the observations in first stage of reform period (200112-200306), otherwise 0. *Post_2_Stage* is a dummy equal to 1 for the observations in second stage of reform period (200307-200503), otherwise 0. *Treated* is a dummy equal to 1 if the industry does not belong to the forbidden industry in the Home Office Scheme. Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Log (1+number of new firms created in an industry at a month)						
Treated*Pre	-0.024						
	(0.060)						
Treated*Post	0.230**	0.238***	0.242***	0.211**			
	(0.092)	(0.081)	(0.081)	(0.082)			
Treated*Post_1_Stage					0.144**	0.147**	0.128**
					(0.064)	(0.064)	(0.063)
Treated*Post_2_Stage					0.323***	0.326***	0.307***
					(0.104)	(0.104)	(0.114)
Constant	2.468***	2.468***	1.186***	1.157***	2.468***	1.367***	2.486***
	(0.060)	(0.060)	(0.383)	(0.388)	(0.060)	(0.406)	(0.066)
Controls	No	No	Yes	Yes	No	Yes	Yes
Treated*Controls	No	No	No	Yes	No	No	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,350	4,350	4,350	4,350	4,350	4,350	4,350
R-squared	0.95	0.95	0.95	0.95	0.95	0.95	0.95

Table 3 Heterogeneity Test on Business Creation: Firm Size

The table explores the heterogeneity of the impact of the home-office scheme on business creation across different firm size in the matched sample. The sample includes 58 industries, January 1999 - March 2005, monthly. Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
Dependent Var. = Log (1+number of new firms created in an industry at a month)		
Treated*Employee_less_than_3*Post	0.238***	0.238***
	(0.075)	(0.075)
Treated*Post	0.010	-0.011
	(0.034)	(0.038)
Treated*Employee_less_than_3	-0.097**	-0.097**
	(0.046)	(0.046)
Employee_less_than_3*Post	0.333	0.333
	(0.354)	(0.354)
Employee_less_than_3	2.025***	2.025***
	(0.280)	(0.280)
Constant	0.282**	0.624***
	(0.110)	(0.197)
Controls and Treated*Controls	No	Yes
Month FE	Yes	Yes
Industry FE	Yes	Yes
Observations	8,700	8,700
R-squared	0.80	0.80

Table 4 Heterogeneity Test on Business Creation: Novice vs Experienced Entrepreneurs

The table explores the heterogeneity of the impact of the home-office scheme on firm creation among Novice and Experienced Entrepreneurs in the matched sample. Novice sample include first-time entrepreneurs who do not have prior business experience. We further classify the experienced into two groups: failures and non-failures. The sample of failures include individuals who started business, then failed and remained as failures as of December 1998, which is right prior to the beginning of sample period in the main analysis. Similarly, the sample of non-failures include individuals who started their business in or before December 1998 and survived throughout the sample period of main analysis (i.e. do not exit at least till March 2005). The sample includes 58 industries, January 1999 - March 2005, monthly. Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Novice		Experienced			
			Failures		Non-Failures	
Treated*Post	0.240***	0.210***	0.068**	0.067*	0.146**	0.124*
	(0.078)	(0.079)	(0.033)	(0.036)	(0.067)	(0.071)
Constant	2.014***	-0.137	0.289***	0.608**	1.241***	-0.725
	(0.069)	(0.458)	(0.039)	(0.303)	(0.063)	(0.478)
Controls	No	Yes	No	Yes	No	Yes
Treated*Controls	No	Yes	No	Yes	No	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,350	4,350	4,200	4,200	4,350	4,350
R-squared	0.94	0.94	0.60	0.60	0.90	0.90

Table 5 Business Creation and Financial Constraint

The table explores the role of financial constraint in the impact of the home-office scheme on firm creation in the matched sample. Panel A focuses on the initial capital contribution made by the entrepreneurs at the business creation. Specifically, *Contribution_capital* is the (logarithm of) median contributed amount among businesses that started over the period of 1980 to 1998 for each industry. Panel B is based on the entrepreneurs' income. We measure the entrepreneurs' income using the median income at the community level and take the average at the industry level for businesses that were created prior to our sample period. Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
Dependent Var. = Log (1+number of new firms created in an industry at a month)		
Panel A Contribution Capital		
Treated*Contribution_capital*Post	1.770***	1.735***
	(0.606)	(0.597)
Treated*Post	-0.035	-0.056
	(0.119)	(0.123)
Contribution_capital*Post	-1.170***	-1.152***
	(0.331)	(0.332)
Constant	2.468***	2.914***
	(0.061)	(0.217)
Controls and Treated*Controls	No	Yes
Month and Industry FE	Yes	Yes
Observations	4,350	4,350
R-squared	0.95	0.95
Panel B Entrepreneurs' Income		
Treated*Income*Post	-0.164	-0.182
	(0.347)	(0.346)
Treated*Post	0.895	0.936
	(1.388)	(1.383)
Income*Post	0.119	0.120
	(0.116)	(0.116)
Constant	2.468***	2.912***
	(0.060)	(0.218)
Controls and Treated*Controls	No	Yes
Month and Industry FE	Yes	Yes
Observations	4,350	4,350
R-squared	0.95	0.95

Table 6 Business Creation and Entrepreneur Characteristics

The table examines the impact of home office scheme on the entrepreneur characteristics of new business created in the matched sample. Ratio of HDB/Married represent the proportion of HDB resident/the married among all founders for each newly created business. We focus on the sample of firms created by Singaporean when we can merge with the demographics data. Female with babies are defined as female with age from 20 to 40. Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
	Ratio of HDB	Ratio of Married	Ratio of Female	Ratio of Female with babies
Treated*Post	0.020*	-0.014*	-0.024**	-0.016
	(0.010)	(0.008)	(0.012)	(0.010)
Constant	0.798***	1.393***	0.189	0.433***
	(0.150)	(0.123)	(0.136)	(0.138)
Controls	Yes	Yes	Yes	Yes
Treated*Controls	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	79,975	79,975	79,975	79,975
R-squared	0.12	0.02	0.04	0.03

Table 7 Home Office Scheme and Future Entrepreneurial Activities

The table focus on entrepreneurs with the experience of first business failure and explores whether home-office scheme help facilitate the probability of entrepreneur's future (second) firm creation via reduced salience of first business failure in the matched sample. Specifically, we focus on those entrepreneurs whose first business was established during our sample period (January 1999 - March 2005) but failed afterwards. Then we classify them into two groups based on the time of first business creation. D(*FirstBusi_Post*) is equal to one for those who establish the first business in the and post-reform period (December 2001 – March 2005). D*(FirstBusi_Treated Industries)* is equal to one if the first business created falls in the treated industries. Robust standard errors clustered by industry of first business are reported in parentheses. Superscripts of *, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)
Dependent Var. = D (Second Business Created)			
D(FirstBusi_Post)	0.026**		
	(0.010)		
D(FirstBusi_Post) *D(FirstBusi_Treated Industries)	0.016	0.015	0.014
	(0.014)	(0.014)	(0.014)
Constant	0.510***	0.587***	0.074**
	(0.003)	(0.025)	(0.031)
First Business Region FE	No	No	Yes
First Business Creation Month FE	No	Yes	Yes
First Business Industry FE	Yes	Yes	Yes
Observations	37,933	37,933	37,933
R-squared	0.01	0.01	0.01

Table 8 Quality of Business Created: Survival Analysis

Panel A of the table reports the estimated hazard ratios from Cox-proportional hazard models of firm exit for the matched sample. Estimates on discrete variables represents the effect from moving from zero to one. Panel B presents the OLS estimate of firm's survival. *D(Survival)* is a dummy equal to 1 if the business survives during the first /two/three/four/five years. The sample includes all firms in the 58 industries created in the period of January 1999 - March 2005. Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Panel A Hazard regression					
		Full Sample		Pre-reform	Post-reform
Treated				1.016	0.776***
				(0.037)	(0.038)
Treated*Post	0.697***	0.705***	0.637***		
	(0.022)	(0.022)	(0.022)		
Controls	No	No	Yes	Yes	Yes
Treated*Controls	No	No	Yes	Yes	Yes
Region FE	No	Yes	Yes	Yes	Yes
Month and Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	112,542	112,541	112,541	42,377	70,164
Panel B OLS regression					
			D(Survival)		
	1 year	2 years	3 years	4 years	5 years
Treated*Post	-0.003	0.009	0.036***	0.055***	0.061***
	(0.004)	(0.006)	(0.011)	(0.017)	(0.019)
Constant	0.909***	1.015***	1.396***	1.460***	1.474***
	(0.081)	(0.096)	(0.120)	(0.200)	(0.233)
Controls	Yes	Yes	Yes	Yes	Yes
Treated*Controls	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Month and Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	116,955	116,955	116,955	116,955	116,955
R-squared	0.02	0.03	0.05	0.06	0.08

Table 9 Learning by Venturing

In Panel A we investigate the impact of business creation experience during home-office scheme period on future entrepreneurial activities for the matched sample. Specifically, we focus on entrepreneurs whose first business was established during our sample period (January 1999 - March 2005) and classify them into two groups based on the time of first business creation. *D(FirstBusi_Post)* is equal to one for those who establish the first business in the and post-reform period (December 2001 – March 2005). D*(FirstBusi_Treated)* is equal to one if the first business created falls in the treated industries. Robust standard errors clustered by industry of first business are reported in parentheses. Panel B of the table examines the intensive margin by focusing on serial entrepreneurs in the above sample, that is, those who have the second business established, and makes comparison of second business's characteristics: (1) number of employees at origination; (2) survival rate within 2 years (results are similar using 1,3,4 or 5 years). Our analysis is focused on the treated industries. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

Panel A Extensive Margin Analysis: Probability of Second Business Creation

	(1)	(2)
Dependent Var. = D (Second Business Created)		
D(FirstBusi_Post) *D(FirstBusi_Treated)	0.026***	0.025***
	(0.008)	(0.008)
Constant	0.530***	0.450***
	(0.012)	(0.047)
First Business Region FE	No	Yes
First Business Creation Month FE	Yes	Yes
First Business Industry FE	Yes	Yes
Observations	127,046	127,038
R-squared	0.01	0.01

Panel B Intensive Margin Analysis

	(1)	(2)	(3)	(4)
Dependent Var.	Number of employees		D(survival within 2 years)	
D(FirstBusi_Post) *D(FirstBusi_Treated)	0.306***	0.270***	0.002	0.002
	(0.097)	(0.084)	(0.009)	(0.009)
Constant	3.719***	7.119***	0.875***	-0.330***
	(0.882)	(2.247)	(0.107)	(0.079)
Control for industry productivity	No	Yes	No	Yes
Second Business Region FE	No	Yes	No	Yes
Second Business Month FE	Yes	Yes	Yes	Yes
Second Business Industry FE	Yes	Yes	Yes	Yes
First Business Creation Month and Industry FE	Yes	Yes	Yes	Yes
Observations	48,745	48,745	48,745	48,745
R-squared	0.11	0.15	0.26	0.27

Table 10 Aggregate Impact: Home-office scheme and Property Price

The table presents the OLS estimate of the impact of the home-office scheme on house price. The sample in Column 1 to 3 includes all transactions of private residential properties during January 1999 - March 2005, while the falsification test in Column 4 is based on the pre-reform period January 1999 - Nov 2001. The dependent variable is *Log-unit-price* ($ per square meter) of each house. *Pre* is a dummy equal to 1 for the observations during the period from 200101-200111, otherwise 0. *Post* is a dummy equal to 1 for the observations after the reform (200112-200503), otherwise 0. *Treated* is a dummy equal to 1 if the postcode(building) is with treatment under the Home Office Scheme. Specifically, we first, for each postcode, calculate the ratio of residents who started business in the treated industry over the period of 1980 to 1998 and then define postcode as one with treatment if its ratio is higher than the median of sample distribution. We follow Agarwal et al.(2018) to control for the following house characteristics: unit size(m^2), indicator for condominium, dummy for high flow (level 9 or above), dummy for freehold and dummy for new sale. The socioeconomic variables of buyers, including old, male, Chinese and Marriage, are added in Column 2 to 4. Postcode and Year-month fixed effects are in all specifications. Robust standard errors are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
	Log-unit-price ($ per square meter)			
	Full Sample Period			Pre-reform
Treated*Post	0.017**	0.017**	0.012*	
	(0.008)	(0.008)	(0.007)	
Treated*Pre			-0.008	-0.005
			(0.011)	(0.013)
Size(m^2)	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Condominium	0.052***	0.052***	0.052***	0.091***
	(0.012)	(0.012)	(0.012)	(0.026)
D(High Floor)	0.037	0.037	0.038	0.059
	(0.052)	(0.052)	(0.052)	(0.083)
D(Freehold)	0.045***	0.044***	0.044***	0.043***
	(0.003)	(0.003)	(0.003)	(0.010)
D(New Sale)	-0.009***	-0.009***	-0.009***	-0.003
	(0.003)	(0.003)	(0.003)	(0.007)
Old		0.004	0.004	0.007
		(0.004)	(0.004)	(0.011)
Male		0.005	0.005	0.012
		(0.004)	(0.004)	(0.009)
Married		0.005**	0.005**	0.006
		(0.002)	(0.002)	(0.005)
Chinese		0.011	0.011	0.033
		(0.011)	(0.011)	(0.040)
Constant	8.828***	8.811***	8.811***	8.692***
	(0.024)	(0.027)	(0.027)	(0.053)
Postcode and Year-month FE	Yes	Yes	Yes	Yes
Observations	41,173	41,173	41,173	13,363
R-squared	0.68	0.68	0.68	0.57

A. Theoretical Framework

In this section, we adopt the model from Evans and Jovanovic (1989) and derive the predictions of the home office scheme. We show that our results are consistent with the model predictions that removing regulation entry barriers can encourage entrepreneurship, especially for financially constrained entrepreneurs.

A key assumption in the model is that there is no unemployment and an agent cannot withdraw from the labor force. A person chooses to become either a worker or an entrepreneur. The payoff for a worker is w, while the payoff of an entrepreneur can be expressed as:

$$y = \max_{k \in [0, \lambda A]} E[\{\theta k^\alpha - rk\}\epsilon] - \tau, \qquad \alpha \epsilon (0,1)$$

Here, y is the entrepreneur's payoff, k is capital, A is the entrepreneur's wealth, ϵ is the income shock experienced after an investment where $E[\epsilon] = 1$, θ is the quality of the business idea, λ is the entrepreneur's collateral constraint ($\lambda \geq 1$). We assume that each person can borrow up to an amount that is proportional to his wealth, $(\lambda - 1)A$. Thus, the maximum amount of capital that the entrepreneur can control is λA. τ is the fixed cost they need to pay before the home office scheme. For example, τ can be the rent cost and transportation cost. In our setting, we assume that having a separate office does not increase the output (e.g., real-estate agencies). The validity of this assumption may vary across different industries.

Let k^* be the optimal capital investment for entrepreneurs without financial constraints. A person is financially constrained if the following is satisfied:

$$\left(\frac{\alpha\theta}{r}\right)^{\frac{1}{1-\alpha}} + \tau = k^* + \tau > \lambda A$$

The intuition is the following. if the maximum amount of capital that the entrepreneur control is not enough for optimal capital investment and fixed costs, the entrepreneur is financially constrained and cannot reach the optimal capital investment.

The expected payoff for an unconstrained entrepreneur is:

$$\theta k^{*\alpha} - rk^* - \tau = y_u - \tau$$

Whereas the expected payoff for a constrained entrepreneur can be expressed as:

$$\theta(\lambda A - \tau)^\alpha - r(\lambda A) - \tau = y_c(\tau) - \tau$$

From the above equation, we observe that changing τ affects *all* individuals, whereas changing λ only affects financially constrained individuals. Let l be an indicator that equals 1 if the entrepreneur is unconstrained, and zero otherwise. A person starts a business if:

$$y_u \cdot l + y_c(\tau) \cdot (1 - l) - \tau > w$$

The home office scheme helps to reduce τ, which is the fixed cost of regulation entry barrier. The model has the following predictions about the impact of the home office scheme on the selection of new entrepreneurs. For unconstrained entrepreneurs, the home office scheme increases the payoff by reducing the fixed costs (τ). Thus, it will attract marginal entrepreneurs to start new businesses. For constrained entrepreneurs, the home office scheme increases the payoff by both increasing the capital investment ($\lambda A - \tau$) and reducing the fixed costs (τ). Thus, it will attract both marginal entrepreneurs and financially constrained entrepreneurs to start new businesses.

Our results show that firm creation is more pronounced among small-scale businesses (Table 3) and novice entrepreneurs (Table 4). These results support the prediction about the selection of marginal entrepreneurs. We also show that firm creation is more pronounced among low-income individuals and industries that require high starting capital (Table 5). These results support the prediction about the selection of financially constrained entrepreneurs.

We further analyze the predictions about the impact of the home office scheme on firm survival. Conditional on starting a business, an entrepreneur stops operating if:

$$\{y_u \cdot l + y_c(\tau) \cdot (1 - l)\}\epsilon - \tau \leq w$$

The home office scheme affects firm survival through two channels. The first is a selection channel. Since the scheme will both attract marginal entrepreneurs and financially constrained entrepreneurs, firm survival depends on the ability of these entrepreneurs. The second is a treatment effect. Since the scheme reduces the fixed cost, the payoff of an entrepreneur is higher and the choice to become a worker is less attractive.

The model has the following predictions about the impact of the home office scheme on firm survival. For unconstrained entrepreneurs, the selection channel implies that firm survival decreases after the scheme. The treatment effect suggest that firm survival increases. Thus, the overall effect depends on which channel has a stronger effect. For constrained entrepreneurs, the treatment effect become stronger since the scheme also increases the capital investment ($\lambda A - \tau$), and thus increases the revenue and profit. Due to our data limitation, we cannot directly test the impact of the scheme on the revenue and profit. We can test the impact on firm survival.

Our results show that additional new firms in response to the reform have a higher survival rate (Table 8). It suggest that treatment effects likely overweight the selection channel. Moreover, the increase in survival is more pronounced among low-income individuals and industries that require high starting capital (Table 9), suggesting that the treatment effect is stronger for financially constrained entrepreneurs.

Table A1 Type of Businesses/Uses that are not allowed

Panel A of the table presents the list of business/uses that are not allowed under the Home Office Scheme. Panel B tabulates the top five industries among treated and control group in terms of business creation during our sample period.

Panel A List of forbidden business/uses
a) Maid Agency/Employment Agency
b) Contractors Business
c) Car Trading Business
d) Commercial School
e) Sales/marketing office involving conducting seminars/talks for large number of customers
f) Courier Business
g) Manufacture/Preparation/Processing of products and goods.
h) Ophthalmic dispensing/Pharmacy/Medical or dental clinics/Veterinary medicine
i) Card reading/Palm reading or fortune telling in any form
j) Funeral chapels or homes
k) Mausoleums
l) Shop use and any form of retail activity including pet shop.
m) Food catering/Restaurants
n) Conducting of dress making/embroidery lessons
o) Repair of household appliances, electrical products, footwear, etc.
p) Beauty/Hair-Dressing/Massage therapy services

Panel B Top 5 industries among treated and control group	
Treated group	Control group
Computer Programming, Consultancy and Related Activities	Retail Trade
Office Administrative, Office Support	Food and Beverage Service
Activities Auxiliary to Financial Service and Insurance	Construction Activities
Financial Service Activities, Except Insurance and Pension Funding	Personal Service Activities
Wholesale Trade	Education

Table A2 Robustness Check: Propensity Score Matching

Panel A of the table presents the result of the propensity score matching logistic regression. The dependent variable, *Treated*, is equal to one for industries in the treatment group, and zero otherwise. Panel B reports the comparison between the matched treated and control industries. The industry-level *productivity* is defined based on the industry-level average of quarterly change in value added over the period of 1992 (the earliest date we have for industry productivity) to 1998. *Risk*, for each industry, is the average 1-year survival rate among businesses that started over the period of 1980 to 1998. *Log(Firm Size)* and *Log(Firm contribution Capital)* are defined similar and is the (logarithm) of the average of total number of people and contributed capital amount for firms created over the period of 1980 to 1998 for each industry. To define *Log(Monthly Business Creation)*,we first for each industry calculate the total number of firms created each month prior to our sample period and then take the (logarithm) of the average. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

Panel A Propensity Score Matching Logistic Regression

	(1)
Productivity	-0.129
	(0.100)
Risk	10.197
	(13.097)
Log(Firm Size)	2.274***
	(0.811)
Log(Monthly Business Creation)	0.547**
	(0.227)
Log(Firm contribution Capital)	0.080
	(0.169)
Constant	-14.496
	(12.711)
Observations	81

Panel B Summary Statistics of the Matched Industries

	(1)	(2)	(3)
	Matched Treatment Group	Matched Control Group	Diff.
Productivity	3.145	3.366	-0.221
Risk	0.975	0.969	0.006
Log(Firm Size)	1.145	1.051	0.094
Log(Monthly Business Creation)	2.364	2.045	0.319
Log(Firm contribution Capital)	11.69	11.59	0.100
R-squared	29	29	

Table A3 Heterogeneity Test on Business Creation: Integrity

The table explores the relationship between entrepreneur's integrity and the impact of the home-office scheme on business creation in the matched sample. Two proxies are used here: (1) D(Near Police Station) equals one if the distance between the firm's registration address and nearest police station is longer than the median of sample distribution and zero otherwise; (2) D(Lawsuit) is a dummy that equals one for the group of firms that are created by entrepreneurs who was the defendant in any lawsuit after the sample period (2005 or later). Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
Dependent Var. = Log (1+number of new firms created in an industry at a month)		
Panel A Distance to Police Station		
Treated*D(Near Police Station)*Post	0.035	0.035
	(0.042)	(0.042)
Treated*Post	0.194**	0.171**
	(0.074)	(0.076)
D(Near Police Station)*Post	-0.047**	-0.047**
	(0.023)	(0.023)
D(Near Police Station)*Treated	0.117***	0.117***
	(0.041)	(0.041)
D(Near Police Station)	-0.084**	-0.084**
	(0.037)	(0.037)
Constant	1.897***	2.313***
	(0.049)	(0.173)
Controls and Treated*Controls	No	Yes
Month and Industry FE	Yes	Yes
Observations	8,700	8,700
R-squared	0.93	0.93
Panel B Lawsuits Incurrence Ex-Post		
Treated*D(Lawsuit)*Post	-0.075*	-0.075*
	(0.043)	(0.043)
Treated*Post	0.238***	0.210**
	(0.082)	(0.082)
D(Lawsuit)*Post	0.094***	0.094***
	(0.026)	(0.026)
D(Lawsuit)*Treated	-0.258***	-0.258***
	(0.095)	(0.095)
D(Lawsuit)	-0.569***	-0.569***
	(0.072)	(0.072)
Constant	2.199***	2.598***
	(0.048)	(0.156)

Controls and Treated*Controls	No	Yes
Month and Industry FE	Yes	Yes
Observations	8,700	8,700
R-squared	0.92	0.92

Table A4 Home Office Scheme and Home-Office Business Creation

The table investigates the impact of the home-office scheme on home-office firm creation in the matched sample. The home-office firm is identified in the following two ways: (1) matching the residence information in Singaporean demographic datasets with office address in Panel A; (2) matching the residence information inferred from a large Singapore house transaction datasets of non-HDB with office address in Panel B. The dependent variable is log number of home-office firm for 58 industries from January 1999 - March 2005, monthly. *Post* is a dummy equal to 1 for the observations after the reform (200112-200503), otherwise 0. *Post_1_Stage* is a dummy equal to 1 for the observations in first stage of reform period (200112-200306), otherwise 0. *Post_2_Stage* is a dummy equal to 1 for the observations in second stage of reform period (200307-200503), otherwise 0. *Treated* is a dummy equal to 1 if the industry does not belong to the forbidden industry in the Home Office Scheme. Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
	Dependent Var. = Log (1+number of new firms created in an industry at a month)			
Panel A Based on Singaporean demographic datasets				
Treated*Post	0.205**	0.165**		
	(0.083)	(0.078)		
Treated*Post_1_Stage			0.099	0.083
			(0.060)	(0.057)
Treated*Post_2_Stage			0.300***	0.260**
			(0.112)	(0.113)
Constant	0.611***	-2.041***	0.611***	0.594***
	(0.069)	(0.537)	(0.069)	(0.072)
Controls and Treated*Controls	No	Yes	No	Yes
Month and Industry FE	Yes	Yes	Yes	Yes
Observations	4,350	4,350	4,350	4,350
R-squared	0.86	0.86	0.86	0.86
Panel B Based on Singaporean private property transaction datasets				
Treated*Post	0.104	0.083		
	(0.078)	(0.078)		
Treated*Post_1_Stage			0.074	0.062
			(0.066)	(0.065)
Treated*Post_2_Stage			0.131	0.107
			(0.094)	(0.100)
Constant	0.131***	-1.581***	0.131***	0.108**
	(0.043)	(0.428)	(0.043)	(0.048)
Controls and Treated*Controls	No	Yes	No	Yes
Month and Industry FE	Yes	Yes	Yes	Yes
Observations	3,975	3,975	3,975	3,975
R-squared	0.65	0.65	0.65	0.65

Table A5 Robustness Check on Business Creation Test

Panel A of the table reports the robustness test accounting for industry size by (1) performing a weighted least square using the industry size; (2) excluding minor sectors in the forbidden list, including Card reading/Palm reading or fortune telling in any form, Funeral chapels or homes and Mausoleums. Panel B address the contaminating effect from other similar programs. In Column 1 and 2 we exclude technology-based industries (i.e. computer, information technology etc.) that might be eligible under *Technopreneur Home Office Scheme* while in Column 3 and 4 we only include new firms with only one or two employees. Panel C verifies the external validity by estimating the impact of home-office scheme in the unmatched(full) sample. Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
	Dependent Var. = Log (1+number of new firms created in an industry at a month)			
Panel A Industry Size				
	Weighted by Industry Size		Excluding Minor Sectors	
Treated*Post	0.286***	0.262***	0.236***	0.220***
	(0.088)	(0.085)	(0.074)	(0.072)
Constant	1.933***	0.859**	2.202***	1.147***
	(0.059)	(0.347)	(0.050)	(0.327)
Controls and Treated*Controls	No	Yes	No	Yes
Month and Industry FE	Yes	Yes	Yes	Yes
Observations	6,075	6,075	6,075	6,075
R-squared	0.93	0.93	0.94	0.94
Panel B Other Programs				
	Exclude Tech Industries		Firms with one or two employees	
Treated*Post	0.271***	0.244***	0.177***	0.135**
	(0.077)	(0.079)	(0.064)	(0.064)
Constant	2.210***	1.323***	1.402***	0.310
	(0.046)	(0.325)	(0.053)	(0.398)
Controls and Treated*Controls	No	Yes	No	Yes
Month and Industry FE	Yes	Yes	Yes	Yes
Observations	5,775	5,775	6,075	6,075
R-squared	0.94	0.94	0.91	0.91
Panel C External Validity: Full Sample				
Treated*Post	0.236***	0.205***		
	(0.074)	(0.075)		
Treated*Post_1_Stage			0.117*	0.099*
			(0.060)	(0.059)
Treated*Post_2_Stage			0.344***	0.327***
			(0.093)	(0.102)

Constant	2.203***	1.169***	2.203***	2.214***
	(0.050)	(0.332)	(0.050)	(0.055)
Controls and Treated*Controls	No	Yes	No	Yes
Month and Industry FE	Yes	Yes	Yes	Yes
Observations	6,075	6,075	6,075	6,075
R-squared	0.94	0.94	0.94	0.94

Table A6 Falsification Test – Randomizing the treated industries

The table presents the falsification test for the impact of the home-office scheme on firm creation. The sample includes 81 industries, January 1999 - March 2005, monthly. The treated industries is randomly selected. *Treated* is a dummy equal to 1 if the industry does not belong to the forbidden industry in the Home Office Scheme. Controls include (1) Industry productivity is the change in value added per work in each industry; (2) GDP Growth is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Dependent Var. = Log (1+number of new firms created in an industry at a month)			
Treated*Post	-0.070	-0.070	-0.066
	(0.071)	(0.071)	(0.070)
Constant	2.203***	0.663*	0.668*
	(0.051)	(0.377)	(0.377)
Controls	N	Y	Y
Treated* Controls	N	N	Y
Month FE	Y	Y	Y
Industry FE	Y	Y	Y
Observations	6,075	6,075	6,075
R-squared	0.94	0.94	0.94

Table A8 Business Creation and Entrepreneur Characteristics

The table examines the impact of home office scheme on the additional measures of entrepreneur characteristics of new business created. The mid-aged sample include individuals with age from 35 to 55. Column 1 includes all firms in the 58 industries created in the period of January 1999 - March 2005 and Column 2-5 focus on the sample of firms created by Singaporean when we can merge with the demographics data. Controls include (1) Industry productivity is the change in value added per work in each industry;(2) GDP Growth is the annual GDP growth in Singapore. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1) Ratio of Singaporean	(2) Ratio of Mid-Aged	(3) Ratio of Chinese
Treated*Post	0.010**	-0.027**	-0.009*
	(0.004)	(0.013)	(0.005)
Constant	1.142***	1.007***	0.703***
	(0.048)	(0.103)	(0.151)
Controls	Yes	Yes	Yes
Treated*Controls	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	116,955	79,975	79,975
R-squared	0.13	0.03	0.04

Table A9 Quality of Business Created: Survival Analysis

The table presents the OLS estimate of firm's failure which comes with lawsuit cases or personal bankruptcy filing in the matched sample. *D(Failure)* is a dummy equal to 1 if we observe the founders experiencing lawsuit cases (defendant) or personal bankruptcy filing in the same year of business failure, which is defined during the first /two/three/four/five years after registration. The sample includes all firms in the 58 industries created in the period of January 1999 - March 2005. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

| | D(Failure)*100 | | | | |
	1 year	2 years	3 years	4 years	5 years
Treated*Post	-0.018	-0.104*	-0.306***	-0.415***	-0.264*
	(0.036)	(0.058)	(0.083)	(0.109)	(0.150)
Constant	11.127	10.673	10.318	9.579	9.015
	(9.995)	(10.113)	(10.229)	(10.298)	(10.415)
Controls and Treated*Controls	Yes	Yes	Yes	Yes	Yes
Month and Industry FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Observations	116,310	116,310	116,310	116,310	116,310
R-squared	0.003	0.004	0.006	0.008	0.009

Table A10 Business Creation: Heterogeneity Test Across Industries

The table explores the heterogeneity of the impact of the home-office scheme on firm creation across industries. The industry with high/low productivity is defined based on the industry-level average of quarterly change in value added over the period of 1992 (the earliest date we have for industry productivity) to 1998. To define risk, we first for each industry calculate the average 1-year survival rate among businesses that started over the period of 1980 to 1998 and then define an industry as one with high (low) level of risk if its average survival rate is higher than the median of sample distribution. Results are similar when we use alternative time periods to construct the survival rate (i.e. within 2 ,3, 4 and 5 years). The sample includes 58 industries, January 1999 - March 2005, monthly. Controls include (1) *Industry productivity* is the change in value added per work in each industry; (2) *GDP Growth* is the annual GDP growth in Singapore. Robust standard errors clustered by industry are reported in parentheses. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent Var. = Log (1+number of new firms created in an industry at a month)				
Panel A Industry-level Productivity				
	Low Productivity		High Productivity	
Treated*Post	0.223**	0.206*	0.228*	0.207*
	(0.105)	(0.111)	(0.117)	(0.116)
Constant	2.516***	0.937*	2.400***	1.197*
	(0.077)	(0.494)	(0.101)	(0.643)
Controls	No	Yes	No	Yes
Treated*Controls	No	Yes	No	Yes
Month FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	2,550	2,550	1,800	1,800
R-squared	0.95	0.95	0.95	0.95
Panel B Industry-level Risk				
	Low Risk		High Risk	
Treated*Post	0.328***	0.299**	0.139	0.114
	(0.117)	(0.116)	(0.115)	(0.121)
Constant	1.952***	1.321***	3.060***	0.903
	(0.073)	(0.464)	(0.097)	(0.609)
Controls	No	Yes	No	Yes
Treated*Controls	No	Yes	No	Yes
Month FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	2,325	2,325	2,025	2,025
R-squared	0.91	0.91	0.96	0.96

Table A11: Robustness Check on Heterogeneity Test Across Industries-Starting Capital
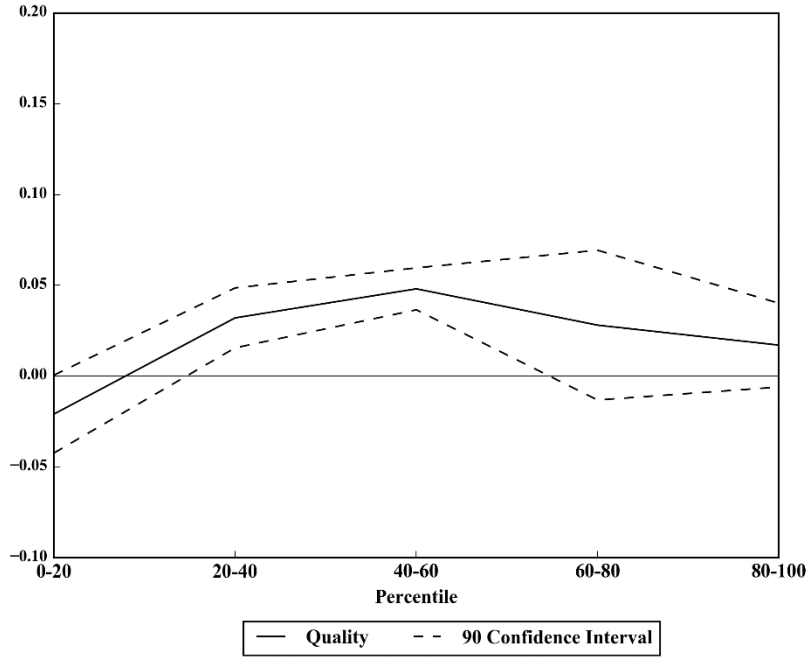
The table checks the spillover effect of entrepreneurial activities among neighborhoods prior to our sample period(1980 to 1998). Observations in Panel A is at year and postcode level. The dependent variable, *Ratio of Treated Industry*$_{p,t}$, is the ratio of residents who started business in the treated industry for each postcode, p, and year, t, over the period of 1980 to 1998. Observations in Panel B and C is at year, postcode and industry level. *D(at least one firm created)*$_{p,i,t}$ is an indicator variable that equals one if at least one firm is created in each postcode, p, and year, t, over the period of 1980 to 1998. *Number of firms created*$_{p,i,t}$ denotes the number of firms created in each postcode, p, and year, t, over the period of 1980 to 1998. *, **, *** denotes significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Panel A Industry Density at Year-Postcode Level			
	Ratio of Treated Industry$_{p,t}$		
Ratio of Treated Industry$_{p,t-1}$	0.267***		
	(0.003)		
Ratio of Treated Industry$_{p,t-2}$		0.211***	
		(0.003)	
Ratio of Treated Industry$_{p,t-3}$			0.211***
			(0.003)
Constant	0.527***	0.546***	0.546***
	(0.002)	(0.002)	(0.002)
Year, Postcode FE	Yes	Yes	Yes
Observations	119,475	97,640	97,640
R-squared	0.07	0.04	0.04
Panel B Extensive Margin at Year-Postcode-Industry Level			
	$D(at\ least\ one\ firm\ created)_{p,i,t}$		
$D(at\ least\ one\ firm\ created)_{p,i,t-1}$	0.267***		
	(0.003)		
$D(at\ least\ one\ firm\ created)_{p,i,t-2}$		0.211***	
		(0.003)	
$D(at\ least\ one\ firm\ created)_{p,i,t-3}$			0.211***
			(0.003)
Constant	0.527***	0.546***	0.546***
	(0.002)	(0.002)	(0.002)
Year, Postcode, Industry FE	Yes	Yes	Yes
Observations	119,475	97,640	97,640
R-squared	0.07	0.04	0.04
Panel C Intensive Margin at Year-Postcode-Industry Level			
	$number\ of\ firms\ created_{p,i,t}$		
$number\ of\ firms\ created_{p,i,t-1}$	0.267***		
	(0.003)		
$number\ of\ firms\ created_{p,i,t-2}$		0.211***	
		(0.003)	
$number\ of\ firms\ created_{p,i,t-3}$			0.211***
			(0.003)

Constant	0.527***	0.546***	0.546***
	(0.002)	(0.002)	(0.002)
Year, Postcode, Industry FE	Yes	Yes	Yes
Observations	119,475	97,640	97,640
R-squared	0.07	0.04	0.04

Figure A1 Quality and Financial Constraint

The figure plots the DID estimates on quality of business created (3-year survival rate) in Panel B of Table 8 at each quantile of the two measures for financial constraints: capital contribution and income, along with their 90 percent confidence interval.

Panel A Capital Contribution

Panel B Income