The Impact of the Regulatory Sandbox on the FinTech Industry*

Thomas Hellmann
Saïd Business School, University of Oxford and NBER

Alexander Montag
Saïd Business School, University of Oxford and
Research Institute of Industrial Economics (IFN)

Nir Vulkan
Saïd Business School, University of Oxford

August 2022

We investigate the impact of the UK regulatory sandbox on the UK FinTech industry. By now regulatory sandboxes operate in 57 countries and have become an important policy tool for governments to support the emergence of a FinTech sector. We use comprehensive data from the UK regulatory sandbox which was the first sandbox ever created and has the largest number of participating companies overall. We find evidence of positive externalities at the industry level. Participation in the sandbox by one start-up is followed by increased entry and more money being raised by other start-ups in the same industry. There is some evidence that the sandbox screens out better companies, but we find no evidence that companies' momentum significantly increases after their participation in the sandbox.

Keywords: Regulatory Sandbox, FinTech, Financial Regulation, Start-Ups

JEL Codes: G28, M13, O38

---

*E-mails: thomas.hellmann@sbs.ox.ac.uk, alexander.montag@sbs.ox.ac.uk, nir.vulkan@sbs.ox.ac.uk. We thank seminar participants at Wilfrid Laurier for valuable comments and suggestions. We also thank Nick Clark and Ravi Bhalla from the FCA for helpful discussions.

1 Introduction

Financial regulation has always been a balancing act (Brummer and Yadav 2019). New financial products and services can benefit consumers but can also introduce new forms of risks, which in turn can harm some customers.

In recent years we are witnessing a wave of innovation in finance, commonly known as FinTech, with new financial products and services coming to the market almost daily in most developing countries. This wave of innovation is fuelled by the increased use of mobile phones as the first point of call for banking and finance, the use of algorithms which take advantage of vast amounts of data to make quick decisions, and also by the changing attitudes by governments. You can now get a small, short-term loan on your mobile phone, lend money to SMEs via P2P platforms, invest in startups using an Equity Crowdfunding platform or buy fractions in shares. None of these were possible before 2015, and most, possibly all, would have been deemed "too risky" by all regulators. Clearly, regulators had to become innovative themselves to cope with these increasing new challenges.

A sandbox is a form of regulatory innovation designed exactly to deal with these challenges. Ofgem's definition says that it "allows innovators to trial new products, services and business models in a real-world environment without some of the usual rules applying" (Ofgem, 2018). As the name suggests, it offers a restricted and protected environment without the normal regulatory requirements, where companies can experiment with a new idea whilst being supported by the regulator. The purpose of the sandbox is to help establish early on what potential regulatory obstacles may be so that the companies can address these.

The UK started the first regulatory sandbox ever in 2015.[1] It has since been copied around the world at a fast rate. By 2021, there were 73 unique sandboxes in 57 countries, with more planned. In the EU, the commission vice president for financial services and stability, Vladis Dombrovkis, praises European FinTech sandboxes which "help firms to roll out innovative services in the financial sector" (EBF, n.d.). A longer report commissioned by the EU ECON committee suggests sandboxes play a crucial role in the advance of FinTech in the EU and suggests more sandboxes should be opened (Parenti, 2020). Note that the US came relatively late to the game because of its uniquely complex regulatory structure, but is quickly catching up, with many states now running their own versions of a FinTech sandbox.[2]

But who benefits? From the outset, the motivation for the sandbox was vague: Policy makers emphasized the benefits to the economy and the public, while entrepreneurs and investors talk about the sandbox as a ticket to more investment opportunities and higher growth. The goal of this paper is to answer the following questions: First, do participating companies benefit in terms of growth and funding? And second, are there positive spillovers from the sandbox to the FinTech industry?

Using comprehensive data from the UK, we explain whether sandbox participants themselves benefit beyond the help given to them in terms of regulatory challenges. We then look at the economic benefits in the FinTech industry overall and measure the impact of being in the sandbox, looking specifically whether there are spillover effects in the relevant industries.

[1] See the website of the FCA (https://www.fca.org.uk/firms/innovation/regulatory-sandbox) for more information and a full history of the scheme.
[2] See Martins (2021) for a good discussion of a US FinTech sandbox and why it is both complicated and necessary.

We find strong evidence in support of positive spillovers from sandbox entry in terms of subsequent birth and fundraising of high-growth start-ups at the industry level. The evidence around the direct benefit to sandbox participants is more mixed. When we compare to similar companies who did not participate in the sandbox, we find that participating companies do better. But when comparing participants before and after the sandbox scheme we do not find any evidence of economic benefits. Overall our findings support the use of regulatory sandbox, especially in terms of promoting competitive entry into regulated industries.

The rest of the paper is organised in the following way: In section 2 we formally state the hypotheses we test, and we provide a literature review. Section 3 describes our data and section 4 our empirical strategy. The results are presented in section 5, while section 6 discussed extensions and robustness checks. Section 7 concludes.

2 Hypotheses and literature review

We now state the hypotheses we test in this paper:

Hypothesis 1: *Participating in the sandbox benefits the participants in terms of raising finance and growth.*

Hypothesis 1 is consistent for example with Deloitte's (2018) "Journey through the Sandbox" report, which states "The unequivocal message is that the sandbox has delivered real value to firms, … While the FCA has emphasised strongly that it does not "pick winners," the feedback from our interviews is that being accepted into the sandbox increased the credibility of firms with both investors and customers alike". It is also consistent with the findings of Cornelli et al. (2022) which

states “Entry into the sandbox is associated with a higher probability of raising funding and an increase of about 15% in the average amount of funding raised”.

Direct benefit for participants can come from two potential sources. First, there may be signalling value (Spence, 1978) with better companies being more likely to apply. Closely related, there may be a certification effect (Puri, 1996) where the FCA selects better companies into the sandbox. We combine these two effects into a screening effect and empirically associate it with the comparison of companies in versus out of the sandbox. For this effect we postulate the following hypothesis.

Hypothesis 1.1: *Participants in the sandbox perform better compared with similar companies that did not participate in the sandbox.*

Second, there may be some acceleration benefits from participating in the sandbox that may help companies to improve their performance after coming out of the sandbox. We call this the momentum effect and empirically identify it with the comparison of companies before vs. after participation in the sandbox. For this effect we postulate the following hypothesis.

Hypothesis 1.2: *Participants in the sandbox perform better after the sandbox compared with before.*

Finally, we look at spillovers. We test

Hypothesis 2: *Participation in the sandbox has a positive spillover effect on the FinTech industry.*

Hypothesis 2 is consistent with the Kalifa report (HM Treasury, 2021) which states “The FCA’s regulatory sandbox has played an instrumental role in supporting innovation and encouraging UK FinTech business” and what the FCA itself says in 2019 (FCA, 2019), “We have played an active role in the FinTech industry and have produced policy on innovation in financial services

markets…. Early evidence suggests that our work: … encourages positive innovation domestically and internationally".

Hypothesis 2 is also consistent with the notion that regulatory innovation applies to all companies and may therefore foster competitive imitation. For example, in the UK, the first regulated Equity Crowdfunding platform has agreed with the FCA that investors can self-certify through a series of short online tutorials and quizzes. If entrepreneurs now seek to start a new lending or investing platform, they know that this new tool is available to them and that regulators are likely to agree at least to this aspect of their business. This could be good news in terms of increased entry and competition in the FinTech industry.

2.1 Literature Review

Our paper relates to several different strands of research. First, there is an economics literature on policy and innovation that traces back to the seminal paper by Viscusi and Moore (1993) which looks at a link between regulation (in the form of liability cost) and product innovation. The authors show that a reduction in liability can result in a significant increase in innovation. This is consistent with our findings where the sandbox, which can be seen as a reduction to the fixed cost of entry, leads to more entry, not just for the companies in the sandbox, but in the industry beyond.

Outside liability cost, there is also an economics literature on the links between entry, innovation and imitation: Vega-Redondo (1997), Shaffer (1989) and Ridley (2008) all provide models which show that imitation leads to more competition (in fact to a competitive equilibrium where firms make zero economic profits).

Closer to our context, Schlag (1998, 1999) considers the case where imitation takes place across different submarkets. This seems relevant to FinTech, because only the regulatory part of the tech

can be imitated. In Shlag's models, imitation does lead to more competition, but resulting in a less competitive in equilibrium (Cournot-Nash rather than the perfectly competitive outcome).

Focusing solely on the empirics, the paper that is the closest to ours is Cornelli et al. (2022) which focuses on a "before vs after" analysis and finds that sandbox companies raise more capital post-sandbox entry. Our paper differs in the following way. First, we look at differences in "in vs out" and "before vs after" which allows us to speak to the relative importance of the sandbox in screening companies versus giving participating companies momentum. Second, we construct company size measures using annual reports data, in addition to using fundraising data. Third, and arguably most importantly, we study spillovers to non-sandbox high-growth companies at the industry level.

There is a growing academic literature on regulatory sandboxes in Law: Brummer and Yadav, 2019, and Ringe and Ruof 2018 and references within provide a good cover. The questions considered in this purely theoretical literature are similar to ours – in particular, the spillover, or positive externalities, of the sandbox schemes is often mentioned. We hope our findings can be useful in these discussions in future, as we examine the available empirical evidence around this important scheme.

Finally, there is a small, but growing, literature in management. Jagtiani and John (2018), looks at the tension between innovation and consumer safety in the specific FinTech context of lending. Alaassar et al. (2021) compares and contrasts sandboxes with incubators in terms of which better support innovation. Our findings can hopefully be useful in future such comparisons. Finally, Allen et al. (2021) provides a comprehensive survey of FinTech which includes in section 9.2, a review on FinTech regulation and sandboxes.

3 Data

3.1 Data sources

Our data comes from the following sources. First, we collect names and cohort dates on all companies that ever enter the UK regulatory sandbox from the Financial Conduct Authority's (FCA) website.[3] Our study examines outcomes after companies have entered the sandbox. We therefore restrict companies to those in the first five cohorts, which took place between 2016 and 2019, to allow sufficient time to measure post-sandbox outcomes.

Second, we use company level annual reports and fundraising data on high-growth start-ups from Beauhurst. Beauhurst uses different criteria to classify start-ups as high-growth companies; for example, receiving an equity investment or featuring on a selected high-growth list.[4] Out of the 111 companies that entered the sandbox between 2016 and 2019, we manually identify 45 in the Beauhurst data. Whilst we use company level data from Beauhurst for these sandbox companies, the arguably more important uses of the Beauhurst data in our study are the creation of a set of matched control companies for the first part of our analysis (company outcomes) and the construction of entry as well as fundraising measures for non-sandbox high-growth companies (spillovers).

Using only high-growth companies, as opposed to all companies, is particularly important when constructing measures of entry and fundraising in the spillovers analysis because of the large asymmetry in entrepreneurial outcomes. More specifically, start-ups contribute to economic growth by increasing, amongst others, productivity and job creation (Haltiwanger, Jarmin, and Miranda 2013; Decker et al. 2014). However, not all start-ups contribute equally. Most start-ups

[3] https://www.fca.org.uk/firms/innovation/regulatory-sandbox/accepted-firms
[4] Beauhurst lists all high-growth company criteria on its website: https://www.beauhurst.com/data/

fail, and few of the survivors achieve phenomenal growth. In fact, most entrepreneurs do not even have high growth aspirations (Hurst and Pugsley 2011). In our spillovers analysis, we therefore want to create measures of entry and fundraising of those companies that are most likely to contribute to economic growth. The fact that Beauhurst only covers high-growth start-ups makes their data particularly useful for our study.

Third, we use annual reports data from Companies House and fundraising data from Pitchbook for the 66 sandbox companies that we could not identify in the Beauhurst data. Out of these 66 sandbox companies, we can identify 64 in Companies House and 37 in Pitchbook.[5] We thus have annual reports and fundraising data for 109 and 82 sandbox companies, respectively.

3.2 Sample construction for company outcome analysis

Our analysis consists of two parts, company outcomes and spillovers. For the company outcomes analysis, we create two company level one-to-one matched controls samples – we use the annual reports data to construct a company-fiscal year panel and we use the fundraising data to create a company-calendar year-quarter panel. We construct matched controls samples because they allow us to do "in vs out" as well as "before vs after" analyses, which can speak to the relative importance of being admitted to the sandbox (screening) and participating in the sandbox (momentum).[6]

We construct the two company level panels in the following way. We start with the 109 sandbox companies which we can identify in Beauhurst, Companies House, and Pitchbook, and we exclude

[5] Two of the Sandbox companies are not incorporated in the UK, which is why they do not appear in Companies House. In the UK, limited liability companies are required to submit annual reports to Companies House by law.
[6] We use the terms screening and momentum, rather than selection and treatment, because our empirical setting is not identical to a randomised control trial. Specifically, sandbox entry is not randomly assigned to companies – neither do companies apply to the sandbox randomly nor does the sandbox admit companies randomly. However, we believe that a careful analysis of company outcomes and industry spillovers around sandbox entry is important because its results speak to the benefits of sandbox admission and are therefore informative for policy makers.

companies that are older than seven years at the time of entering the sandbox. We do this because our focus is on start-up companies. We also require companies to have data for at least one period (fiscal year in the annual reports sample and calendar year-quarter in the fundraising sample) before and after entering the sandbox, respectively. In addition, we only include companies with information on their industry classification, incorporation date, and headquarters location. In the annual reports sample, we further require companies to have non-missing values for assets. Last, we restrict observations to the three fiscal years and twelve calendar year-quarters before and after sandbox entry in the annual reports and fundraising samples, respectively, because our focus is on changes in company outcomes around sandbox entry. This leaves 67 and 74 sandbox companies in the annual reports and fundraising samples, respectively.

We then create a set of matched control companies in the following way. We use the full set of high-growth companies in the Beauhurst data and we match all non-sandbox start-ups founded in the same industry (4-digit SIC code) and calendar year to each sandbox company (with replacement). We then only keep those matched control companies which have data available for each fiscal year/calendar year-quarter of the respective sandbox company. We again require information on industry classification, incorporation date, and headquarters location, as well as non-missing values for assets in the annual reports sample. We then randomly keep one matched control company for each sandbox company. Importantly, we use the same control companies in the annual reports and fundraising samples to ensure consistency in our empirical approach. The final annual reports sample has 284 company-fiscal years for 92 companies (46 sandbox and 46

matched control companies), and the fundraising sample has 1,252 company-calendar year-quarters for 76 companies (38 sandbox and 38 matched control companies).[7]

3.3 Sample construction for spillover analysis

For the spillovers analysis, we create two industry-calendar year-quarter samples, one using entry and one using fundraising data. These samples allow us to measure within-industry changes in entry and fundraising of non-sandbox companies around sandbox entry. We construct the samples in the following way. We again start with the 109 sandbox companies which we can identify in Beauhurst, Companies House, and Pitchbook, and we exclude companies that are older than seven years at the time of entering the sandbox. The rationale is the same as in the sample construction for the company outcome analysis, we do this because our focus is on start-up companies. We also require sandbox companies to have information on their industry classification. This leaves 79 and 63 sandbox companies in the entry and fundraising samples, respectively.

We then use the full set of high-growth companies in Beauhurst and restrict it to those non-sandbox companies with non-missing values for their industry classification. For the entry sample, we additionally require companies to have non-missing incorporation dates. We then only keep companies that operate in industries with at least one sandbox company. This leaves 5% (4%) of distinct industries with 51% (44%) of companies in the entry (fundraising) sample. This implies that sandbox companies are more prevalent in industries which represent a disproportionately large fraction of high-growth start-ups. We then create a balanced industry-calendar year-quarter panel for 23 (18) industries in the entry (fundraising) sample between 2015q1 and 2020q4. We choose

[7] In the annual reports sample, we annualise flow variables to account for differences in fiscal period lengths. Depending on the skewness of their distributions, we winsorize some variables at the 5th and 95th percentiles to alleviate the potential impact of outliers.

2015q1 as a start date because the first sandbox cohort started in 2016q4. Table A1 lists definitions for all variables used in the analysis.

3.4 Descriptive statistics

Table 1 presents descriptive statistics. Panel A shows summary statistics for the annual reports sample at the company-fiscal year level. Column 1 reports these for the full sample, which consists of 284 company-fiscal years for 92 distinct companies (46 sandbox and 46 matched control companies). Columns 2 and 3 report summary statistics for matched control and sandbox companies separately. Columns 4 and 5 split observations for sandbox companies into those occurring before and after sandbox entry. We also include the statistical significance of *t*-tests for the difference in means between observations for sandbox and control companies (asterisks in Column 3) as well as observations for sandbox companies before and after sandbox entry (asterisks in Column 5). Sandbox companies are larger than control companies, at least in terms of liabilities and employees. However, there is no statistically significant difference in company size of sandbox companies before and after entering the sandbox. A similar pattern emerges when looking at fundraising in Panel B of Table 1. Panel C shows the distribution of industries (4-digit SIC codes) of sandbox companies, most of which operate in finance or technology related industries. Taken together, this evidence points towards the sandbox having a relatively more important screening than momentum role.

4 Empirical strategy

Our empirical analysis consists of two parts, company outcomes and spillovers. We first examine changes in company outcomes around sandbox entry, relative to pre-sandbox entry levels as well as a set of matched control companies. This allows us to disentangle "in vs out" from "before vs

after" differences, and our results can therefore speak to the relative importance of being admitted to the sandbox (screening) and participating in the sandbox (momentum).

In the company outcomes analysis, we estimate the following estimating equation

$$Y_{i,t} = \alpha + \beta EverAdmitted_i + \gamma AfterEntry_{i,t} + \tau Z_{i,t} + \delta_j + \delta_y + \varepsilon_{i,t} \quad (1)$$

in which i is a company and t is a fiscal year (calendar year-quarter) in the annual reports (fundraising) sample. The dependent variable is $Y_{i,t}$ which measures company outcomes in period t. $Z_{i,t}$ is a vector of company control variables, which includes the log of company age and a dummy variable that equals one if a company's headquarters are in London.[8] δ_j are industry fixed effects. We define a company's industry as the primary 4-digit SIC class that it operates in.[9] We include industry fixed effects to control for potential unobserved time-invariant heterogeneity across industries. δ_y are calendar year and calendar year-quarter fixed effects in the annual reports and fundraising sample, respectively. We include calendar year (-quarter) fixed effects to control for potential unobserved heterogeneity across time periods.

The coefficients of interest in Equation 1 are β and γ. $EverAdmitted_i$ is a dummy variable that equals one if a company ever enters the sandbox. $EverAdmitted_i$ varies at the company level and its coefficient captures differences between sandbox and control companies ("in vs out"). $AfterEntry_{i,t}$ is a dummy variable that equals one once a company has entered the sandbox. $AfterEntry_{i,t}$ varies over time (only for sandbox companies) and its coefficient measures differences between before and after sandbox entry ("before vs after"). We are particularly interested in the relative explanatory power of these two variables. That is, how much of the

[8] Company age is the number of years since a company's incorporation, or since the start date of a company's first fiscal year/calendar year-quarter if its incorporation date is missing.
[9] There are 481 levels in the full Beauhurst data, with 32 levels amongst sandbox companies.

variation in company outcomes around sandbox entry can be explained by sandbox companies being different relative to control companies (screening) versus sandbox companies changing post-sandbox entry (momentum).

We then examine spillovers by looking at industry level changes around sandbox entry. We estimate the following estimating equation

$$Y_{j,q+n} = \alpha + \beta Sandbox_{j,q} + \delta_j + \delta_q + \varepsilon_{j,q+n} \quad (2)$$

in which j is an industry and q is a calendar year-quarter. The dependent variable is $Y_{j,q+n}$ which measures industry outcomes in calendar year-quarter $q+n$. Importantly, we only use non-sandbox companies when constructing the dependent variable so that we measure the correlation between sandbox entry and outcomes of non-sandbox companies operating in the same industry. We report results for n ranging from -4 to 4 to measure the temporal directionality of the correlation between sandbox entry and industry outcomes. Specifically, we hypothesise that sandbox entry is positively associated with subsequent industry outcomes, operationalised by entry and fundraising. A potential concern is that the temporal correlation goes in the other direction, with past industry entry and fundraising being positively correlated with current sandbox entry.

The coefficient of interest in Equation 2 is β. $Sandbox_{j,q}$ measures the number of companies that enter the sandbox in a particular industry in a calendar year-quarter. We include industry, δ_j, and calendar year-quarter, δ_q, fixed effects to control for unobserved heterogeneity across industries and calendar-year quarters, respectively. The inclusion of these fixed effects implies that the identifying variation comes from changes within industries over time, comparing industry outcomes in the same calendar year-quarters.

5 Results

In the first step of our analysis, we examine company outcomes around sandbox entry. Table 2 presents results for regressions of company size on sandbox admission in the company level annual reports sample. The dependent variable is the log of one plus total assets, total liabilities, and the number of employees in Panels A, B, and C, respectively. The unit of analysis is a company-fiscal year. We use a one-to-one matched controls sample, in which we randomly match one high-growth start-up founded in the same industry and calendar year to each sandbox company. We cluster standard errors by company.

Table 2 shows that sandbox companies are larger than control companies. Specifically, sandbox companies have higher total liabilities and more employees than control companies (Panels B and C), whilst there is no statistically significant difference in total assets (Panel A). The positive association between sandbox admission ("ever admitted") and company size is strongest in the employee regressions, with three and one coefficients being statistically significant at the 5% and 10% level, respectively. We find no evidence of sandbox companies growing larger once entering the sandbox relative to pre-sandbox entry levels, as evidenced by the fact that none of the "after entry" coefficients is statistically significant. Taken together, these results suggest that the sandbox has a relatively more important screening than momentum role and are similar to the unconditional differences in means reported in Table 1.

Table 3 presents results for regressions of fundraising on sandbox admission in the company level fundraising sample. The dependent variable is a dummy variable that equals one if a company raises capital and the log of one plus the amount raised in Panels A and B, respectively. The unit of analysis is a company-calendar year-quarter. We use a one-to-one matched controls sample, in which we randomly match one high-growth start-up founded in the same industry and calendar year to each sandbox company. We cluster standard errors by company.

The results in Table 3 are similar to those reported in Table 2. We find some evidence that sandbox companies are more likely to raise outside capital compared to control companies, with the coefficient on "ever admitted" being positive and statistically significant at the 5% level in models 1 and 3 in Panel A. Again, none of the "after entry" coefficients is statistically significant. The findings in Table 3 also point towards a relatively more important screening than momentum role of the sandbox.[10]

As a next step in our analysis, we investigate spillovers around sandbox entry. Table 4 presents results for regressions of high-growth start-up entry and fundraising on sandbox admission in the industry level entry (Panel A) and fundraising (Panel B) samples. The dependent variable is the log of one plus the number of new company incorporations and companies that raise capital in Panels A and B, respectively. The unit of analysis is an industry-calendar year-quarter. We cluster standard errors by industry.

Table 4 shows that entry into the sandbox is positively associated with subsequent entry and fundraising of non-sandbox companies that operate in the same industry. In Panel A, the coefficient of "sandbox" is positive and statistically significant at the 1% and 10% level in the models measuring entry at $q+2$ and $q+3$, respectively. In Panel B, the coefficient of "sandbox" is positive and statistically significant at the 5% level in the model measuring fundraising at $q+4$.

[10] The closest paper to ours is Cornelli et al. (2022), which focuses on changes in fundraising of Sandbox companies post-Sandbox entry. Compared to our fundraising results, Cornelli et al. (2022) finds stronger evidence for Sandbox companies being more likely to raise capital after having entered the Sandbox. Their empirical specification, however, differs from ours which might, at least in part, explain the difference in results. Specifically, Cornelli et al. (2022) includes interaction terms of time-invariant company characteristics and a post-Sandbox entry dummy ("after entry" variable in our paper). In contrast, we include time-varying company age as well as time-invariant company characteristics without interacting these with either of our variables of interest ("ever admitted" and "after entry") because we want to control for these company characteristics, rather than including them as moderators.

These results suggest that there are positive spillovers from companies entering the sandbox for other non-sandbox companies operating in the same industry.

Our results so far indicate the following. The company level analysis (Tables 2 and 3) shows that companies entering the sandbox are larger and more likely to raise capital than a set of matched control companies, with no evidence of sandbox companies becoming larger or being more likely to raise capital once having entered the sandbox compared to pre-entry levels. In the spillovers analysis (Table 4), we find evidence for positive spillovers from sandbox admission for other non-sandbox companies operating in the same industry. Taken together, these results suggest that the sandbox plays a relatively more important screening than momentum role, and that there are positive externalities of sandbox admission at the industry level.

6 Extensions and robustness

In the baseline company outcomes analysis (Tables 2 and 3), we use one-to-one matched controls samples. To allow for a more general matched controls sample, we repeat the analysis using a five-to-one matched controls sample, in which we randomly match up to five (subject to availability) high-growth start-ups founded in the same industry and calendar year to each sandbox company (with replacement). Except for using up to five matched controls for each sandbox company, we follow the same steps to construct the two company level samples (annual reports and fundraising) as for the baseline samples (please see Section 2.2). Tables 5 and 6 present the results for the company outcomes analysis using multiple matched control companies in the annual reports and fundraising sample, respectively. We find similar results to those in the baseline analysis, pointing towards a relatively more important screening than momentum role of the sandbox.

We next repeat the company level analysis using an alternative sample, in which we only include companies that ever enter the sandbox. The rationale is the following. Companies that ever enter the sandbox are likely different from those that do not. Creating a set of matched controls sample by matching on observables, as we have done in the analysis so far, cannot account for unobservable differences between sandbox and control companies. Restricting the sample to sandbox companies only thus controls for selection into the sandbox in a different way. For identification, we exploit the fact that companies enter the sandbox at different times (there are five cohorts in our sample). This analysis thus compares companies that have entered the sandbox with other companies that have not yet entered the sandbox.[11] Tables 7 and 8 present the results for the company outcomes analysis using only sandbox companies in the annual reports and fundraising sample, respectively. We again find similar results to those in the baseline analysis.

For robustness, we re-run the baseline company outcomes analysis by additionally controlling for lagged values of company size in the annual reports sample (Table A2) and lagged cumulative fundraising in the fundraising sample (Table A3). As in the baseline analysis, we use the one-to-one matched controls samples. Including these lagged control variables changes the interpretation of the coefficients of our variables of interest ("ever admitted" and "after entry") in the following way. The association between sandbox admission and company size/fundraising is now conditional on prior period values of company size/cumulative fundraising, and the coefficients for "ever admitted" and "after entry" therefore capture changes in the growth of the dependent variable, as opposed changes in the level as in the baseline specification. Tables A2 and A3 present the results, which are similar to those in the baseline analysis. A disadvantage of controlling for

[11] The identifying variation for the "after entry" coefficient should be the same as in the baseline specification. More specifically, it captures differences in outcomes of sandbox companies before and after entering the sandbox.

lagged values of company size/cumulative fundraising is that it involves more stringent data requirements, as a result of which the samples in Tables A2 and A3 include 18 and 15 sandbox companies, respectively, compared to 46 and 38 sandbox companies in the baseline samples. This decrease in the sample sizes reduces the precision of our coefficient estimates and, arguably more importantly, implies that we identify off fewer sandbox companies which decreases the external validity of our results. Nevertheless, it is comforting that the baseline results hold in these subsamples controlling for lagged values of company size and cumulative fundraising.

We also perform the following robustness tests for the spillovers analysis. First, we use 2-digit SIC divisions, instead of 4-digit SIC classes, to define industries. SIC divisions are coarser, with 86 levels amongst sandbox companies compared to 32 in the baseline sample. Except for using 2-digit SIC divisions instead of 4-digit SIC classes, we follow the same steps as in Section 2.3 to construct the industry level entry and fundraising samples. Restricting observations to those for industries with at least one sandbox company keeps 16% (12%) of distinct industries and 59% (47%) of companies in the entry (fundraising) sample, resulting in a balanced industry-quarter panel for 14 (10) industries between 2015q1 and 2020q4. We find similar results (unreported) as in the baseline specification. We omit reporting results for brevity.

Second, we replace the sandbox count variable with a dummy variable that equals one if there is at least one company that enters the sandbox in an industry-calendar year-quarter. We again find similar results (unreported), which we omit for brevity.

7 Conclusion

In recent years we are witnessing a huge transformation in Finance. FinTech, which began in the aftermath of the financial crises of 2007, has accelerated since 2015 and accelerated even more

during Covid. Within this important trend, the sandbox scheme is an important policy tool used by governments around the world to support and promote innovation in finance. In this paper we find evidence in support of this scheme in terms of its positive impact on competition in the FinTech industry.

Our study is in the context of the UK: The UK is largely seen as the centre for FinTech in the world, with more investment and FinTech unicorns created than anywhere else. It also had the first sandbox. When it comes to finance the UK tends to lead because the Finance sector (the City), has a much larger share of the economy than in other countries. It is no surprise that the UK invented the first sandbox, the UK government prioritises finance and the regulator, the FCA, has the mandate to act strategically.

Overall our research shows that the FinTech industry is the real beneficiary from the sandbox scheme. It suggests that the policy intervention is working for the industry overall and not just for participating companies.

References

Alaassar, Ahmad, Anne-Laure Mention, and Tor Helge Aas, 2021, Exploring a new incubation model for FinTechs: Regulatory sandboxes, *Technovation* 103, 102237.

Allen, Franklin, Xian Gu, and Julapa Jagtiani, 2021, A Survey of Fintech Research and Policy Discussion, *Review of Corporate Finance* 1, 259–339.

Brummer, Chris, and Yesha Yadav, 2019, Fintech and the Innovation Trilemma, *Georgetown Law Journal* 107, 235–308.

Cornelli, Giulio, Sebastian Doerr, Leonardo Gambacorta, and Ouarda Merrouche, 2022, Regulatory Sandboxes and Fintech Funding: Evidence from the UK. Working paper.

Decker, Ryan, John Haltiwanger, Ron Jarmin, and Javier Miranda, 2014, The Role of Entrepreneurship in US Job Creation and Economic Dynamism, *Journal of Economic Perspectives* 28, 3–24.

Deloitte, 2018, A journey through the FCA regulatory sandbox: The benefits, challenges, and next steps.

EBF, n.d., EU framework for experimentation, https://www.ebf.eu/priorities/innovation-cybersecurity/eu-framework-for-experimentation/, accessed on 7 August 2022.

FCA, 2019, The Impact and Effectiveness of Innovate.

Haltiwanger, John, Ron S. Jarmin, and Javier Miranda, 2013, Who Creates Jobs? Small versus Large versus Young, *Review of Economics and Statistics* 95, 347–361.

HM Treasury, 2021, Kalifa Review of UK Fintech.

Hurst, Erik, and Benjamin Wild Pugsley, 2011, What Do Small Businesses Do?, *Brookings Papers on Economic Activity* 42, 73–142.

Jagtiani, Julapa, and Kose John, 2018, Fintech: The Impact on Consumers and Regulatory Responses, *Journal of Economics and Business* 100. FinTech – Impact on Consumers, Banking and Regulatory Policy, 1–6.

Martins, Alessandra Carolina Rossi, 2021, A Sandbox for the U.S. Financial System.

Ofgem, 2018, What is a regulatory sandbox?.

Parenti, Radostina, 2020, Regulatory Sandboxes and Innovation Hubs for FinTech.

Puri, Manju, 1996, Commercial banks in investment banking conflict of interest or certification role?, *Journal of Financial Economics* 40, 373–401.

Ridley, David B., 2008, Herding versus Hotelling: Market Entry with Costly Information, *Journal of Economics & Management Strategy* 17, 607–631.

Ringe, Wolf-Georg, and Christopher Ruof, 2018, A Regulatory Sandbox for Robo Advice. Working paper.

Schlag, Karl H., 1998, Why Imitate, and If So, How?: A Boundedly Rational Approach to Multi-armed Bandits, *Journal of Economic Theory* 78, 130–156.

Schlag, Karl H., 1999, Which one should I imitate?, *Journal of Mathematical Economics* 31, 493–522.

Shaffer, Sherrill, 1989, Competition in the U.S. banking industry, *Economics Letters* 29, 321–323.

Spence, Michael, 1978, Job Market Signaling, in Peter Diamond and in Michael Rothschild ed.: *Uncertainty in Economics* (Academic Press).

Vega-Redondo, Fernando, 1997, The evolution of Walrasian behavior, *Econometrica* 65, 375–384.

Viscusi, W. Kip, and Michael J. Moore, 1993, Product Liability, Research and Development, and Innovation, *Journal of Political Economy* 101, 161–184.

Tables

Table 1
Descriptive statistics

This table presents descriptive statistics. Panel A shows these at the company-fiscal year level for the annual reports sample, Panel B at the company-calendar year-quarter level for the fundraising sample, and Panel C at the company level. In Panels A and B, we report standard deviations in parentheses and the statistical significance of *t*-tests for the difference in means between "Control" and "Sandbox" as well as "Before Sandbox" and "After Sandbox." *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. In Panel C, we report industries with less than 5% of all companies together as "Other" for brevity.

Panel A: Annual reports sample

	Full	Control	Sandbox	Before Sandbox	After Sandbox
Assets (mil GBP)	3.635	4.353	2.917	2.248	3.646
	(16.596)	(22.450)	(6.908)	(5.771)	(7.944)
Liabilities (mil GBP)	2.014	0.900	3.231***	3.010	3.465
	(6.461)	(3.342)	(8.522)	(8.670)	(8.426)
Employees	16.298	10.622	22.280**	18.864	25.347
	(33.685)	(30.179)	(36.231)	(31.230)	(40.273)
Observations	284	142	142	74	68

Panel B: Fundraising sample

	Full	Control	Sandbox	Before Sandbox	After Sandbox
Raised capital	0.151	0.128	0.174**	0.196	0.162
	(0.358)	(0.334)	(0.380)	(0.398)	(0.369)
Amount raised (tho GBP)	537.351	722.243	352.460	401.734	324.812
	(5992.098)	(8150.922)	(2315.582)	(2930.821)	(1888.288)
Observations	1,252	626	626	225	401

Panel C: Industries

	Companies	%
Other information technology and computer service activities	11	24%
Computer programming activities	9	20%
Other financial service activities, except insurance and pension funding	5	11%
Computer consultancy activities	4	9%
Activities of head offices	2	4%
Data processing, hosting and related activities	2	4%
Activities of insurance agents and brokers	2	4%
Other business support service activities	2	4%
Web portals	2	4%
Other	7	15%
	46	

Table 2
Sandbox admission and company size

This table presents results for regressions of company size on sandbox admission. The dependent variable is the log of one plus total assets, total liabilities, and the number of employees in Panels A, B, and C, respectively. The unit of analysis is a company-fiscal year. We use a one-to-one matched controls sample, in which we randomly match one high-growth start-up founded in the same industry and calendar year to each sandbox company. The variables of interest are "ever admitted" (a dummy variable that equals one if a company is ever admitted to the sandbox) and "after entry" (a dummy that equals one in the fiscal years after a company has entered the sandbox). We include industry and calendar year fixed effects. We also control for the log of company age and a London dummy variable in models 3 and 4. Table A1 contains definitions for all variables. *t*-statistics are shown in parentheses, and standard errors are heteroscedasticity robust and clustered by company. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Assets				
	(1)	(2)	(3)	(4)
Ever admitted	-0.190	-0.394	-0.176	-0.294
	(-0.30)	(-0.55)	(-0.28)	(-0.43)
After entry		0.426		0.248
		(0.66)		(0.40)
Age			2.014*	1.988*
			(1.94)	(1.90)
London			-0.401	-0.409
			(-0.53)	(-0.54)
Industry FEs	Yes	Yes	Yes	Yes
Calendar year FEs	Yes	Yes	Yes	Yes
Observations	284	284	284	284
Adjusted R^2	0.187	0.185	0.221	0.219

Panel B: Liabilities				
	(1)	(2)	(3)	(4)
Ever admitted	1.606**	1.277	1.561**	1.328
	(2.47)	(1.45)	(2.49)	(1.57)
After entry		0.680		0.482
		(0.84)		(0.62)
Age			2.544**	2.506**
			(2.56)	(2.54)
London			0.760	0.755
			(0.89)	(0.88)
Industry FEs	Yes	Yes	Yes	Yes
Calendar year FEs	Yes	Yes	Yes	Yes
Observations	271	271	271	271
Adjusted R^2	0.190	0.190	0.233	0.232

Panel C: Employees				
	(1)	(2)	(3)	(4)
Ever admitted	0.596**	0.515*	0.588**	0.515**
	(2.42)	(1.89)	(2.52)	(2.02)
After entry		0.149		0.135
		(0.68)		(0.66)
Age			0.834	0.832
			(1.62)	(1.61)
London			0.198	0.199
			(0.53)	(0.53)
Industry FEs	Yes	Yes	Yes	Yes
Calendar year FEs	Yes	Yes	Yes	Yes
Observations	190	190	190	190
Adjusted R^2	0.194	0.191	0.244	0.241

Table 3

Sandbox admission and fundraising

This table presents results for regressions of fundraising on sandbox admission. The dependent variable is a dummy variable that equals one if a company raises capital and the log of one plus the amount raised in Panels A and B, respectively. The unit of analysis is a company-calendar year-quarter. We use a one-to-one matched controls sample, in which we randomly match one high-growth start-up founded in the same industry and calendar year to each sandbox company. The variables of interest are "ever admitted" (a dummy variable that equals one if a company is ever admitted to the sandbox) and "after entry" (a dummy that equals one in the calendar year-quarters after a company has entered the sandbox). We include industry and calendar year-quarter fixed effects. We also control for the log of company age and a London dummy variable in models 3 and 4. Table A1 contains definitions for all variables. *t*-statistics are shown in parentheses, and standard errors are heteroscedasticity robust and clustered by company. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Fundraising dummy				
	(1)	(2)	(3)	(4)
Ever admitted	0.046**	0.055	0.044**	0.050
	(2.27)	(1.66)	(2.17)	(1.54)
After entry		-0.014		-0.009
		(-0.39)		(-0.26)
Age			-0.036	-0.035
			(-1.27)	(-1.21)
London			0.025	0.025
			(0.94)	(0.94)
Industry FEs	Yes	Yes	Yes	Yes
CY-quarter FEs	Yes	Yes	Yes	Yes
Observations	1252	1252	1252	1252
Adjusted R^2	0.013	0.012	0.013	0.012

Panel B: Fundraising amount				
	(1)	(2)	(3)	(4)
Ever admitted	0.310	0.116	0.267	0.075
	(1.14)	(0.28)	(1.01)	(0.18)
After entry		0.303		0.299
		(0.70)		(0.69)
Age			0.075	0.046
			(0.21)	(0.12)
London			0.443	0.441
			(1.23)	(1.22)
Industry FEs	Yes	Yes	Yes	Yes
CY-quarter FEs	Yes	Yes	Yes	Yes
Observations	1252	1252	1252	1252
Adjusted R^2	0.007	0.006	0.007	0.006

Table 4

Sandbox admission and spillovers

This table presents results for regressions of high-growth start-up entry and fundraising on sandbox admission at the industry level. The dependent variable is the log of one plus the number of new company incorporations and companies that raise capital in Panels A and B, respectively. The unit of analysis is an industry-calendar year-quarter. The variable of interest is "sandbox" (the number of companies in an industry that enter the sandbox in a calendar year-quarter). We include industry and calendar year-quarter fixed effects. Table A1 contains definitions for all variables. *t*-statistics are shown in parentheses, and standard errors are heteroscedasticity robust and clustered by industry. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Entry

	(1) q-4	(2) q-3	(3) q-2	(4) q-1	(5) q	(6) q+1	(7) q+2	(8) q+3	(9) q+4
Sandbox	0.004	0.040	-0.013	0.023	0.018	0.038	0.093***	0.056*	0.038
	(0.16)	(1.56)	(-0.39)	(1.19)	(0.50)	(1.21)	(3.72)	(1.96)	(1.15)
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CY-quarter FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	460	483	506	529	552	529	506	483	460
Adjusted R^2	0.873	0.865	0.856	0.844	0.827	0.824	0.823	0.822	0.818

Panel B: Fundraising

	(1) q-4	(2) q-3	(3) q-2	(4) q-1	(5) q	(6) q+1	(7) q+2	(8) q+3	(9) q+4
Sandbox	-0.029	-0.009	-0.016	0.024	0.032	-0.015	0.036	0.002	0.042**
	(-1.14)	(-0.48)	(-0.69)	(1.14)	(1.49)	(-0.47)	(1.47)	(0.09)	(2.51)
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CY-quarter FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	370	388	406	424	442	424	406	388	370
Adjusted R^2	0.967	0.967	0.967	0.967	0.963	0.964	0.965	0.966	0.966

Table 5

Sandbox admission and company size with multiple matched controls

This table presents results for regressions of company size on sandbox admission. The dependent variable is the log of one plus total assets, total liabilities, and the number of employees in Panels A, B, and C, respectively. The unit of analysis is a company-fiscal year. We use a five-to-one matched controls sample, in which we randomly match up to five (subject to availability) high-growth start-ups founded in the same industry and calendar year to each sandbox company. The variables of interest are "ever admitted" (a dummy variable that equals one if a company is ever admitted to the sandbox) and "after entry" (a dummy that equals one in the fiscal years after a company has entered the sandbox). We include industry and calendar year fixed effects. We also control for the log of company age and a London dummy variable in models 3 and 4. Table A1 contains definitions for all variables. *t*-statistics are shown in parentheses, and standard errors are heteroscedasticity robust and clustered by company. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Assets				
	(1)	(2)	(3)	(4)
Ever admitted	-0.330	-0.540	-0.410	-0.570
	(-0.52)	(-0.76)	(-0.69)	(-0.87)
After entry		0.436		0.333
		(0.75)		(0.60)
Age			1.887***	1.872***
			(2.69)	(2.66)
London			-0.468	-0.473
			(-1.01)	(-1.02)
Industry FEs	Yes	Yes	Yes	Yes
Calendar year FEs	Yes	Yes	Yes	Yes
Observations	523	523	523	523
Adjusted R^2	0.121	0.120	0.159	0.158

Panel B: Liabilities				
	(1)	(2)	(3)	(4)
Ever admitted	1.478**	1.024	1.362**	0.954
	(2.51)	(1.24)	(2.44)	(1.22)
After entry		0.936		0.845
		(1.24)		(1.16)
Age			2.021***	1.996***
			(2.67)	(2.65)
London			-0.191	-0.196
			(-0.35)	(-0.36)
Industry FEs	Yes	Yes	Yes	Yes
Calendar year FEs	Yes	Yes	Yes	Yes
Observations	510	510	510	510
Adjusted R^2	0.090	0.092	0.118	0.119

Panel C: Employees				
	(1)	(2)	(3)	(4)
Ever admitted	0.481**	0.475*	0.424**	0.411*
	(2.13)	(1.90)	(2.09)	(1.80)
After entry		0.012		0.024
		(0.06)		(0.11)
Age			0.621*	0.621*
			(1.81)	(1.81)
London			-0.167	-0.167
			(-0.72)	(-0.72)
Industry FEs	Yes	Yes	Yes	Yes
Calendar year FEs	Yes	Yes	Yes	Yes
Observations	349	349	349	349
Adjusted R^2	0.126	0.123	0.165	0.162

Table 6

Sandbox admission and fundraising with multiple matched controls

This table presents results for regressions of fundraising on sandbox admission. The dependent variable is a dummy variable that equals one if a company raises capital and the log of one plus the amount raised in Panels A and B, respectively. The unit of analysis is a company-calendar year-quarter. We use a five-to-one matched controls sample, in which we randomly match up to five (subject to availability) high-growth start-ups founded in the same industry and calendar year to each sandbox company. The variables of interest are "ever admitted" (a dummy variable that equals one if a company is ever admitted to the sandbox) and "after entry" (a dummy that equals one in the calendar year-quarters after a company has entered the sandbox). We include industry and calendar year-quarter fixed effects. We also control for the log of company age and a London dummy variable in models 3 and 4. Table A1 contains definitions for all variables. *t*-statistics are shown in parentheses, and standard errors are heteroscedasticity robust and clustered by company. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Fundraising dummy				
	(1)	(2)	(3)	(4)
Ever admitted	0.042**	0.050*	0.041**	0.046
	(2.27)	(1.68)	(2.24)	(1.57)
After entry		-0.013		-0.007
		(-0.40)		(-0.23)
Age			-0.046**	-0.046**
			(-2.30)	(-2.26)
London			0.009	0.009
			(0.46)	(0.46)
Industry FEs	Yes	Yes	Yes	Yes
CY-quarter FEs	Yes	Yes	Yes	Yes
Observations	2241	2241	2241	2241
Adjusted R^2	0.003	0.003	0.004	0.004

Panel B: Fundraising amount				
	(1)	(2)	(3)	(4)
Ever admitted	0.279	0.096	0.261	0.055
	(1.18)	(0.27)	(1.11)	(0.16)
After entry		0.285		0.320
		(0.74)		(0.83)
Age			-0.298	-0.318
			(-1.17)	(-1.23)
London			0.167	0.165
			(0.67)	(0.66)
Industry FEs	Yes	Yes	Yes	Yes
CY-quarter FEs	Yes	Yes	Yes	Yes
Observations	2241	2241	2241	2241
Adjusted R^2	0.001	0.001	0.001	0.001

Table 7

Sandbox admission and company size with Sandbox companies only

This table presents results for regressions of company size on sandbox admission. The dependent variable is the log of one plus total assets, total liabilities, and the number of employees in Panels A, B, and C, respectively. The unit of analysis is a company-fiscal year. We restrict observations to those for companies that are ever admitted to the sandbox. The variable of interest is "after entry" (a dummy that equals one in the fiscal years after a company has entered the sandbox). We include industry and calendar year fixed effects. We also control for the log of company age and a London dummy variable in models 3 and 4. Table A1 contains definitions for all variables. *t*-statistics are shown in parentheses, and standard errors are heteroscedasticity robust and clustered by company. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Assets		
	(1)	(2)
After entry	1.202*	0.899
	(1.75)	(1.38)
Age		3.115***
		(3.36)
London		-0.758
		(-0.88)
Industry FEs	Yes	Yes
Calendar year FEs	Yes	Yes
Observations	189	189
Adjusted R^2	0.209	0.287

Panel B: Liabilities		
	(1)	(2)
After entry	1.114	0.960
	(1.43)	(1.22)
Age		1.937**
		(2.08)
London		-0.658
		(-0.82)
Industry FEs	Yes	Yes
Calendar year FEs	Yes	Yes
Observations	175	175
Adjusted R^2	0.203	0.246

Panel C: Employees		
	(1)	(2)
After entry	0.396*	0.386*
	(1.84)	(1.84)
Age		1.528***
		(3.64)
London		0.233
		(0.61)
Industry FEs	Yes	Yes
Calendar year FEs	Yes	Yes
Observations	129	129
Adjusted R^2	0.260	0.421

Table 8

Sandbox admission and fundraising with Sandbox companies only

This table presents results for regressions of fundraising on sandbox admission. The dependent variable is a dummy variable that equals one if a company raises capital and the log of one plus the amount raised in Panels A and B, respectively. The unit of analysis is a company-calendar year-quarter. We restrict observations to those for companies that are ever admitted to the sandbox. The variable of interest is "after entry" (a dummy that equals one in the calendar year-quarters after a company has entered the sandbox). We include industry and calendar year-quarter fixed effects. We also control for the log of company age and a London dummy variable in models 3 and 4. Table A1 contains definitions for all variables. *t*-statistics are shown in parentheses, and standard errors are heteroscedasticity robust and clustered by company. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Fundraising dummy		
	(1)	(2)
After entry	0.014	0.021
	(0.38)	(0.58)
Age		-0.046*
		(-1.72)
London		0.014
		(0.38)
Industry FEs	Yes	Yes
CY-quarter FEs	Yes	Yes
Observations	1015	1015
Adjusted R^2	-0.007	-0.007

Panel B: Fundraising amount		
	(1)	(2)
After entry	0.649	0.622
	(1.38)	(1.28)
Age		-0.114
		(-0.35)
London		0.218
		(0.51)
Industry FEs	Yes	Yes
CY-quarter FEs	Yes	Yes
Observations	1015	1015
Adjusted R^2	0.000	-0.001

Appendix

Table A1
Variable definitions

This table lists definitions for all variables.

Variable	Definition
Assets	The book value of a company's total assets
Liabilities	The book value of a company's total liabilities
Employees	A company's number of employees
Capital raised	A dummy variable that equals one if a company receives equity funding in a calendar year-quarter
Amount raised	The total equity funding a company receives in a calendar year-quarter
Entry	An industry's number of new company registrations in a calendar-year quarter
Ever admitted	A dummy variable that equals one if a company is ever admitted to the sandbox
After entry	A dummy variable that equals one in the fiscal years/calendar-year quarters after a company has entered the sandbox
Age	The number of years since a company's incorporation
London	A dummy variable that equals one if a company's headquarters are in London
Industry	The primary industry in which a company operates (32 levels)
Year	The calendar year during which a company's particular fiscal year ends
Quarter	Calendar year-quarters (e.g., 2016q3 or 2018q4)

Table A2

Sandbox admission and company size controlling for lagged company size

This table presents results for regressions of company size on sandbox admission. The dependent variable is the log of one plus total assets, total liabilities, and the number of employees in Panels A, B, and C, respectively. The unit of analysis is a company-fiscal year. We use a one-to-one matched controls sample, in which we randomly match one high-growth start-up founded in the same industry and calendar year to each sandbox company. The variables of interest are "ever admitted" (a dummy variable that equals one if a company is ever admitted to the sandbox) and "after entry" (a dummy that equals one in the fiscal years after a company has entered the sandbox). We control for lagged values of the log of one plus total assets, and we include industry and calendar year fixed effects. We also control for the log of company age and a London dummy variable in models 3 and 4. Table A1 contains definitions for all variables. *t*-statistics are shown in parentheses, and standard errors are heteroscedasticity robust and clustered by company. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Assets				
	(1)	(2)	(3)	(4)
Ever admitted	0.189	0.330	0.236	0.391
	(0.68)	(0.96)	(0.90)	(1.18)
After entry		-0.354		-0.384
		(-0.64)		(-0.67)
L.Assets	0.828***	0.828***	0.825***	0.824***
	(10.38)	(10.60)	(9.97)	(10.27)
Age			-0.829*	-0.783*
			(-1.90)	(-1.75)
London			-0.783**	-0.803**
			(-2.17)	(-2.25)
Industry FEs	Yes	Yes	Yes	Yes
Calendar year FEs	Yes	Yes	Yes	Yes
Observations	99	99	99	99
Adjusted R^2	0.762	0.760	0.768	0.766

Panel B: Liabilities				
	(1)	(2)	(3)	(4)
Ever admitted	1.412***	1.316***	1.419***	1.371***
	(3.93)	(2.99)	(4.12)	(3.08)
After entry		0.251		0.125
		(0.36)		(0.18)
L.Assets	0.824***	0.822***	0.795***	0.795***
	(10.76)	(10.85)	(10.06)	(10.02)
Age			1.005*	0.992*
			(1.76)	(1.75)
London			-0.171	-0.165
			(-0.41)	(-0.39)
Industry FEs	Yes	Yes	Yes	Yes
Calendar year FEs	Yes	Yes	Yes	Yes
Observations	96	96	96	96
Adjusted R^2	0.650	0.646	0.649	0.644

Panel C: Employees				
	(1)	(2)	(3)	(4)
Ever admitted	0.624**	0.650***	0.621**	0.654**
	(2.54)	(2.77)	(2.47)	(2.69)
After entry		-0.068		-0.089
		(-0.33)		(-0.43)
L.Assets	0.266***	0.266***	0.265***	0.266***
	(5.29)	(5.20)	(5.41)	(5.38)
Age			-0.006	0.000
			(-0.02)	(0.00)
London			-0.066	-0.076
			(-0.17)	(-0.19)
Industry FEs	Yes	Yes	Yes	Yes
Calendar year FEs	Yes	Yes	Yes	Yes
Observations	76	76	76	76
Adjusted R^2	0.677	0.672	0.666	0.661

Table A3

Sandbox admission and fundraising controlling for lagged cumulative fundraising

This table presents results for regressions of fundraising on sandbox admission. The dependent variable is a dummy variable that equals one if a company raises capital and the log of one plus the amount raised in Panels A and B, respectively. The unit of analysis is a company-calendar year-quarter. We use a one-to-one matched controls sample, in which we randomly match one high-growth start-up founded in the same industry and calendar year to each sandbox company. The variables of interest are "ever admitted" (a dummy variable that equals one if a company is ever admitted to the sandbox) and "after entry" (a dummy that equals one in the calendar year-quarters after a company has entered the sandbox). We control for lagged values of the log of one plus cumulative amount raised, and we include industry and calendar year-quarter fixed effects. We also control for the log of company age and a London dummy variable in models 3 and 4. Table A1 contains definitions for all variables. *t*-statistics are shown in parentheses, and standard errors are heteroscedasticity robust and clustered by company. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Fundraising dummy				
	(1)	(2)	(3)	(4)
Ever admitted	0.015	-0.000	0.013	-0.003
	(0.42)	(-0.00)	(0.38)	(-0.08)
After entry		0.027		0.030
		(0.50)		(0.60)
L.Cum amount raised	0.000	0.000	0.001	0.002
	(0.12)	(0.13)	(0.45)	(0.46)
Age			-0.161**	-0.162**
			(-2.06)	(-2.07)
London			0.012	0.012
			(0.29)	(0.31)
Industry FEs	Yes	Yes	Yes	Yes
CY-quarter FEs	Yes	Yes	Yes	Yes
Observations	560	560	560	560
Adjusted R^2	-0.002	-0.004	0.005	0.004

Panel B: Fundraising amount				
	(1)	(2)	(3)	(4)
Ever admitted	0.081	-0.375	-0.024	-0.504
	(0.20)	(-0.75)	(-0.06)	(-1.07)
After entry		0.825		0.865
		(1.24)		(1.32)
L.Cum amount raised	0.036	0.037	0.038	0.039
	(0.98)	(1.00)	(0.98)	(1.00)
Age			-1.084	-1.100
			(-1.35)	(-1.40)
London			0.573	0.587
			(1.27)	(1.34)
Industry FEs	Yes	Yes	Yes	Yes
CY-quarter FEs	Yes	Yes	Yes	Yes
Observations	560	560	560	560
Adjusted R^2	-0.001	-0.000	0.002	0.003