COVID-19 and entrepreneurship entry and exit: Opportunity amidst adversity

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ABSTRACT

We theoretically and empirically examine how acquiring new skills and increased financial worries influenced entrepreneurship entry and exit intentions during the pandemic. To that end, we analyze primary individual-level survey data we collected in the aftermath of the COVID-19's first wave in Russia, which has had one of the highest COVID-19 infection rates globally. Our results show that acquiring new skills during the pandemic helped owners keep their existing businesses and encouraged start-ups in sectors other than information technology (IT). For IT start-ups, having previous experience matters more than new skills. While the pandemic-driven financial worries are associated with business closure intentions, they also inspire new business start-ups, highlighting the pandemic's creative destruction power. Furthermore, preferences for formal employment and remote work also matter for entrepreneurial intentions. Our findings enhance the understanding of entrepreneurship formation and closure in a time of adversity and suggest that implementing entrepreneurship training and upskilling policies during recurring waves of the COVID-19 pandemic can be an important policy tool for innovative small business development.

1. Introduction

What drives entrepreneurial decisions in adverse circumstances, such as a global pandemic? Previous research has examined entrepreneurial activities under conditions of war [1] and terrorism [2]. Furthermore, the financial crisis of 2007/2009 also spurred a body of literature on the consequences of financial shocks on entrepreneurship (e.g., Refs. [3–6]. Despite the growing body of literature on the impacts of the COVID-19 pandemic on entrepreneurship (e.g. Refs. [3,7,8], little is known about the consequences of the ongoing COVID-19 pandemic on business closures or start-up decisions in the context of emerging economies. The pandemic is unique because it combines the features of a rather sudden adverse event having the potential of enduring adversity into the future [9], which makes studying its consequences of paramount importance for entrepreneurship scholars.

The pandemic was an enormous shock to workers, businesses, and governments globally. In 2020, 114 million people became jobless [10], and the total tally up until the end of 2021 amounted to 255 million [11]. In many countries, financial concerns, the fears of a global economic downturn and unemployment skyrocketed due to COVID-19 [12, 13].

The pandemic also became a great challenge for many self-employed and solo entrepreneurs worldwide [14]. It hit the hardest gig economy workers, including the self-employed, independent contractors, and those employed in temporary jobs. Often, these workers had to face difficult trade-offs between the health and safety risks imposed by the disease, the realities of business closure, and the loss of livelihoods due to the lockdowns [15,16]. Many governments' stay-at-home orders threatened the existence of small businesses and solo entrepreneurs, especially in the services and retail sectors [7] and the tourism industry [17].

Nevertheless, the pandemic simultaneously created a potential for

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the modernization and digitization of products and services, thus fostering new opportunities for future business development [13,18,19]. In many countries, new start-up registrations soared, with new ventures seeking to provide novel solutions in logistics, delivery, and information technology (IT) [20].

Specifically, the pandemic provided renewed opportunities for digital entrepreneurship [21]. The IT sector gave individuals the tools and capabilities to continue telemedicine, education, work, and entertainment [19,22,23]. As such, the demand for technologies and digital services during the pandemic presented an opportunity for creating innovative solutions to cope with the consequences of lockdowns and stay-at-home orders [24]. For example, the pandemic created a rapidly emerging demand for COVID apps, contact tracing apps, cashless commerce solutions, data management banks, person recognition, e-health, and other services [24].

In addition to bringing joblessness and insecurity, the pandemic was also a wake-up call for many workers and employers as it exposed deficiencies in skills and knowledge. European data show that 30–40% of non-manual workers in many Eastern European countries lacked digital skills [25]. Global survey results from 190 countries show that two in three workers would like to learn new skills to land new jobs or roles that offer more security or opportunity [26]. Moreover, most workers who wanted to learn new skills for a new job did so because they wanted to switch to IT or digital jobs [26]. This willingness to retrain and upskill is driven not only by COVID-19 but also by ongoing automation trends [26]. In Russia, the country of interest in this paper, more than half (56%) of respondents were willing to retrain for a new role [26].

This paper focuses on understanding business owners' options and potential choices under uncertain and turbulent conditions. Specifically, we study the role of push factors specific to the pandemic, such as financial insecurity, and pull factors, such as acquiring new skills and talents. We explore whether the pandemic led to the closure of ailing businesses and whether it inspired the start-up intentions of individuals who saw the pandemic as an opportunity. This line of work has both practical and academic significance because it can reveal important patterns, creative solutions, and coping strategies that interest current and potential business owners and policymakers seeking to support the innovativeness and resilience of businesses in turbulent times. Furthermore, understanding, in particular, the promise of digital entrepreneurship and innovations in the IT sector are crucial for arranging the future of work and also dealing with adversity.

We utilize primary individual-level survey data collected during COVID-19's first wave in Russia, one of the most negatively affected countries during the pandemic's first wave [27]. The first COVID-19 wave resulted in over 800,000 infected persons in Russia by July 2020. As of July 2022, 18.5 million persons have at some point been infected with COVID-19 in Russia. Apart from the health consequences, the pandemic also has had economic repercussions for ordinary people and businesses in Russia.[1] In June 2020, about 60% of Russians reported losing some of their income, and one in ten lost their livelihoods because of COVID-19 [28]. The pandemic has also severely affected small businesses in Russia. One in every five small and medium enterprises was shut down during the first wave [29]. Also, only 10% of businesses accessed government support during the first wave, even though over 35% were eligible for such support [30].

In addition, by being a country with a long history of communism, dependent on natural resources, and having high institutional barriers to business start-up, Russia is generally a challenging context in which to run a business [31–34]. The main barriers relate to corruption, lack of the rule of law, and difficult access to finance [35]. On the one hand, the pandemic further exacerbated these challenges for existing businesses and discouraged the start-up of new businesses. At the same time, the

lockdowns and stay-at-home orders provided opportunities for learning new skills and creating innovative start-ups [7]. Moreover, high-quality education in engineering, science, and IT is still a tradition in Russia [36], creating opportunities for developing innovative small businesses.

The ongoing pandemic is a unique event combining the short-term shock and long-term persistent features. Therefore, understanding how it influenced entrepreneurial decision-making is of utmost importance. We provide several contributions in this direction. First, conceptually, we modify and augment Shepherd and Williams' [9] theoretical framework, which distinguishes between adverse events (e.g., earthquakes or terrorist acts) and persistent adversity (e.g., poverty traps) to account for both push (financial insecurity) and pull (the acquisition of new skills) factors affecting entrepreneurial behavior during the pandemic. Second, empirically, by employing the novel individual-level data, we are the first to provide evidence about the differences in the role of the new skills acquired during the pandemic and financial worries for entrepreneurial exit and entry intentions in general and in the IT sector, particularly. Third, by focusing on both entry and exit decisions in Russia, we contribute to the scant literature on entrepreneurship decisions in transition countries [31,32,37]. Finally, we add to the policy dialogue on the relative importance of financial support to businesses compared to the introduction of upskilling programs during the pandemic. Our results suggest that training programs for acquiring new skills can be an important tool for preventing business exits and motivating start-ups.

Our study has several limitations related to the cross-sectional nature of our data and the fact that we cannot address the challenges brought by the subsequent waves of COVID-19 beyond the first wave. Nevertheless, we offer a unique glimpse into the important considerations and factors motivating and discouraging Russian entrepreneurs, which can inform public and practical debates on the topic. Our results offer several avenues for future research, which we detail in the conclusion. Furthermore, our study offers a glimpse into understanding entrepreneurship decisions during a crisis in a particular context. Further research into innovation and entrepreneurship in turbulent times and different contexts is urgently needed [3].

2. Background: COVID-19 and entrepreneurship in Russia

Russia provides an interesting case for analyzing the consequences of the pandemic for individual entrepreneurship decisions. Recent reports by the Global Entrepreneurship Monitor [38,39] underscore several distinctive features of existing and nascent Russian entrepreneurs. According to different sources, the percentage of those who intend to start their own business varies from 14% to 30% [39,40]. This figure has been steadily increasing in recent years. However, Russia is still among the countries with the lowest possibilities for starting a business [39]. For nearly 80% of those who want to start a business, the major motivation is earning a better livelihood. This figure is remarkably high for an upper-middle-income economy like Russia's and is comparable to that in Ecuador or Madagascar [38].

Furthermore, with over 800,000 registered COVID-19 cases during the first wave (March–July 2020), Russia became and continues to be one of the most infected countries in the world and a top infected country in Europe (about 18.5 million registered cases up until July 2022). During the first wave, the Russian government limited international travel in response to the rising number of infections. It announced the so-called "non-working days" that were effectively stay-at-home orders and implied a temporary closure of non-essential businesses. These measures lasted from the end of March 2020 until mid-May 2020 [41,42]; and [43]. Along with these measures, the responsibility of introducing further pandemic-related policies, re-opening non-essential businesses, and regulating regional mobility was shifted from the federal to the regional authorities [44,42]. This resulted in the substantial regional variation in the support policies for businesses and households introduced to cope with the pandemic consequences (for an overview of

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[1] For instance, see Hartwell et al. [44] on the role of the pandemic on governance and air pollution in Russia.

COVID economic policies in Russia, see Ref. [45].

Beyond challenges to public health, the pandemic also had many socioeconomic consequences in Russia and beyond. Recent survey evidence suggests that every tenth Russian reported having lost their job after the first wave, amounting to about 10 million job losses [28,46]. While the official data suggest a more modest increase in the number of unemployed (about 1.7 million newly unemployed during the first wave), this number still implies at least a 30% increase in the number of unemployed during the pandemic's first months (i.e., April–June 2020, as compared to January–March 2020).[2]

The self-employed and solo entrepreneurs faced especially high risks of losing their income due to the safety precautions, stay-at-home orders, and the closure of non-essential services during the pandemic [47, 48]. Nevertheless, the number of self-employed in Russia has been growing steadily. It has increased ten times in the first half of 2020 compared with 2019, reaching 850,000 individuals by mid-July 2020 and almost 2.5 million individuals by June 2021 [49–51]. There are many reasons for such a rapid increase in the number of self-employed during the pandemic. These include the rise in unemployment and the need to earn a living, changes in preferences from salaried employment to independent self-employment, the pandemic support for the self-employed, and a lower income tax for the self-employed [51]. The program of preferential taxation for the self-employed was first introduced in 2019, but only in four Russian regions. At the beginning of 2020, it was extended to 19 regions and from July 2020 to all regions. The program covers solo entrepreneurs and self-employed individuals with no employees who earn less than 2.4 million rubles per year (ca. 33, 000 USD) and includes a simplified registration as a self-employed and a taxpayer, a low flat income tax rate,[3] low-interest loans, the possibility to pay voluntary social security contributions, and a tax subsidy amounting to the income tax paid in 2019 [49,50,52,53].

In the report to the Russian President in May 2020, the business ombudsman stated that the first COVID-19 wave affected 67% of the Russian businesses of any size, while small and medium-size businesses were affected most severely [54]. According to the report, more than 50% of businesses evaluated their current state as a "crisis" or "catastrophe," and more than 60% estimated their survival chances at less than 50%. Furthermore, during the first wave, the key difficulties for businesses were the inability to pay wages, rent, and property taxes. In the surveys of entrepreneurs conducted after the first wave, the respondents stated that the most affected activities were restaurants, tourism, retail trade, services, transport, and manufacturing, while businesses in the IT, telecommunications, and health services sectors were among the least affected [55,56].

Several support policies were introduced at the federal and regional levels to help businesses and families cope with the first wave of the pandemic. These measures included tax furlough schemes, rental payments postponement, credit support, wage subsidies, low-interest loans, employment support, and other measures [45,57]. However, only 10% of Russian businesses have used this support [54]. Such a low utilization rate is partly explained by the fact that about 60% of the economic sectors had not been included in the government's initial list of "severely affected industries" eligible for support [54].[4] Indeed, despite the diversity of support measures, a survey of small and medium-size business

owners conducted in the immediate aftermath of the first wave of the pandemic suggests that more than 80% of respondents did not expect to receive any government support and planned to survive on their own [55]. Nevertheless, as we discuss below, an extreme situation such as the pandemic may also bring a chance for modernization and a change in the preferences of current and future entrepreneurs.

3. Conceptual framework and hypotheses development

3.1. Adversity and entrepreneurship

This paper builds on the scholarship on adversity and entrepreneurship, which has assessed the consequences of disasters, shock events, and chronic hardship.[5] Following Shepherd and Williams [9]; we define adversity as "low-probability, high-impact negative shocks or jolts to a focal individual's or organization's environment that is potentially highly disruptive to well-being" (p. 2). Adversity could be *short-lived* or *persistent*. Specifically, after a disaster or a one-time negative event, different actors such as governments, nonprofits, and ad-hoc groups, undertake measures to alleviate immediate needs and offer relief [58]. In addition, new ventures often emerge to fulfill different needs that the above-mentioned actors cannot cover. The main motivation of such ventures is to offer solutions to existing challenges and alleviate suffering [58].

Several empirical papers have studied the link between negative shocks and entrepreneurship, showing heterogeneous results that depend on the shock and the context. For example, Bullough et al. [1] show that perceived danger during the war in Afghanistan lowers entrepreneurial intentions. Yet resilience slightly diminishes the negative relationship between perceptions of danger and start-up desires. In addition, Davidsson and Gordon [6] demonstrate that the global financial crisis did not meaningfully impact start-up activities in Australia. In another context, Branzei and Abdelnour [2] find that terrorism outbreaks, and in some cases, escalations, are negatively associated with business venture resilience. Yet, when the authors control for the actual level of terrorism taking place, terrorism escalations are unassociated with resilience. As another example, in the aftermath of the 2010 Haitian earthquake, new ventures were formed to fill the gaps between formal relief teams and the needs of the communities [58].

In addition to one-time shocks, the literature has examined entrepreneurship in conditions of persistent adversity such as chronic poverty, corruption, and violence. In such circumstances, business owners may creatively use existing resources, overcome adversity, and actively look for opportunities [59,60].

We build on Shepherd and Williams' [9] theoretical framework, which distinguishes between adverse events (e.g., earthquakes or terrorist acts) and persistent adversity (e.g., poverty). From the viewpoint of the first wave, the COVID-19 pandemic combined the features of both a shock and a persistent state. The pandemic hit countries quickly and unexpectedly. Moreover, from the point of view of summer 2020, the end of the pandemic was unclear, which made it seem like a persistent event with possible future outbreaks [61]. Even though the Russian Ministry of Health registered the first COVID-19 vaccine called "Sputnik V" in August 2020, its effectiveness in preventing future outbreaks was unknown. The pandemic may be a unique event combining the short-term shock and long-term persistent features. Therefore, understanding how it influenced entrepreneurial decision-making is of great importance.

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[2] For more details, see the unemployment statistics from the Russian Statistical Office, available at: https://rosstat.gov.ru/labour_force (accessed October 4, 2021).

[3] Instead of the usual 13% personal income tax rate, the tax rate for the self-employed working with individuals is 4% and when working with firms is 6%.

[4] The industries that were considered to be "severely affected" included retail trade, transport, tourism, education, cultural and sport activities, services, and some types of manufacturing. However, in most industries that were not included in the list of those eligible for state financial support, the total revenue also fell by 30% or more during the first pandemic wave [54].

[5] For a bibliographic analysis of the studies related to crises and entrepreneurship, see Xu, Wang, Wang, & Skare [97]. On economic crises and firm dynamics in developed countries, see Ayres and Raveendranathan [4]; Mehrotra and Sergeyev [98]; and Woo [99]. We thank an anonymous referee for pointing out these references.

First, according to Shepherd and Williams [9]; if adversity is a one-time shock, actors respond to it either by falling into chronic dysfunction or by engaging in entrepreneurial action [9]. Negative shocks may lead to unmanageable stress or destructive coping mechanisms. Some individuals or businesses may enter a "survival mode" [58], whereby they can barely function and must rely on outside help. Some business owners may find themselves unable to keep their businesses in such traumatic situations and decide to terminate them. In the context of Russia, given that the Russian government failed to provide sufficient help for ailing businesses, some business owners may have found themselves in a state of despair and lacking the capabilities and means to conduct day-to-day operations.

In addition to the chronic dysfunction leading to disengaged and failing business owners [9], we propose that for some entrepreneurs, the crisis may have been an eye-opening experience exposing the deficiencies of their businesses. Faced with adversity, some business owners may have decided that the COVID-19 crisis was an opportunity to separate from a dysfunctional venture. In that sense, given that closing down a business is a psychologically scarring experience [62, 63], the pandemic may have made it more acceptable for failing business owners to terminate their enterprises. These business owners may have been delaying closing the business despite incurring financial losses using anticipatory grief as a mechanism [64]. In other words, prolonged grief before the closing is a coping mechanism that helps "soften the blow" of a business closure. It may be possible, therefore, that some entrepreneurs who were considering but delaying closures saw the pandemic as a chance to do so as the stigma associated with business closure would be less if happening to many businesses simultaneously.

Business *closure* is not necessarily business *failure*: business closure reasons often include finding a new job, financial worry, retirement, or intentions to start a new venture. Furthermore, at the macro-level, business closures may help create market niches for new and creative ventures. At the individual level, they may provide personal growth and further development [65,66]. In that sense, a business closure is not necessarily a negative process but rather a dynamic part of the economy associated with Schumpeterian forces [66].

At the same time, in the context of a pandemic, business closures are likely due to the decline in business activities and financial distress because of lockdowns, coupled with a lack of government support [67]. Amid such adversity, business owners may not be able to concentrate on learning or resilience. Several anecdotal reports suggest that entrepreneurs and the self-employed in Russia had divergent experiences during the COVID-19 pandemic [47,48,55,68]. For some, the pandemic increased their financial worries, creating the need to look for alternative sources of income and inducing switches to salaried jobs permanently or temporarily [47,48,55]. Others considered the pandemic a modernization opportunity and adopted new technologies or digitized their operations [47,68].

3.2. Adversity, learning, financial worries, and business closures

Research suggests that business failure can be associated with future-oriented behaviors and learning [69]. At the same time, grief and dysfunction may hinder such processes [64,70] because disengaged business owners are unlikely to invest in the future [71]. As such, business owners considering terminating their ventures may be unwilling to acquire new skills right before the closure, even though the process of owning and terminating a business may have been a learning experience. As such, disengaged business owners are unlikely to adjust and acquire new tools to adapt themselves and their businesses to the post-pandemic world. This may be for two reasons: either because the pandemic was so debilitating for them that they had no scope for investing time or resources in learning, or because they were already in the process of anticipatory grief and were delaying the imminent business closure. While we cannot disentangle these two mechanisms

empirically, we can test whether business exit intentions are associated with fewer investments in learning and skills acquisition. In light of this, our first hypothesis is:

H1a. Learning new skills during the pandemic is negatively associated with intentions for business closure.

Large-scale shocks such as COVID-19 impose financial worries on entrepreneurs [72]. For example, analyses with UK data reveal that financial worries during the pandemic increased mental distress and reduced the well-being benefits of self-employment [73]. Evidence from older individuals in 20 European countries and Israel shows that self-employed workers who experience financial distress suffer more pronounced reductions in life satisfaction than salaried workers [74].

Because government support for businesses in Russia was scant, financial worries likely played a key role in business closure considerations. When faced with imminent closure, many business owners must balance the financial and emotional costs of failure [64] and procrastinate with closing down the venture even though it is financially costly [64]. Nevertheless, the pandemic likely made the financial aspects of running a business more salient and intensified the urgency of a business closure. As such, the pandemic may have intensified the financial worries of business owners and pushed them to consider terminating their business. Therefore, we conjecture that:

H1b. Financial worries are positively associated with business closure intentions.

3.3. Adversity, learning, financial worries, and start-up intentions

Disengagement and dysfunction are not the only possible equilibria for entrepreneurship following negative shocks. For some groups, adversity and negativity allow finding a new identity and growing and building up from rock bottom [75]. According to the framework in Shepherd and Williams [9], when facing a one-time adverse event, resilient actors may start new ventures to restore the community's well-being or facilitate their own recovery. Furthermore, in the context of persistent or long-lasting adversity, resilient individuals ignore the setbacks and actively explore potential opportunities or think differently about the potential gains of new ventures [9].

We argue that in the context of unexpected and unique negative experiences such as the COVID-19 pandemic, resilient individuals may actively look for learning and growing possibilities to cultivate the skills and knowledge that would allow them to engage in entrepreneurial ventures during and after the shock. Entrepreneurs are, in general, good at various skills and invest in a broad range of learning experiences [76, 77]. This is in part necessary because entrepreneurs perform many tasks in their business, from accounting and planning to customer relations, human resource management, and others. Moreover, resilient individuals actively search for meaning and purpose during tough times; they embrace adversity and improvise [78]. In this sense, the pandemic may have taught entrepreneurial individuals resilience skills and provided them with the capabilities to face conditions of uncertainty and stress.

Alternatively, entrepreneurial individuals may have used the pandemic as an opportunity to actively acquire digital or other skills and invest in formal training that would better prepare them for the future of work. The first wave of COVID-19 may have proven to be a profound learning experience, whereby the stay-at-home orders may have given people a push to acquire new skills or the courage to pursue a new venture. For example, survey evidence from 19 countries suggests that 2 in 5 workers reported that their digital skills improved during the pandemic [79]. About half of respondents reported that they are building entrepreneurial skills to start their own venture since many believe that automation may threaten traditional employment in the future. Moreover, according to a survey conducted in May 2020 in Russia, during the first wave of the pandemic, 52% of entrepreneurs and

45% of salaried employees devoted their time to personal development and learning new skills [80]. The skills acquired by entrepreneurs and salaried workers are greatly valuable for starting or developing their own business and include management, marketing, advertising, sales, and accounting [80]. Given this evidence, we hypothesize that:

H2a. Learning new skills during the pandemic positively correlates with start-up intentions.

We also explore financial constraints and worry brought on by the pandemic and their role in start-up intentions. On the one hand, financial worries may inspire resilient individuals to seek opportunities and persist through adversity by envisioning a new business venture [9]. Such individuals may see financial troubles as a temporary problem that can be circumvented through entrepreneurship. On the other hand, monetary concerns impair mental health, well-being, and cognitive functioning [81,82]. This may leave individuals in distress and make them disengaged and powerless. They may focus on daily survival rather than starting businesses [9]. Therefore, it is *a priori* unclear whether financial worries impede or inspire future entrepreneurship. As such, we hypothesize that:

H2b. Financial worries are associated with business start-up intentions.

3.4. COVID-19 and IT businesses: opportunities, financial worries, and learning

Finally, resilient entrepreneurs are used to overcoming constraints and pursuing entrepreneurial opportunities in times of persistent adversity [9]. They may look for solutions to problems or view the situation as an opportunity to alleviate the adversity. In the context of COVID-19, the social distancing measures and lockdowns caused an overnight change in the way of living and working. This demanded reliance on information technology and digital forms of communication. Education, high-skilled work, and many services shifted online. Worldwide, the IT sector provided the tools and capabilities underpinning various remote activities [23] and offered new business opportunities for those with the relevant skills [19].

With about 83 internet users per 100 people in Russia in 2019 [83], over a third of all jobs can be done from home [84]. In a survey conducted during the first wave of the pandemic, one in three (32%) Russian respondents evaluated their digital competencies as high, and another 30% evaluated their digital skills as above the mean [85]. In addition, 12% of entrepreneurs and 16% of salaried employees learned new IT skills during the first wave of the pandemic [80]. Therefore, COVID-19 allowed some individuals to engage in innovative ventures that provide solutions to the digital challenges posed by the pandemic. The pandemic required fast and reliable technological solutions and products such as mobile COVID-19 tracing apps, chatbots, IT services, and communications software [22]. Those with existing IT skills and experiences and those who equipped themselves with new capabilities during the pandemic were likely better positioned to envision a new IT start-up. Therefore, we posit that:

H3a. Prior experiences in the IT sector and learning new skills during the pandemic are positively associated with IT business start-up intentions.

Furthermore, according to recent surveys of entrepreneurs in Russia, IT businesses suffered the least from the pandemic [55]. This suggests that financial worries are unlikely to play a role in the intention to start a business in the IT sector. Specifically, our last hypothesis is:

H3b. Financial worries are not associated with IT business start-up intentions.

As explained in the next section, we test hypotheses H3a and H3b by defining our dependent variable of IT start-up aspirations in two

different ways, which effectively means that we compare the determinants of start-up intentions in the IT sector with the determinants of start-up intentions in starting a business in sectors other than IT. Moreover, we also study the determinants of start-up intentions in the IT sector with those in the non-IT sector relative to not starting a business at all.

4. Methodology

To test hypotheses H1a and H1b, we estimate the following model :

$$CloseBusiness_i = \gamma_0 + \gamma_1 NewSkills_i + \gamma_2 FinW_i + \boldsymbol{Sector}_i^{'}\boldsymbol{\Phi} + X_i^{'}\boldsymbol{\delta} + \varepsilon_i \quad (1)$$

where the subscript i stands for an individual. $CloseBusiness_i$ represents the individual intention to close an existing business. $NewSkills_i$ is a dummy variable that equals 1 if an individual has acquired new skills during the first wave of the pandemic and zero otherwise. $FinW_i$ is a measure of financial distress: a dummy variable that equals 1 if an individual thinks about having their own means for living more frequently because of the pandemic and zero otherwise. $Sector_i$ is a set of economic sectors in which the individual is currently employed or self-employed, including agriculture, mining, construction, healthcare, education, IT, manufacturing, transport and infrastructure, wholesale and retail trade, finance, services, or "other" sectors with the latter category corresponding to any remaining activities that are difficult to include to the earlier categories. The categories of this variable are not mutually exclusive since individuals could work in several sectors. For instance, a law professor could lecture at a university and at the same time work at a private or state law company. X_i is a vector of individual socioeconomic characteristics such as gender, age, education, marital status, employment status, health status, income level, formal employment and remote work preferences, and the regional fixed effects. Finally, γ, $\boldsymbol{\Phi}$, and $\boldsymbol{\delta}$ are the vectors of parameters to be estimated; ε_i is the stochastic disturbance term.

We then analyze the factors that affect starting a new business (hypotheses H2a and H2b). The model is as follows:

$$StartBusiness_i = \beta_0 + \beta_1 NewSkills_i + \beta_2 FinW_i + \boldsymbol{Sector}_i^{'}\boldsymbol{\theta} + X_i^{'}\boldsymbol{\Psi} + e_i \quad (2)$$

where $StartBusiness_i$ equals 1 if an individual i has an intention to start a new business and zero otherwise. The rest of the control variables are the same as in Equation (1). Furthermore, $\boldsymbol{\theta}$, and $\boldsymbol{\Psi}$ are the set of the model parameters and e_i is a stochastic disturbance term.

Given the binary nature of our dependent variables $CloseBusiness_i$ and $StartBusiness_i$, we estimate Equations (1) and (2) using a probit estimator, which is a maximum likelihood estimator. Specifically, we estimate the probabilities of having intentions to close or start a business using a cumulative standard normal distribution function based on a linear combination of predictors.[6] Such an estimator has several advantages compared to a linear probability model, i.e., the estimation of Equations (1) and (2) using the ordinary least squares (OLS) [86,87]. First, the predicted probabilities from probit regression lie within the 0–1 range. Second, compared to a linear probability model, a probit estimator does not create a heteroskedasticity problem. Given these advantages, we choose the probit model for our estimations. To simplify the interpretation of results, we compute the marginal effects.

To test hypotheses H3a and H3b, we analyze the intentions to start a business in the IT sector. We do that using two different methods: a probit model and a multinominal logit model. First, we estimate a model for having an intention to start a business in IT compared to starting a business in any other sector. In other words, we study the determinants of start-up intentions in the IT sector relative to those who want to start a

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[6] Alternatively, a logit model based on a logistic function can be applied. Both logit and probit models produce similar results [86]. The results from logit regression are available upon request.

business in other sectors. The model is as follows:

$$Start\ Business\ in\ IT_i = \delta_0 + \delta_1 NewSkills_i + \delta_2 FinW_i + \textbf{Sector}_i^{'}\Omega + \textbf{X}_i^{'}\omega + \varrho_i \tag{3}$$

where *Start Business in IT_i* equals 1 if an individual intends to start a business in the IT sector and zero if an individual intends to start a business in any other sector. We estimate Equation (3) by a probit estimator and compute the marginal effects.

Furthermore, we also test hypotheses H3a and H3b using a multi-nomial logit estimator. For this, we estimate a model for intentions to start a business with three mutually exclusive possible choices/alternatives: (i) intention to start a business in IT, (ii) intention to start a business in any other sector, and (iii) having no intentions to start a business. In other words, this dependent variable has three unordered categories. For this case, Cameron and Trivedi [87] recommend using the multinominal logit regression to estimate the probability of starting a business in IT and the probability of starting a business in any other sector. Compared to OLS, the multinomial logit estimator estimates the effects of explanatory variables on the probability of each alternative. The probabilities are computed as follows:

$$Pr[StartBusiness_i = j] = \frac{\exp(\alpha_{0j} + \alpha_{1j}NewSkills_i + \alpha_{2j}FinW_i + \textbf{Sector}_i^{'}\varphi_j + \textbf{X}_i^{'}\nu_j)}{1 + \sum_j \exp(\alpha_{0j} + \alpha_{1j}NewSkills_i + \alpha_{2j}FinW_i + \textbf{Sector}_i^{'}\varphi_j + \textbf{X}_i^{'}\nu_j)} \tag{4}$$

In Equation (4), an individual *i* can select only one among *j* alternatives, where *j = 1* if an individual has an intention to start a business in IT, *j = 2* if an individual has an intention to start a business in any other sector, and *j = 3* if an individual has no intention to start a business. This last category (no intention to start a business) is used as the baseline, and the results related to *j = 1* and *j = 2* are interpreted relative to this category. The probability of choosing the category *j = 3* is specified in Equation (5):

$$Pr[StartBusiness_i = 3] =$$
$$= \frac{1}{1 + \sum_j \exp(\alpha_{0j} + \alpha_{1j}NewSkills_i + \alpha_{2j}FinW_i + \textbf{Sector}_i^{'}\varphi_j + \textbf{X}_i^{'}\nu_j)} \tag{5}$$

The control variables in Equations (4) and (5) are the same as in Equations (1)–(3) above, and exp (·) is an exponential function.

We use robust standard errors in all models and cluster them at the regional level. Such clustering allows for correlation among individuals in the same region [86].

5. Data and variables

5.1. Survey details

Our analysis is based on original individual-level survey data of *individual* experiences, preferences, and self-employment intentions during the first wave of the pandemic in Russia and collected between June and September 2020. We designed the survey questionnaire in the Russian language and conducted it online using the platform *testograf.ru*. This platform conforms with the current legislation of the Russian Federation and offers an SSL-certificate, protection from DDoS-attacks, and daily backups.

The survey was distributed online by a professional team from the Far Eastern Federal University via international and Russian-based social networks, including Facebook, Vkontakte, Youtube, Instagram, Odnoklassniki, and online city forums. Before starting the survey, every respondent was asked whether they were at least 18 years old. The

survey continued only in the case of a positive response. This restriction resulted in a drop-out rate of less than 1%. About 400 individuals (about 7.5% of respondents) did not finish the survey. The respondents could complete the survey on a computer, smartphone, or tablet. As mentioned above, there are about 83 internet users per 100 people in Russia in 2019 [83], suggesting that answering the survey was possible for most socioeconomic groups.

The survey consists of 80 questions organized in four major topic blocks: (1) individual socioeconomic characteristics such as age, gender, employment status, marital status, and education; (2) individual attitudes and self-assessed well-being and health; (3) self-employment and entrepreneurship intentions and experiences; and (4) food consumption. All questions were asked in the Russian language. The sample of respondents who answered all survey questions contains about 4,900 individuals. To ensure anonymity, the survey did not ask for any private information (e.g., name, address, or the exact geolocation) that could help identify a respondent. The respondents were also informed that their answers would remain anonymous. The average time to complete the survey was about 25 min.

5.2. Variables

The key dependent variables capture respondents' intentions to start a new venture or close their current business. The intention to close a business is based on the survey question, "If you have had a business or a start-up in the last 30 days, do you plan to close it?" with possible answers: "I had no business," "yes," "maybe," "most likely no, "no," and "I had to close it already due to the pandemic." Relying on answers from respondents who had a business in the last 30 days, we construct a dummy variable *CloseBusiness* that equals 1 if a respondent answered "yes," "maybe," or "I had to close it already due to the pandemic" to the question above, and 0 if a respondent answered "no" or "most likely no" to this question. Individuals who did not own a business are excluded from the analysis based on Equation (1).

The variable capturing business start-up intentions is based on the survey question "Do you plan to create a business or a start-up in the next 12 months?" with possible answers: "yes," "maybe," "most likely no," and "no." Using the answers to this survey question, we construct the dummy variable *StartBusiness,* which equals 1 if a respondent answered "yes" or "maybe," and 0 if a respondent answered "no" or "most likely no."

The main independent variables, both of which are binary—*NewSkills* and *FinW*—are based on the survey questions "Did you acquire new skills for your work or studies during the stay-home-orders period?" and "Because of the pandemic, I think of my living expenses more frequently," respectively. Each of these variables equals 1 if a respondent answered "yes" and 0 if a respondent answered "no." In addition to "yes" and "no," the categories of *FinW* also include an additional category "difficult to say."

Table 1 details the descriptive statistics and the definitions of all variables used in the analysis. Table 1 also presents several socioeconomic characteristics of the Russian population based on the latest census data of 2010, the latest census data available at the time of writing. The data we collected are skewed towards females and educated people. Using the *ebalance* command in Stata, we rebalance our data such that the share of females and educated people equals the Russian population means [88]. The corresponding means of these variables after rebalancing are presented in parentheses (see column "Means" in Table 1). Finally, we apply the computed entropy balancing weights in

Table 1
Descriptive statistics.

Variable	Survey question	No. obs.	Mean	St. Dev.	Min	Max	Census mean
Intention to close business	If you have had a business or a start-up in the last 30 days, do you plan to close it? (1 = yes, 0 = no)	681	0.273	0.446	0	1	
Intention to start a business	Do you plan to start a business or a start-up in the next 12 months? (1 = yes, 0 = no)	4,812	0.198	0.398	0	1	
New skills	Did you acquire new skills for your work or studies during the stay-at-home orders period? (1 = yes, 0 = no)	4,812	0.528	0.499	0	1	
Financial worry	Because of the pandemic, I think of my living expenses more frequently						
no		4,812	0.321	0.467	0	1	
yes		4,812	0.591	0.492	0	1	
difficult to say		4,812	0.088	0.283	0	1	
Preference for formal employment	Because of the pandemic, I now understand better how important it is to have a formal employment						
no		4,812	0.256	0.437	0	1	
yes		4,812	0.582	0.493	0	1	
difficult to say		4,812	0.161	0.368	0	1	
Preference for remote work	When I have a job, I prefer to work remotely						
no		4,812	0.435	0.496	0	1	
yes		4,812	0.383	0.486	0	1	
difficult to say		4,812	0.182	0.386	0	1	
Higher education	Respondent's education (1 = has a higher education, 0 = otherwise)	4,812	0.792 (0.244)*	0.406	0	1	0.234
Personal monthly income	Respondent's personal income in Russian Rubles						
below 15,000 Rub		4,812	0.144	0.351	0	1	
15,001–60,000 Rub		4,812	0.520	0.500	0	1	
above 60,000 Rub		4,812	0.197	0.398	0	1	
refusal		4,812	0.139	0.346	0	1	
Female	Respondent's gender (1 = female, 0 = male)	4,812	0.672 (0.539)*	0.470	0	1	0.538
Age	Respondent's age in years	4,812	35.703	14.218	18	86	38
Married	Respondent's marital status (1 = married or cohabitating, 0 = otherwise)	4,812	0.515	0.500	0	1	0.633
Self-assessed health	How would you assess your own health? (1 = very bad, 10 = very good)	4,812	6.854	1.767	1	10	
Employment status	Respondent's employment status (1 = employed or self-employed, 0 = otherwise)	4,812	0.729	0.445	0	1	0.632
Moscow/St. Petersburg	Respondent lives in Moscow or St. Petersburg (1 = yes, 0 = no)	4,812	0.153	0.360	0	1	0.115
Time to complete the survey	Log (seconds)	4,812	6.736	0.647	5.01	12.17	
Open questions	No. of open-ended questions answered on the respondent's own experience during the pandemic	4,812	1.088	1.209	0	3	

Note: Open questions include the following: "Could you share anything else about your experience during the pandemic?", "What has improved in your life during the pandemic?", "Do you have any questions or comments for us?" The last column presents the 2010 Russian census means provided by the Federal State Statistics Service. * denotes that the sample was rebalanced on this variable, applying the entropy balancing and using the census mean. The number in parentheses corresponds to the sample mean after entropy balancing. For other variables (age, marital and employment statuses, and the share of those living in Moscow and Saint Petersburg), the means are comparable to those in the 2010 census, suggesting that the sample is representative at a country level.

all our analyses to ensure that our results are nationally-representative.

6. Results

6.1. Empirical results related to intentions to close a business (H1a and H1b)

We first discuss the results pertaining to intentions to close a business and hypotheses 1a and 1b. All results are conditional on the control variables, ensuring that we are comparing similar individuals. In addition, the balancing weights that we use ensure that our results are representative of the Russian population at large. The evidence in Table 2 indicates that entrepreneurs who invested in acquiring new skills during the first wave of the pandemic were 15.6% points (p.p.) less likely to close their existing business than entrepreneurs who did not acquire new skills. This is in line with our hypothesis H1a. We find no association between financial worries during the pandemic and business closure intentions. In other words, we do not find support for our hypothesis H1b. We also find no evidence that preferences for formal employment or remote work affect business closure intentions during the pandemic. These results imply that acquiring new skills is a major

coping strategy helping to adapt to adverse economic conditions and maintain businesses during the COVID-19 pandemic.

Our results suggest that socioeconomic characteristics such as age, gender, income, and education are generally unassociated with business closure intentions during the pandemic. This suggests that the pandemic affects business owners across all socioeconomic groups. One exception concerns entrepreneurs who live in Moscow and Saint Petersburg. This group is 34.1 p. p. less likely to close their existing business than entrepreneurs in other regions of Russia. This might be because these two cities are the biggest business centers, in which there is more demand for business activities, and there are more opportunities to keep the business functioning.

6.2. Empirical results related to intentions to start a business (H2a and H2b)

As discussed above, adverse events may also motivate individuals to start new ventures to restore community well-being, facilitate their own recovery, or explore new opportunities. In Table 2, column 2, we find that acquiring new skills during the pandemic increases the likelihood of starting own business by 9.3 p. p. This provides support for our

Table 2
Intentions to start and close business during the pandemic (marginal effects).

VARIABLES	Intention to close down a business	Intention to start a business
New skills acquired	−0.156***	0.093***
	(0.040)	(0.021)
Financial worry	0.065	0.060***
	(0.062)	(0.018)
Preference for formal employment	0.082	−0.123***
	(0.057)	(0.025)
Preference for remote work	0.037	0.065***
	(0.050)	(0.023)
Female	−0.057	−0.066***
	(0.053)	(0.024)
Age	−0.000	−0.006***
	(0.002)	(0.001)
Married	0.056	0.054**
	(0.052)	(0.024)
Has a higher education	−0.074	−0.040
	(0.060)	(0.031)
Self-assessed health	−0.018	−0.004
	(0.014)	(0.007)
Income (below 15,000 Rub is a default)		
15,001–60,000 Rub	0.052	0.110***
	(0.080)	(0.029)
above 60,000 Rub	−0.002	0.228***
	(0.097)	(0.035)
Employed	0.009	−0.009
	(0.050)	(0.032)
Currently works in IT	−0.024	0.057
	(0.092)	(0.040)
Lives in Moscow or St. Petersburg	−0.341***	0.148***
	(0.093)	(0.014)
Region FE	yes	yes
Current/past occupation sector FE	yes	yes
Nr. of regions	52	74
Pseudo-R^2	0.235	0.150
Observations	681	4,812

Notes: ***p < 0.01, **p < 0.05, *p < 0.1. Marginal effects are reported. Robust standard errors clustered at the regional level are in parentheses. The weights from entropy balancing are used. Controls for "difficult to say" answers to financial worry, preference for formal employment, and remote work questions, and the control for refusal to answer the question on income are included.

Table 3
Intentions to start an IT business (marginal effects).

VARIABLES	Intention to start an IT business	Intention to start an IT business, without Moscow and St. Petersburg
New skills acquired	0.028	0.045**
	(0.021)	(0.021)
Financial worry	0.048*	0.035
	(0.025)	(0.032)
Preference for formal employment	−0.006	0.015
	(0.032)	(0.034)
Preference for remote work	0.074***	0.090***
	(0.023)	(0.023)
Female	0.330***	0.369***
	(0.028)	(0.026)
Age	0.330***	0.369***
	(0.028)	(0.026)
Married	0.330***	0.369***
	(0.028)	(0.026)
Has a higher education	0.330***	0.369***
	(0.028)	(0.026)
Self-assessed health	0.330***	0.369***
	(0.028)	(0.026)
Income (below 15,000 Rub is a default)		
15,001–60,000 Rub	0.047	0.004
	(0.030)	(0.036)
above 60,000 Rub	0.109**	0.018
	0.047	0.004
Employed	0.022	0.006
	(0.016)	(0.021)
Currently works in IT	−0.042	−0.043
	(0.032)	(0.032)
Lives in Moscow or St. Petersburg	−0.002	
	(0.022)	
Region FE	yes	yes
Current/past occupation sector FE	yes	yes
Nr. of regions	36	34
Pseudo-R^2	0.651	0.688
Observations	810	648

Notes: ***p < 0.01, **p < 0.05, *p < 0.1. Marginal effects are reported. Intention to start a business in all other sectors is used as a default. Robust standard errors clustered at the regional level are in parentheses. The weights from entropy balancing are used. Controls for "difficult to say" answers to financial worry, preference for formal employment, remote work questions, and the control for refusal to answer the question on income are included.

hypothesis H2a that learning new skills during the pandemic is positively associated with start-up intentions. Interestingly, in line with hypothesis H2b and supporting the predictions of Shepherd and Williams [9]; we also find that financial worries during the pandemic inspire potential entrepreneurs to seek new opportunities and increase the likelihood of starting their own business by 6 p. p. This also implies that potential entrepreneurs who learn new skills also see the pandemic and the accompanying financial worries as a challenge they need to overcome or as a motivation to start a business, likely because they want to have their future and earnings in their own hands.

Table 2 also furnishes key insights about the likely profile of the cohort of entrepreneurs who will likely replace the business owners whose businesses were destroyed by the pandemic. Specifically, they are more likely to be young married men with a high income living in Moscow or Saint Petersburg, and lower preferences for formal employment and greater preferences for remote work. The results in Table 2 also remain robust if we exclude from the regressions the individual socio-demographic characteristics (see Table A1 in the appendix).

6.3. Empirical evidence related to starting an IT business (H3a and H3b)

The pandemic created the potential for a new cohort of entrepreneurs and opportunities for the modernization and digitization of some products and services. It offered new opportunities for future business development, especially in the IT sector. We explore whether entrepreneurs who intend to start a business in the IT sector differ from other nascent entrepreneurs. To that end, we first estimate the probability of starting an IT business compared to intentions to start a business in other sectors using a probit regression. We later show additional results related to testing H3a and H3b using multinomial regressions. In those regressions, we compare starting a business in the IT sector with starting a business in any other sector against the default option of not starting a business. We present results with and without Moscow and Saint Petersburg observations (see columns 1 and 2 in Table 3, respectively).[7]

As shown in both columns of Table 3, based on the probit model, previous experience in the IT sector does not affect the likelihood of starting a business in the IT sector. However, new skills acquisition increases the likelihood of starting an IT business in regions outside Moscow and Saint Petersburg by 4.5 p. p. Therefore, we find partial support for our hypothesis H3a. Specifically, new skills acquisition and IT start-up intentions are positively associated in regions outside the capital cities, implying that the pandemic could have induced digitization and opened new business opportunities in the periphery.

Also, in line with our hypothesis H3b, financial worries are not

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[7] Moscow and Saint Petersburg are the largest cities that themselves constitute a region. Given that these cities are the biggest business centers in Russia, potential entrepreneurs from those cities may have a different profile and preferences and drive our results. To show that this is not the case we provide the results without Moscow and Saint Petersburg.

Table 4
Intention to start an IT business and other sectors (marginal effects).

VARIABLES	Intention to start an IT business	Intention to start a business in any other sector except IT	Intention to start an IT business, without Moscow and St. Petersburg	Intention to start a business in any other sector except IT, without Moscow and St. Petersburg
New skills acquired	0.008	0.086***	0.010	0.073***
	(0.013)	(0.019)	(0.014)	(0.021)
Financial worry	0.021**	0.039**	0.020**	0.044**
	(0.008)	(0.019)	(0.010)	(0.020)
Preference for formal employment	0.015	0.070	0.018	0.080*
	(0.016)	(0.048)	(0.017)	(0.045)
Preference for remote work	0.027**	0.040*	0.030**	0.029
	(0.011)	(0.023)	(0.012)	(0.025)
Female	−0.037***	−0.029*	−0.041***	−0.033*
	(0.011)	(0.017)	(0.012)	(0.019)
Age	−0.001*	−0.005***	−0.001**	−0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Married	0.001	0.062**	0.000	0.072**
	(0.010)	(0.026)	(0.012)	(0.028)
Has a higher education	0.003	−0.048*	0.002	−0.030
	(0.010)	(0.027)	(0.013)	(0.027)
Self-assessed health	0.001	−0.005	0.001	−0.009
	(0.002)	(0.007)	(0.003)	(0.006)
Income (below 15,000 Rub is a default)				
15,001–60,000 Rub	0.020**	0.089***	0.018*	0.100***
	(0.010)	(0.027)	(0.010)	(0.030)
above 60,000 Rub	0.054***	0.184***	0.049***	0.218***
	(0.014)	(0.041)	(0.015)	(0.038)
Employed	−0.018	0.010	−0.015	0.014
	(0.012)	(0.031)	(0.012)	(0.036)
Currently works in IT	0.074***	−0.053*	0.083***	−0.054*
	(0.019)	(0.028)	(0.019)	(0.030)
Lives in Moscow or St. Petersburg	0.017**	0.162***		
	(0.008)	(0.015)		
Region FE	yes	yes	yes	yes
Current/past occupation sector FE	yes	yes	yes	yes
Nr. of regions	74	74	72	72
Pseudo-R²	0.228		0.238	
Observations	4,812	4,812	4,077	4,077

Notes: ***p < 0.01, **p < 0.05, *p < 0.1. A multinomial logit regression is used to jointly estimate columns 1 and 2 and jointly estimate columns 3 and 4. Marginal effects are reported. No intention to start a business is used as a default. Robust standard errors clustered at the regional level are in parentheses. The weights from entropy balancing are used. Controls for "difficult to say" answers to financial worry, preference for formal employment, remote work questions, and the control for refusal to answer the question on income are included.

associated with the intention to start a business in the IT sector outside Moscow and Saint Petersburg. Financial worries only marginally affect start-up intentions when we include Moscow and Saint Peterburg in the analysis sample. Finally, preferences for formal employment have no statistically significant association with the intention to start a business in the IT sector. Interestingly, preferences for remote work are an important pull factor for those who would like to start a business in the IT sector.

Next, we test H3a and H3b using a multinomial logit. We divide our respondents into three groups: i) those who have an intention to start a business in IT, ii) those who have an intention to start a business in any other sector (other than IT), and iii) those who have no intention to start a business. The latter category is the omitted category, i.e., serves as a baseline for the previous two groups. Columns 1 and 2 of Table 4 show results related to the intention to start an IT business and in any other sector except IT, respectively. Columns 3 and 4 show the results related to the intention to start an IT business and in any other sector except IT

without Moscow and Saint Petersburg observations.

First, inspecting the coefficient estimates on the control variables, we find that young men and those with higher incomes living in Moscow or Saint Petersburg are more likely to start a business in both the IT and non-IT sectors. Furthermore, individuals with prior experience in IT are more likely to start an IT business than those without experience in IT. This finding supports our hypothesis H3a. Relatedly, respondents who currently work in the IT sector are less likely to start a business in the non-IT sectors.

Second, we document that acquiring new skills during the pandemic motivates business start-ups in non-IT sectors (by 8.6 p. p.). At the same time, individuals with financial worries are more likely to be interested in business start-ups in both IT and non-IT sectors than those without financial worries (by 2.1 p. p. and 3.9 p. p, respectively). This evidence is against our hypothesis H3b that financial worries are unimportant for starting an IT business.

Finally, the findings suggest that preferences for formal employment only marginally increase an intention to start a non-IT business outside Moscow and Saint Petersburg and are not associated with intentions to start an IT business. We also find that preferences for remote work are essential for potential entrepreneurs in both IT and non-IT sectors. The magnitude (i.e., average marginal effect) of the coefficient estimate for remote work is 1.5 times greater for potential entrepreneurs in non-IT sectors than in the IT sector. This might be explained by the work-at-home realities brought by the pandemic. Given their prior experience in the IT sector, those who would like to start an IT business may have had remote work experience before the pandemic. In contrast, those who wanted to start a business in non-IT sectors were likely to obtain only a taste of remote work during the pandemic.

6.4. Addressing endogeneity

This section addresses several methodological concerns and provides robustness checks that increase confidence in our results and main conclusions. First, there may be a potential endogeneity problem in the relationship between the intention to close down or start a business, new skills, and financial worries. Such endogeneity may be due to several reasons. For instance, individuals may plan to start a business first and, as a result, invest in new skills. Moreover, start-up intentions may also bring financial worries since new business ventures are associated with high risk and uncertainty. In addition, unobserved heterogeneity may be an issue. For example, individuals may sort into particular positions (self-employment or regular employment) or have preferences for business start-up or closure based on their unobserved traits, such as motivation, risk tolerance, and entrepreneurial aptitude. Such unobserved traits also influence the perception of financial worries and the probability of learning new skills, in addition to being correlated with business considerations.

To address this simultaneity bias issue, we rely on the Lewbel IV estimator [89], which uses higher moments of the data to create regressors uncorrelated with the product of heteroskedastic errors.[8] The instruments are thus simple functions of the model's data based on the heteroskedasticity in the model's standard errors. The Lewbel technique does not require any information outside the model (i.e., external instruments) and can be used with cross-sectional data.

To illustrate the Lewbel approach, we have the following general representation of a simultaneous system of equations:

$$Y_1 = Y_2' \delta_1 + X' \delta_1 + \varepsilon_1 \tag{6a}$$

$$Y_2 = Y_1' \delta_2 + X' \delta_2 + \varepsilon_2 \tag{6b}$$

Table 5
Intentions to close and start a business (marginal effects, Lewbel IV).

VARIABLES	Intention to close down a business	Intention to start a business	Intention to start an IT business	Intention to start an IT business, without Moscow and St. Petersburg
New skills acquired	−0.080***	0.078***	−0.008	−0.008
	(0.030)	(0.013)	(0.017)	(0.021)
Financial worry	0.107***	0.052***	−0.058**	−0.063**
	(0.041)	(0.011)	(0.025)	(0.027)
Preference for formal employment	0.158***	−0.120***	0.024	0.038
	(0.039)	(0.015)	(0.027)	(0.032)
Preference for remote work	−0.043	0.074***	0.030	0.038
	(0.028)	(0.013)	(0.024)	(0.027)
Female	−0.018	−0.061***	−0.095***	−0.109***
	(0.033)	(0.015)	(0.023)	(0.025)
Age	0.001	−0.005***	−0.001	−0.000
	(0.001)	(0.001)	(0.001)	(0.002)
Married	−0.026	0.029***	−0.000	0.010
	(0.038)	(0.009)	(0.021)	(0.027)
Has a higher education	−0.030	0.023	0.007	0.006
	(0.058)	(0.017)	(0.027)	(0.035)
Self-assessed health	−0.011	0.006	0.003	0.007
	(0.010)	(0.004)	(0.005)	(0.006)
Income (below 15,000 Rub is a default)				
15,001–60,000 Rub	−0.042	0.071***	0.055	0.022
	(0.075)	(0.017)	(0.034)	(0.031)
above 60,000 Rub	−0.071	0.129***	0.099**	0.040
	(0.074)	(0.025)	(0.043)	(0.042)
Employed	−0.009	−0.034**	0.010	−0.004
	(0.039)	(0.016)	(0.018)	(0.021)
Currently works in IT	0.028	0.041	0.446***	0.459***
	(0.049)	(0.027)	(0.040)	(0.042)
Lives in Moscow or St. Petersburg	−0.069	−0.005	−0.041**	
	(0.047)	(0.011)	(0.016)	
Region FE	yes	yes	yes	yes
Current/past occupation sector FE	yes	yes	yes	yes
Nr. of regions	52	74	36	34
Pseudo-R²	0.161	0.134	0.404	0.410
Observations	681	4,812	810	648

Notes: ***p < 0.01, **p < 0.05, *p < 0.1. Marginal effects are reported. Intention to start a business in all other sectors is used as a default in columns 3 and 4. Robust standard errors clustered at the regional level are in parentheses. The weights from entropy balancing are used. Controls for "difficult to say" answers to financial worry, preference for formal employment, and remote work questions, and the control for refusal to answer the question on income are included.

where Y_1 represents the intention to start/exit a business, Y_2 stands for the new skills acquired and financial worries, and **X** is a vector of exogenous controls, as described in Section 4 above. The errors ϱ_1 and ϱ_2 are allowed to be correlated with each other. Each instrument Z_i in the Lewbel approach is based on the residuals from auxiliary equations multiplied by each of the exogenous variables in mean-centered form as follows:

$$Z_i = (X_i - \overline{X}) \cdot \varepsilon \qquad (7)$$

where ε is a residual vector from a regression of each endogenous regressor on all exogenous regressors (including a constant).

Table 5 presents the Lewbel IV estimates.[9] Comparing column 2 of Tables 2 and 5, we conclude that most of the results concerning intentions to start a business are very similar to the baseline findings

regarding both sign and statistical significance. This suggests that endogeneity is not the main driver of our findings and conclusions related to H2a and H2b.

Comparing the results on the intentions to close down a business (column 1 in Tables 2 and 5), we find that new skills acquired during the pandemic reduce the likelihood of business closure intentions, which is in line with our hypothesis H1a. Furthermore, we also find that financial worry during the pandemic strongly influenced the intentions to close down a business. This is consistent with our hypothesis H1b. Specifically, entrepreneurs experiencing financial worries were 10.7 p. p. more likely to close their existing business than those without such worries. Finally, given the scant government support of businesses in Russia, it appears that the pandemic not only increased the financial worries of entrepreneurs but also shifted their preferences in favor of having formal employment. Indeed, entrepreneurs who prefer formal employment were 15.8 p. p. more likely to close their existing business.

Next, we compare the results regarding the intentions to start an IT business related to H3a and H3b (Table 3 and columns 3 and 4 in Table 5). The estimated coefficient on newly acquired skills becomes insignificant in column 4 in Table 5 (compared to column 2 in Table 3), while having previous experience in the IT sector substantially increases the likelihood of starting a new business in this sector, as compared to having no prior experience in IT. This suggests that our main conclusions related to H3a are only somewhat robust.

Another conclusion from Table 5 is that financial worries reduce the likelihood of starting a business in the IT sector in favor of starting a business in other sectors. This result differs from our findings in Table 3, suggesting that endogeneity might be an issue in Equation (3) and the results controlling for endogeneity (Table 5) provide a greater confidence. In other words, controlling for endogeneity, we find that financial concerns are a push factor for potential IT entrepreneurs but a pull factor for potential entrepreneurs in other sectors. This evidence is against our hypothesis H3b and may have several explanations. First, due to the growing demand for IT services, businesses in the IT sector did not suffer much during the pandemic and may even have seen their activities boosted [55]. Therefore, potential entrepreneurs in the IT sector are likely to have few financial worries. As underscored above, potential IT entrepreneurs also have sufficient IT skills and experience. This may give them extra confidence and reduce pecuniary concerns.

We also offer a formal check regarding omitted variables bias based on a method proposed in Oster [91]; which assesses the size of the potential bias from unobservables based on the assumption of proportionality between bias from unobservable and observable factors. The method, which gauges how large unobservables have to be to explain the associations we document, refines an earlier technique by Altonji, Elder, and Taber [92] by also taking into account movements in the R^2. The method essentially compares the changes in the coefficient estimates between models with and without controls. Because the method can only deal with one endogenous variable and we have two, we use a sequential procedure: the first variable to test is *new skills acquired*, and the second is *financial worry*. Assuming a maximum possible R^2 value of 0.39 in Equation (1) and 0.21 in Equation (2) (=1.3*the observed R^2), the key independent variable is either *new skills acquired* or *financial worries*. We find that Oster's ∂s for the *new skills acquired* variable in Equations (1) and (2) are 8.3 and 10.9, suggesting that the selection of unobservables needs to be 8.3 and 10.9 times as important as the included control variables to render the coefficient estimate on the *new skills acquired* variable to be 0, respectively. Concerning the *financial worry* variable in Equations (1) and (2), Oster's ∂s are 13.9 and 4.8. In general, results are robust to omitted variables bias if the $\partial > 1$ [91], which is the case here.

7. Discussion and conclusion

This paper examines the role of pandemic-related factors for entrepreneurial entry and exit intentions in Russia. Extending Shepherd and

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[9] We rely on the Stata user-written command –ivreg2h– to implement Lewbel's IV method [90].

Williams' [9] theoretical framework, we suggest that the COVID-19 pandemic has the features of being both an adverse shock and a persistent state. We argue that studies of entrepreneurial intentions and exit during the pandemic should simultaneously account for both challenges, such as increased financial worries and emerging opportunities, including acquiring new skills and business chances in the IT sector. Building on Shepherd and Williams [9]; we analyze whether actors respond to the pandemic's circumstances by falling into chronic dysfunction or by engaging in entrepreneurial action.

To that end, we analyze novel survey data that we collected in Russia during the first wave of the COVID-19 outbreak. To our knowledge, this is the first study to examine entrepreneurship in Russia during the pandemic. We thus provide a rare glimpse into the challenges and opportunities that Russian entrepreneurs face amidst this global public health disaster.

Our findings underscore that the new skills acquired during the first pandemic wave in Russia reduce the likelihood of business closures. Such new skills also become crucial for starting a new business. While new skills are crucial for maintaining and starting businesses, our empirical evidence also suggests that financial worries caused by the pandemic affect business exit and entry decisions.

We also furnish several important glimpses into the profile of the COVID-time entrepreneurs. Specifically, individuals with preferences for formal employment are less likely to start a new business. This reluctance may be motivated by the fact that running a business during the pandemic is a risky activity with uncertain payoffs. Simultaneously, remote work possibilities increase the likelihood of starting one's own business. We also find that younger and married males with higher income are more likely to report start-up intentions. This finding is in line with Merida and Rocha [77]; who argue that younger entrepreneurs have lower opportunity costs for entering the business activity and are more willing to take risks.

Admittedly, our study has several shortcomings, which we acknowledge. First, we lack data on the pre-pandemic practices of entrepreneurs and non-entrepreneurs in Russia, which does not allow us to make over-time comparisons. Neither do we have data spanning subsequent waves of COVID-19 and how the business environment and decisions of Russian entrepreneurs have changed during this period. Second, while we provide several robustness checks and a Lewbel IV estimation procedure, we lack exogenous variation in our key explanatory variables, which means that some endogeneity issues remain. Finally, our research and data collection only span Russia, which limits our findings' geographical generalizability.

While providing novel insights, our study opens several opportunities for future research. First, we show that acquiring new skills in times of crisis, such as the COVID-19 pandemic, is important for maintaining the operations of existing businesses and forming start-up intentions. This finding has an important implication for policy and practice. Administering programs offering entrepreneurial training or upskilling for the digital economy may be challenging during a pandemic, given that face-to-face meetings may be difficult to organize. Nevertheless, such challenging conditions also create additional business opportunities. It would be interesting to analyze the business practices in online educational programs and the causes and consequences of human capital acquisition by entrepreneurs in more detail.[10] This dimension is especially important for less developed countries, where the opportunities for government support to businesses are scant.

Furthermore, the networks, ecosystems, and collaboration between businesses could be especially important during times of crisis as they may help businesses share resources and knowledge to survive in the turbulent environment [93]. In this regard, individuals in Russia's major cities – St. Petersburg and Moscow – are better positioned to weather the pandemic shock. Understanding why this is the case and the role played by ecosystems is a crucial next step in this line of work.

Second, our findings suggest that the first pandemic wave may have unleashed a creative destruction process in Russia. On the one hand, increased financial worries and preferences for formal employment increase the likelihood of business closure intentions. On the other hand, new skills, financial worries, and preferences for remote work also boost start-up intentions. Thus, the pandemic can create a new generation of entrepreneurs. Therefore, the crucial follow-up policy question based on this analysis is, "to what extent is this trend sustainable in the long run?" Therefore, future work must examine whether newly created businesses survive the ongoing pandemic and the factors underpinning business survival. Finally, the differences in entrepreneurial intentions in countries' central and periphery regions is another important dimension for future analysis. Specifically, exploring spatial inequalities, challenges, and opportunities for entrepreneurs can help gain a better overview of the potential for government programs and support to ensure that entrepreneurs have equal chances everywhere. Given that entrepreneurship is conducive to economic growth, innovation, and productivity [94–96], understanding the factors underpinning business longevity and sustainability is a crucial question for policy and practice.

Authors' contributions:

Vladimir Otrachshenko: Conceptualization, Methodology, Data curation, Formal analysis, Writing-Original draft preparation; Writing – review & editing; **Olga Popova**: Conceptualization, Methodology, Writing-Original draft preparation; Writing - review & editing; **Milena Nikolova**: Conceptualization, Methodology, Writing-Original draft preparation; Writing – review & editing; **Elena Tyurina**: Data Collection; Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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[10] See Focacci and Perez [106] for a historical case study analysis of the UK, US, Germany, and Sweden and the involvement of governments in education and welfare and the link with innovation and entrepreneurship.

Appendix

Table A1

Intentions to start and close a business during the pandemic, results without individual controls (marginal effects)

VARIABLES	Intention to close down a business	Intention to start a business
New skills acquired	−0.164***	0.111***
	(0.048)	(0.021)
Financial worry	0.078	0.058***
	(0.066)	(0.019)
Preference for formal employment	0.068	−0.145***
	(0.061)	(0.028)
Preference for remote work	0.042	0.065**
	(0.048)	(0.027)
Currently works in IT	0.018	0.083**
	(0.077)	(0.040)
Lives in Moscow or St. Petersburg	−0.369***	0.194***
	(0.118)	(0.014)
Individual controls	no	no
Region FE	yes	yes
Current/past occupation sector FE	yes	yes
Nr. of regions	52	74
Observations	681	4,812
Pseudo-R^2	0.203	0.119

Notes: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Probit estimation is used. Marginal effects are reported. Robust standard errors clustered at the regional level are in parentheses. The weights from entropy balancing are used. Controls for "difficult to say" answers to financial worry, preference for formal employment, and remote work questions, and the control for refusal to answer the question on income are included.

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