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Regulatory Sandboxes and Fintech Funding: Evidence from the UK*

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Abstract

Over fifty countries have introduced regulatory sandboxes to foster financial innovation. This article conducts the first evaluation of their ability to improve fintechs' access to capital and attendant real effects. Exploiting the staggered introduction of the UK sandbox, we establish that firms entering the sandbox see an increase of 15% in capital raised post-entry. Their probability of raising capital increases by 50%. Sandbox entry also has a significant positive effect on survival rates and patenting. Investigating the mechanism, we present evidence consistent with lower asymmetric information and regulatory costs.

Keywords: Regulatory sandbox, Fintech, Start-ups, Venture capital, Innovation

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1. Introduction

The rapid growth of innovative companies in the financial sector that use new technology holds the promise of spurring competition, leading to efficiency gains and more choice for consumers. However, "fintechs" offer novel products in an environment of high regulatory uncertainty, so they often struggle to raise enough capital to develop products and expand (Haddad and Hornuf, 2019). Policymakers around the world are thus stepping up their efforts to foster innovation in the financial sector, as they have done with business accelerators or grants in other areas (Howell, 2017; González-Uribe and Leatherbee, 2018).

A landmark initiative to nurture fintechs was the creation of the "regulatory sandbox" by the United Kingdom's Financial Conduct Authority (FCA). Established in November 2015, the sandbox offers fintechs a controlled testing environment in which they can try out their products on a limited set of customers. Testing occurs under close regulatory supervision: firms receive advice to help them navigate the complexities of regulations and to ease the route to authorization. A key objective of sandboxes is to foster innovation by facilitating fintechs' access to financing at early stages of development.[1] Regulators can use sandboxes to learn about new financial technologies and emerging trends, as well as to identify associated risks before products are launched for the mass market.

By now, over fifty countries have followed the UK and introduced their own regulatory sandbox, often with the goal of nurturing the fintech sector (Wechsler, Perlman, and Gurung, 2018).[2] And yet, despite their wide-spread adoption and significant attention in the media and policy circles, little systematic empirical evidence exists on whether sandboxes actually help fintechs to raise funding, innovate, or develop viable business models. Nor is there any evidence on the underlying channels that could be at work.

This article analyses how entering the FCA's regulatory sandbox affects fintechs' ability to raise funding and attendant real effects. We collect data on capital raised by fintechs in the UK sandbox for the period from 2014q1 to 2019q2. Detailed deal-level data, broken down by individual investor, as well as background information on a firm's age, size, industry, location, and its CEOs allow us to investigate different channels through which the sandbox could affect a firm's access to capital. We focus on the sample of firms accepted into the sandbox and exploit the fact that these firms entered the sandbox in five cohorts. As entry is staggered over rounds of 6 months, we can compare a firm's capital-raising activity before and after participation in the sandbox, relative to firms that will enter the sandbox later.

Entry into the sandbox is associated with an increase in the average amount of funding raised and a higher probability of raising funding. In firm-level regressions, we find that entry into the sandbox is followed by a 15% increase in capital raised (or $700,000) over the following 2 years, relative to firms that will enter the sandbox at a later date. Firms' probability of raising capital increases by 50%. The increase in capital raised corresponds to about one standard deviation.[3]

1 See Regulatory sandbox—Financial Conduct Authority: "A regulatory sandbox has the potential to deliver more effective competition in the interests of consumers by [. . .] enabling greater access to finance for innovators".

2 At the time of writing, fifty-seven jurisdictions operate one or more sandboxes. See the World Bank's Key Data from Regulatory Sandboxes across the Globe for current numbers.

3 The magnitude of our estimates is in line with findings on the effectiveness of public policy to foster innovation in other settings. Howell (2017) finds that R&D grants roughly double a firm's chance of

We obtain similar findings when we compare sandbox fintechs to a set of matched control firms. Specifically, using a coarsened exact matching (CEM) approach, we select a sample of fintechs that are statistically similar in terms of observable firm characteristics. We estimate a difference-in-differences specification with firm and time fixed effects, comparing firms that enter the sandbox to those that never enter the sandbox, but share similar characteristics. In the matched sample, we find almost identical effects to our baseline strategy: entry into the sandbox is associated with a relative 15.1% increase in capital raised.

Facilitating fintechs' access to finance is an important step in benefitting consumers through greater innovation and competition. While the short time span since its inception does not allow for an evaluation of the sandbox's effects on the consumer surplus or competition in the financial sector yet, we can analyze survival rates and patenting activity. We find that sandbox firms are significantly more likely to still be in operation today, compared to a set of matched control firms that did not enter the sandbox (75% versus 60%).[4] In addition, sandbox entry is associated with an increase in patenting activity, suggesting that easier access to capital spurs firms' innovative activity.

We then investigate the underlying mechanisms. Asymmetric information is particularly acute in venture capital markets, because issuers are mainly early-stage firms with no prior track records (Trester, 1998). Uncertainty about the quality of new products and services offered by fintechs could thus present a serious obstacle to raising capital—especially in an environment of high regulatory uncertainty (Haddad and Hornuf, 2019). Navigating the complexities of a constantly changing regulatory framework could further pose a significant cost to firms. Sandboxes could curb informational frictions through regulatory oversight and continuous dialogue between firms and the regulator during the testing period that offers reassurance to investors that firms meet their regulatory obligations. Additionally, advice by trained case officers promises to lower regulatory costs for firms and reduce the risk to firms of offering products that could be in violation of the regulatory framework.

Our evidence is consistent with the notion that the sandbox reduces information asymmetries between investors and firms, as well as costs associated with regulatory uncertainty. We first show that the estimated positive effect of sandbox entry on capital raised is stronger for smaller and younger firms, which are more opaque and hence subject to severe informational frictions (Hall and Lerner, 2010). Similarly, entry into the sandbox is associated with greater increases in deal volume for venture capital deals, which are generally more information-sensitive, compared to other types of deals (Gompers, 1995; Howell, 2020). Second, data at the investor-firm level show that firms in the sandbox raise more capital especially from investors based outside the UK and investors that have not previously invested into the firm. Since these investors likely face higher information asymmetries (Grinblatt and Keloharju, 2001; Ivković and Weisbenner, 2005), we interpret this finding as evidence that the sandbox helps in reducing informational frictions. Finally, we show that firms with a CEO who has a background in financial law raise relatively less capital

receiving venture capital investment. For the UK, Bone *et al.* (2019) find that accelerators increase firms' fundraising activity by around 75%.

4 These patterns are in line with preliminary findings by the FCA (2019), which reports that around 80% of firms that successfully tested in the sandbox are still in operation (as of 2019), which is significantly higher than average numbers for startups. For example, the 3-year survival rate of startups averages around 60% (Hyytinen, Pajarinen, and Rouvinen, 2015).

after entry into the sandbox. This is in line with anecdotal evidence that CEOs without prior experience in financial regulation benefit the most from the guidance provided by case officers (Deloitte, 2019), and thereby from the reduction in regulatory costs and uncertainty.

A key challenge for identification is that even among the group of firms that enter the sandbox at some point, the entry date could be correlated with unobservable firm characteristics.[5] We perform a number of exercises to address this concern. First, we show that among the group of firms that enter the sandbox at some point, the specific entry date is uncorrelated with observable firm characteristics. Second, our main results hold when we compare sandbox fintechs to a set of control forms that are similar along observable characteristics to the sandbox firms, selected via CEM. Third, we show that our results are robust to the inclusion of fixed effects. For example, in investor-firm level regressions we include investor*firm and firm*time fixed effects fixed effects. These fixed effects account for unobservable heterogeneity within each firm-investor combination, as well as unobservable time-varying factors at the firm level (Khwaja and Mian, 2008; Jiménez *et al.*, 2014). While results from these tests suggest that the sandbox has helped fintechs raise funding, in interpreting our findings it is important to keep the caveat in mind that sandbox entry is not random.

We provide a series of additional exercises. One explanation for our findings could be that investors simply learn about firms as they gradually reveal their quality to the market over time, irrespective of entry into the sandbox. Then, firms' ability to raise funding would increase gradually. If instead investors learn about the quality of a firm because of the "sandbox certification", firms' ability to raise funding will increase immediately after entry. We find that the strongest effects on funding raised occur in the first two to four quarters upon entry. Four to eight quarters after entry, the sandbox still has a positive, but smaller effect on funding raised. We also show that our results are robust to alternative estimation methods to account for the presence of zeros in our dependent variable, or when we include cohort or contiguous-cohort fixed effects.

Our findings do not preclude that the sandbox operates through additional channels. For example, it could have a general signaling effect: selection into the sandbox could serve as a stamp of approval and help sandbox firms raise more capital. Regulatory approval could further indicate that a firm's product is viable and will face fewer regulatory hurdles going forward. From the firm's perspective, this would mean that it now has the approval to sell its products, which likely requires investments in sales and scaling. If so, entering (and graduating from) the sandbox would lead to higher demand for capital among all sandbox firms. That said, our findings on the differential effects for small and young firms, and especially the larger effects found for capital raised from foreign and first-time investors, are consistent with the sandbox reducing informational frictions and facilitating fintechs' access to capital above and beyond its general effects through signaling and on the demand for funding.

5 For example, even within the group of firms that enter the sandbox, the entry date could be correlated with a change in the quality of the offered product or service. Such life-cycle considerations imply that firms could then have raised more capital irrespective of their entry into the sandbox. Likewise, firms could strategically postpone their capital-raising activity until acceptance into the sandbox, possibly in the hope of raising additional capital.

All in all, our findings suggest that the regulatory sandbox improves fintechs' access to capital; firms entering the sandbox are also more likely to still be in operation and have a patent. To the best of our knowledge, this article provides the first systematic evidence that sandboxes help fintechs to raise capital and innovate—and hence achieve one of their explicit goals. Sandboxes, which have already been widely adopted, could hence become a useful policy tool for harvesting the benefits of financial innovation.[6]

Our article contributes to the debate on how public policies can foster innovation (Kerr and Nanda, 2015; Lerner and Nanda, 2020). A recent literature has established that fintechs face serious obstacles to raising capital (Block *et al.*, 2018; Haddad and Hornuf, 2019), despite the fact that their innovation provides value to innovators and investors (Chen, Wu, and Yang, 2019). As market failures can lead to sub-optimal private-sector expenditure on research and development, public policies to foster innovation, for example through grants and business incubators or accelerators, can have sizeable benefits (Howell, 2017; González-Uribe and Leatherbee, 2018; Yu, 2020; González-Uribe and Reyes, 2021).[7] Policy makers hence want to promote innovation in the financial sector, and regulatory sandboxes have emerged as a prominent tool to do so. Yet, evidence on their effectiveness is scarce.

We also relate to literature that investigates how to regulate fintechs (Arner, Barberis, and Buckey, 2017; Zetzsche *et al.*, 2017; Magnuson, 2018). Buchak *et al.* (2018) show that the rapid growth of fintech lenders in the USA is mostly explained by lighter regulation and better technology, with benefits to consumers (see also Thakor, 2020 and Fuster *et al.*, 2019). Other studies show that the use of big data and machine learning can lead to algorithmic discrimination and changes in consumer behavior (Bartlett *et al.*, 2022; Berg *et al.*, 2020; Fuster *et al.*, 2022), and that the growth of fintechs raises concerns about data privacy (Armantier *et al.*, 2021; Chen *et al.*, 2023; Doerr *et al.*, 2023). The entry of fintechs into finance thus constitutes a dilemma for policy makers: they need to promote innovation in the financial sector, but without compromising data privacy, financial stability, or consumer welfare (Brummer and Yadav, 2019). New regulatory tools might thus be needed, and sandboxes could be one such tool: they provide regulators with the ability to support safe innovation by gauging the potential welfare implications of new products before they are launched. An assessment of the effectiveness of sandboxes and an understanding of the channels through which they operate are hence indispensable.

The remainder of the article is organized as follows. Section 2 provides background information on the UK regulatory sandbox. Section 3 gives an overview of our data and sample of fintechs. Section 4 explains our empirical strategy. It then reports the main results and provides evidence on the mechanisms at work. In Section 5, we present robustness tests. Section 6 concludes.

6 Cross-country evidence suggests that the establishment of a sandbox is followed by a surge in fintechs' capital-raising activity (Cornelli *et al.*, 2021). These correlations are in line with our main findings.

7 Brown and Davies (2020) show that early-venture fundraising can be inefficient if information acquisition is costly, leading entrepreneurs to undertake bad projects and forgo profitable ones.