Stockholm University

Essays on Household Risk-Taking

Qinglin Ouyang

Doctoral Thesis in Finance at Stockholm University, Sweden 2025

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Qinglin Ouyang

Academic dissertation for the Degree of Doctor of Philosophy in Finance at Stockholm University to be publicly defended on Friday 16 May 2025 at 13.00 in Auditorium 3, House 2, Campus Albano, Albanovägen 18.

Abstract

Households are regularly confronted with decisions involving risk, both in their professional lives and in managing their financial assets. Understanding how individuals navigate these risks in the labor as well as the financial markets provides valuable insights into broader economic patterns. The thesis aims to contribute to the literature by identifying previously overlooked factors.

Article I investigates whether unemployment risk motivates employees to become entrepreneurs. By exploiting a quasi-experiment setting in Sweden, this article is among the first to empirically show that unemployment risk could promote entrepreneurship. In addition, the nudged entrepreneurs do not underperform, in terms of both business quality and personal income, when compared with their counterparts. The findings are expected to help policymakers better design employment protection legislation.

Article II examines how one's cultural origins relate to the decision to enter entrepreneurship. Using a sample of second-generation immigrants in Sweden, this article documents that children of immigrants from more risk-loving cultures are more likely to start a business, although of poorer quality. This study also finds that entrepreneurs with parents from cultures with higher risk appetite earn a lower personal income. Furthermore, the analysis demonstrates that culturally transmitted risk appetite has significant effects beyond individual and parental socio-economic characteristics.

Article III evaluates the portfolio diversification gap between immigrant and native-born investors using a comprehensive administrative dataset from Sweden. I document that immigrant investors incur a 37% higher return loss compared to natives, driven predominantly by underdiversification instead of high risky share. This gap persists even among second-generation immigrants. Moreover, immigrants with native-born partners or from countries with higher financial literacy levels experience lower return losses. These findings highlight the need for policies that facilitate social integration and promote financial education to improve immigrants' financial outcomes.

Keywords: *Entrepreneurship, Asset allocation, Unemployment risk, Immigrant, Culture.*

Stockholm 2025
http://urn.kb.se/resolve?urn=urn:nbn:se:su:diva-241311

ISBN 978-91-8107-186-3
ISBN 978-91-8107-187-0

Stockholm Business School

Stockholm University, 106 91 Stockholm

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ISBN print 978-91-8107-186-3
ISBN PDF 978-91-8107-187-0

Printed in Sweden by Universitetsservice US-AB, Stockholm 2025

To curiosity

Acknowledgments

This has been surreal; I get to see myself finishing such a long journey—one that has been deeply fruitful. There have been ups and downs—well, mostly downs. Interestingly, it is the fact that we as humans tend to overreact to the downs, together with other behavioral biases, that intrigues me all the time. I am thankful to my younger self, who was brave enough—or even reckless enough—to take the leap into the academic world, which was never planned to be part of my life.

When reflecting on the paths I have taken, I cannot be more grateful to my supervisors, Sara and Ai Jun, for being kind guides, reliable co-authors, and supportive friends. My occasionally crazy ideas and thoughts, in research or in life, have always been met with kindness and understanding. Without their support, it would have been impossible for me to experience different ways of working in academia. I would also like to thank Shumiao for hosting me at Saïd Business School at Oxford—it has been a fascinating experience.

I received a lot of constructive comments from our finance section that benefited the dissertation as well as my life, for which I would like to thank Björn, Daniel, Jarkko, Gustav, Jens, Lars, Lu, Ran, Clara, Håkan, Magnus and Michał. Moreover, pedagogical skills are equally important in this profession. Special thanks go to Caihong, Li, Mia, and Iñaki for the generous feedback during our collaboration. I also genuinely appreciate the help and encouraging words from Helene who has been always kind. Beyond our internal colleagues, I am thankful to Elias and Steffen for the time and effort generously spent on helping improve my work and the in-depth and inspiring discussions about everything.

Although I started this journey during the pandemic as the only freshman in the finance section, I have never felt alone, thanks to the care and love from my already-PhD and still-PhD-to-be friends: Saba, Carolina, Chengcheng, Fatemeh, Alexander, Niklas, Sante, Dario, Per, Arien, Paola, Heléna, Andreea, Andreas, Katja, Malin, Olle, Åsa, Christopher, Xiang, Christoph, Gustav, Steffan, Jinci, Yi-

fan, Yijia, Mengyu, Hao, and Zhiwu. It was truly a pleasure to work side by side with you, comrades. I am also grateful to many friends who helped me through the inevitable dark times (figuratively and literally) and shared in joyful moments; a heartfelt thank-you to Ziggy, Tianshu, Shiqi, Qiujia, as well as my little Lappis Poker Club.

My deepest gratitude goes to my family, who have remained my strongest allies. Without their unconditional love (well, perhaps our cats Paper and Picco sometimes do ask for snacks in return), I would not have had the determination to devote myself to exploring the questions I am interested in—or to make it to the end.

Qinglin
April 2025 in Stockholm

Contents

Sammanfattning

Denna avhandling undersöker hur hushåll hanterar risker både på arbetsmarknaden och på finansmarknaden, och erbjuder nya insikter i individers beslutsfattande under osäkerhet. Forskningen är organiserad i tre artiklar som var och en behandlar en distinkt men relaterad aspekt av hushållens risktagande: yrkesval, kulturell överföring av riskpreferenser samt portföljförvaltning bland invandrare. Tillsammans bidrar dessa artiklar till vår förståelse av hur individer reagerar på arbetsmarknadsrisker, hur kulturell bakgrund påverkar entreprenörskap samt hur invandrade investerare presterar på finansmarknaden.

Artikel I undersöker hur arbetsmarknadsrisk påverkar beslutet att bli entreprenör. Traditionella ekonomiska modeller antar att individer väger den förväntade nyttan av entreprenörskap mot den av lönearbete, där risktolerans är en nyckelfaktor. För att empiriskt testa effekten av arbetslöshetsrisk utnyttjar artikeln en svensk reform som oväntat förändrade anställningsskyddet. Reformen innebar en uppluckring av principen ”sist in, först ut” (LIFO på engelska) vid uppsägningar för små företag, vilket ökade anställningsosäkerheten för vissa arbetstagare. Med hjälp av administrativ data och en difference-in-differences-strategi visar studien att ökad arbetslöshetsrisk ledde till en 33-procentig ökning i entreprenörsstart bland de berörda arbetstagarna, utan att företagens prestation eller individens inkomst försämrades. Resultaten visar tydligt att jobbosäkerhet kan fungera som en drivkraft för entreprenörskap och pekar på hur anställningsskydd kan ha oväntade konsekvenser för företagsamhet.

Artikel II fokuserar på de kulturella grunderna för entreprenörskap, och undersöker hur riskpreferenser, ärvda från föräldrarnas ursprungsland, påverkar andra generationens invandrares sannolikhet att starta företag i Sverige. Genom att analysera svenska registerdata och länka dessa till landsnivådata över riskpreferenser från Global Preference Survey, isolerar studien den kulturella komponenten från institutionella och ekonomiska faktorer. Resultaten visar att individer vars föräldrar kommer från mer risktoleranta kulturer har en signifikant högre sannolikhet att bli entreprenörer – en ökning med 30 procent vid en standardavvikelse i kulturellt ärvd risktolerans. Dessa resultat håller även när man kontrollerar för socioekonomisk bakgrund och

föräldraentreprenörskap, vilket understryker att kultur är en kraftfull och självständig drivkraft bakom entreprenörsambitioner.

Artikel III behandlar risktagande på finansmarknaden, med särskilt fokus på hur invandrade investerare i Sverige förvaltar sina aktieportföljer jämfört med infödda. Tidigare forskning har främst fokuserat på huruvida invandrare deltar i finansmarknaden; denna artikel undersöker hur väl de presterar när de väl gör det. Med hjälp av ett omfattande datamaterial över individers tillgångar visar studien att invandrare har en signifikant högre "return loss" till följd av bristande diversifiering – cirka 38 punkter (30 procent sämre) än infödda. Denna skillnad kan i stor utsträckning förklaras av bristande finansiell kunskap samt begränsad social interaktion. Artikeln bidrar därmed med nya insikter om kopplingen mellan ekonomisk prestation och integration, både informationsmässigt och socialt.

Sammanfattningsvis bidrar denna avhandling med ny empirisk evidens inom arbetsmarknadsekonomi och hushållsfinans, genom att belysa hur riskpreferenser, kulturell bakgrund och institutionell kontext påverkar avgörande ekonomiska beslut. Resultaten har betydelse för utformningen av entreprenörskapspolitik, finansiell utbildning och förståelsen av ekonomisk integration bland invandrare.

Introduction

Households are constantly confronted with decisions involving risk, both in their professional lives and in managing their financial assets. Understanding how individuals navigate these risks in the labor as well as the financial markets provides valuable insights into broader economic patterns. The thesis particularly examines households' risk-taking decisions in two key areas of household decision-making: the choice between wage-employment and entrepreneurship and the management of portfolios in the financial market.

From a macroeconomic perspective, entrepreneurship has long been regarded as pivotal due to its impacts on innovation, job creation, and economic growth (Schumpeter, 1911). This viewpoint is strongly supported by a large body of theoretical models and empirical evidence (e.g., Holcombe, 1998; King and Levine, 1993). As Kirzner (1973) describes it, entrepreneurial insights reveal profit opportunities that were previously unnoticed. Despite its importance, only a small fraction of individuals choose to become entrepreneurs. OECD (2023) estimates that only around 16% of people in OECD countries engage in entrepreneurship, even when using a broad definition including the employment of employers, workers who work for themselves, members of producers co-operatives, and unpaid family workers. This figure has been relatively stable over the last two decades, prompting researchers to investigate the factors influencing individuals' decisions to enter entrepreneurship.

One strand of literature focuses on risk-return trade-offs, departing from mean-variance preference models. Earlier theoretical work by Kihlström and Laffont (1979) predicts that less risk-averse individuals are more likely to become entrepreneurs, while more risk-averse individuals choose wage employment. Risk preferences play a key role, as entrepreneurs are believed to have limited ability to diversify their business risks (Moskowitz and Vissing-Jørgensen, 2002). Indeed, risk tolerance has been found not only to encourage entrepreneurship but also to lead to lower-quality firms (Hvide and Panos, 2014). However, this does not necessarily imply that entrepreneurship is associated with higher risks and lower returns. While earlier studies suggest that entrepreneurs do not earn more than wage earners (e.g. Åstebro et al., 2013; Hamilton, 2000), recent evidence

indicates that this may be due to underreporting (Åstebro and Chen, 2014) and the failure to account for the option value of returning to wage employment (Catherine, 2022).

Within the risk-return framework of occupational choice, wage employment is generally assumed to be risk-free, while entrepreneurship carries some degree of risk (Parker, 1996). This assumption reflects, to some extent, the employment protection legislation in many countries, suggesting that employment security may influence individuals to choose wage employment. However, unemployment risk cannot be ignored, even in countries with strong employment protection laws. When wage employment is modeled with non-zero risk, it becomes difficult to predict whether increased unemployment risk will raise or lower the probability of entering entrepreneurship (Parker, 1997).

Testing this relationship is challenging, as unemployment outcomes are typically observed rather than unemployment risk itself. Article I tackles this issue by leveraging an exogenous reform in Sweden's employment protection law that increased unemployment risk for a certain group of employees. This is the first study to provide causal evidence on the relationship between unemployment risk and entrepreneurship entry, finding a significantly positive effect. In addition to its contribution to the literature, the findings have policy implications for employment protection design.

Several other individual characteristics also influence entrepreneurship entry, including marital status, health, psychological traits, and education (see Parker, 2004, for a comprehensive review). These factors interact with risk preferences in shaping occupational decisions, and they can be passed down from parents to children, i.e., intergenerationally (e.g. Zumbuehl et al., 2021; Dohmen et al., 2012). However, these findings from a single-country setup are not sufficient in explaining why the rate of entrepreneurship differs greatly across countries. The entrepreneurship rate in the United States is averaged at around 7 percent, while that in the Czech Republic is 16 percent. The common approach is to examine cross-border data, but it has been challenging to separate the influence of formal institutions (e.g., laws and political systems) from that of informal ones (e.g., culture). Article II addresses this concern by studying second-generation immigrants in Sweden, who are exposed to the same formal institutions but

different cultural heritage. Using a measure of parental risk appetite based on country-of-origin culture, the study finds that children of immigrants from more risk-loving cultures are more likely to start businesses. This effect holds even after controlling for individual and parental socioeconomic characteristics.

While risk-taking in the labor market is important, the frequency of decision-making is relatively low compared to the financial market. The final article in this thesis shifts focus to individual investor behavior in the stock market. Normative economics suggests that households should participate in the stock market due to the high equity premium, regardless of risk preferences (Merton, 1973). However, real-world observations deviate significantly from theory; a recent study shows that in Sweden, a country with a highly developed financial market, only around 25% of households participate in the stock market (Hermansson et al., 2022). This phenomenon is known as the limited stock market participation puzzle (Haliassos and Bertaut, 1995). Similar to the entrepreneurship literature, many studies have examined factors that explain this puzzle at the individual level, including low awareness of the stock market (Guiso and Jappelli, 2005), limited financial literacy (van Rooij et al., 2011), participation costs (Vissing-Jørgensen, 2002), and personal experiences (Andersen et al., 2019; Malmendier and Nagel, 2011).

After identifying factors that motivate stock market participation, it is logical to explore how well these investors perform and what their specific investment decisions are. Overall, investors tend to hold under-diversified portfolios, with younger, less-educated, and lower-income investors displaying greater under-diversification (Goetzmann and Kumar, 2008). Immigrants can be particularly prone to these factors associated with under-diversification, which could hinder their integration into the social sphere. It is therefore socially and academically relavent to investigate how immigrant investors perform. In their seminal work, Calvet et al. (2007) introduced a risk-adjusted performance measure known as return loss, which captures the opportunity cost of holding an under-diversified portfolio. While Goetzmann and Kumar (2008) focused on stock-only portfolios, Calvet et al. (2007) included mutual fund holdings and found that under-diversification among Swedish investors was moderate. However, a more recent study suggests that the welfare loss due to

under-diversification may be substantial (Bhamra and Uppal, 2019). Research on the determinants of return loss remains limited, with one exception being the study of the relationship between financial advice, financial literacy, and return loss (von Gaudecker, 2015). Article III contributes to this growing literature by examining the performance gap between native-born and immigrant investors in Sweden. The study confirms the importance of financial literacy and highlights an additional channel: social interaction.

Summary of the Thesis

Article I

Although entrepreneurs can be highly successful, entrepreneurship remains one of the riskiest activities and can result in significant loss of wealth (e.g., Hall and Woodward, 2010). A large body of the literature has focused on who becomes an entrepreneur, of which the canonical approach considers an individual's decision between entrepreneurship and employment to be determined by the expected utility offered by these options (Parker, 1996). As the return to entrepreneurship is inherently riskier than the return to employment, risk-loving individuals will become entrepreneurs, while those who are more risk averse will remain as employees (Hvide and Panos, 2014; Kihlström and Laffont, 1979). However, the typical profile of an entrepreneur is a middle-aged individual who has substantial working experience as an employee (Azoulay et al., 2020). A question that arises naturally is what prompts a salaried employee to become an entrepreneur. In this paper, we attempt to answer this question by investigating how nonentrepreneurial employment risk affects the transition to entrepreneurship.

To measure the unemployment risk, instead of the unemployment outcome, is challenging. We address this issue by exploiting an exogenous policy shock that increased the ex-ante unemployment risk for employees, but only for certain Swedish firms. The default rule for dismissal, referred to as the "last-in-first-out" (LIFO) principle, is a cornerstone of Sweden's labor protection laws. A major reform that relaxed this rigid principle was implemented on January 1, 2001. After this reform, firms with ten or fewer employees were allowed to

exempt two workers from being laid off according to the original LIFO principle. This reform took the country by surprise and represented a quasi-natural experiment: It was proposed by an unprecedented political coalition and strongly opposed by the ruling party; in late 2000, the reform proposal passed Parliament by a very slim margin.

The identification strategy is to exploit this exogenous change in labor protection resulting from the LIFO reform to estimate the effects of unemployment risk that are free from endogeneity concerns. Using administrative data provided by Statistics Sweden, we combine individual-level information with firm-level data to track the dynamics of private businesses and individuals since 1993. The main outcome variable is the decision to transition from salaried employment to incorporated-business ownership.

Our baseline sample includes all non-agricultural private businesses employing 6-14 employees in 1999. The treatment firms have 6 to 10 employees and so were able to exempt two workers following the LIFO reform. Firms with 11 to 14 employees make up the control group. We estimate the likelihood of treatment and control employees transitioning to entrepreneurship annually from 1995 to 2010, observing a distinct shift in this relationship from the pre- to post-LIFO period. Using a cross-sectional setting, we find that a sudden increase in unemployment risk results in a 2.25 percentage point increase in entrepreneurship entry within the first five years following the LIFO reform. This represents an increase of approximately 33% compared to the control group. We also find that treated entrepreneurs do not underperform, in terms of both firm quality and personal income, when compared with their counterparts who were previously employed at firms in the control group.

Overall, our study reveals that a rigid employment protection policy can act as an impediment to entrepreneurship. According to the World Bank in 2015, over 80 other countries had priority rules in case of redundancy similar to Sweden's. Our findings have important implications for designing policies to spur entrepreneurship. For example, on October 1, 2022, the Swedish government further relaxed the LIFO rule by allowing all firms, regardless of size, to exempt three employees from the LIFO principle.

Article II

This paper studies the role of cultural origin on entry into entrepreneurship, firm performance, and entrepreneurs' personal income. Specifically, we examine the effects of a distinct culturally transmissible preference that is important to entrepreneurship: risk appetite (Moskowitz and Vissing-Jørgensen, 2002; Kihlström and Laffont, 1979). A challenge in studies on the effects of culture is to separate the effects of culturally transmitted preferences on entrepreneurship from other institutional and economic factors. A culture that drives one type of behavior could also result in institutions and policies that encourage and promote the specific behavior (Guiso and Jappelli, 2005). To tackle the common challenge faced in cross-border researches, we examine the entrepreneurial decisions of second-generation migrants in Sweden, a subsample of the Swedish population who were born in Sweden but have two parents born in the same foreign country, with risk preferences associated with their parents' countries of origin. Our identification strategy uses the opportunity to observe this subsample with varying parental background in the same institutional environment.

We use Swedish longitudinal individual-workplace matched data provided by Statistics Sweden to study how culturally inherited risk appetite affects entrepreneurship. Starting with this dataset, we construct a sample consisting of the population of second-generation migrants in Sweden and merge it with risk preferences in their parents' countries of origin derived from the Global Preference Survey, GPS (Falk et al., 2018). The GPS is an experimentally validated survey dataset of economic preferences, including risk preference, from 76 countries representing approximately 90 percent of the world's population. By analyzing the rich register data that allow controlling for parental entrepreneurship and parental socioeconomic factors, we investigate if culturally inherited risk appetite affects entrepreneurship over and above other important parental characteristics. Our results show that an increase of one standard deviation of culturally inherited risk appetite raises the probability of becoming an entrepreneur by 30 percent, which is economically non-trivial. The findings are robust to a list of stricter specifications.

The study primarily contributes to two strands of literature. First, uncovering potential relations between culture and entrepreneurship,

firm performance, and entrepreneurs' personal income should further our understanding of individual background factors that affect entrepreneurship, but also shed light on the variations in entrepreneurship between countries. Second, this study contributes to the research on the role parents play in shaping entrepreneurship. Several studies find that parental entrepreneurship substantially increases the probability of their children's entrepreneurship. Controlling for parental entrepreneurship we show that parents matters over and above such parental influence and could act as a mechanism for the effects of cultural heritage.

Article III

A key issue confronting both researchers and policymakers is understanding how well immigrants integrate into the economic sphere of their host countries. Several studies document that immigrants have substantially lower wealth-levels and allocate their assets differently (Cobb-Clark and Hildebrand, 2006; Hao, 2004; Amuedo-Doranles and Pozo, 2002). Further research indicates that immigrants are less likely to own stocks and mutual funds (e.g. Osili and Paulson, 2008). These prior studies have shed light on the disparities between native and immigrant engagement in financial markets - the "in-or-out" aspect of participation. However, the performance of immigrants who do participate remains largely overlooked. This paper aims at answering the "up-or-down" question for those who are "in", namely, investigate if the portfolios of immigrants who do participate in stock markets differ from natives' portfolios in terms of underdiversification.

To investigate this potential immigrant-native gap in portfolio diversification, I employ the return loss measure proposed by Calvet et al. (2007). This measure quantifies the underdiversification penalty as the opportunity cost incurred by investors who maintain a sub-optimally diversified portfolio compared to the benchmark market portfolio. After matching Swedish registry data on individuals' holdings of individual assets with market data, the baseline sample consists of 171,615 natives and 75,906 immigrants who actively participate in the stock market. The findings reveal that immigrant investors experience a significantly larger return loss of 38 basis points (30%) than their native counterparts, and this finding is robust to

various specifications. In a closer examination, this paper suggests that the discrepancy can be explained two key factors: financial literacy and social interaction.

The contribution of this paper is three-fold. First, the paper answers an important follow-up question about immigrant investors' performance after entering the local stock market. Earlier studies primarily examine the immigrant-native gap in extensive margin and intensive margin of stock market participation (e.g. Seto and Bogan, 2013), as well as the potential explanations thereof (e.g. Asgharian et al., 2024; Gan et al., 2022; Haliassos et al., 2017). Second, the paper offers new evidence to the relation between financial literacy and portfolio performance building of previous works by von Gaudecker (2015) and Li et al. (2020). Third, this paper sheds light on the role of social integration in investment outcome. Although many studies have documented how social interaction can encourage stock market participation through social interaction, it has been unclear whether this interaction improves portfolio performance (Changwony et al., 2015; Hong et al., 2004). The study provides some novel evidence on this relationship.

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I

From employee to entrepreneur: The role of unemployment risk*

Ai Jun Hou, Sara Jonsson, Xiaoyang Li, and Qinglin Ouyang

Abstract

We use Swedish administrative data to study the role of unemployment risk in salaried employees' decisions to become entrepreneurs. Using the 2001 relaxation of Sweden's last-in-first-out (LIFO) dismissal rule as an exogenous shock to unemployment risk, we find that employees facing increased unemployment risk are more likely to become entrepreneurs. The effect is more pronounced for employees with longer tenure, as they were newly exposed to greater unemployment risk. When we track entrepreneurs' income dynamics and the performance of their ventures, we find that entrepreneurs who used to face greater unemployment risk do not underperform compared to other entrepreneurs. Our results provide some of the first empirical evidence of how employees respond to increased unemployment risk.

Keywords: Entrepreneurship, Unemployment risk, Employment protection law, Entrepreneurial performance

JEL Codes: D16, E24, G50, J24, M13

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1 Introduction

Although entrepreneurs can be highly successful, entrepreneurship remains one of the riskiest activities and can result in significant loss of wealth (e.g., Hall and Woodward, 2010). A large body of the literature has focused on *who* becomes an entrepreneur and has presented various explanations. The canonical approach considers an individual's decision between entrepreneurship and employment to be determined by the expected utility offered by these options (Parker, 1996). Consequently, individuals with greater managerial skills will enter into entrepreneurship because the returns from managing a firm exceed the salaries they can earn as employees (Lucas, 1978). As the return to entrepreneurship is inherently riskier than the return to employment, risk-loving individuals will become entrepreneurs, while those who are more risk averse will remain as employees (Hvide and Panos, 2014; Kihlstrom and Laffont, 1979). However, the typical profile of an entrepreneur is a middle-aged individual who has substantial working experience as an employee (Azoulay et al., 2020). A question that arises naturally is what prompts a salaried employee to become an entrepreneur. In this paper, we attempt to answer this question by investigating how nonentrepreneurial employment risk affects the transition to entrepreneurship.

Although unemployment is arguably the biggest risk workers face in their lifetime (Eeckhout and Sepanhsalari, 2023), unemployment risk has largely been overlooked in the literature on the determinants of entrepreneurship. Most models of the decision to become an entrepreneur simply assume salaried employment to be risk free (Parker, 1997; Kihlstrom and Laffont, 1979). However, unemployment risk can lower employees' expected utility from employment and push them toward self-employment. Empirical identification of the impact of unemployment risk is challenging due to measurement issues. Most studies use the ex post unemployment outcome as a proxy, yet unemployment risk corresponds to employees' ex ante likelihood of dismissal. In this paper, we overcome this challenge by exploiting a policy shock that increased the ex ante unemployment risk for employees, but only for certain Swedish firms.

The default rule for dismissal, referred to as the "last-in-first-out" (LIFO) principle, is a cornerstone of Sweden's labor protection laws.

Simply put, this principle stipulates that the last employee(s) hired by a firm must be the first to be dismissed in case of redundancy. A major reform that relaxed this rigid principle was implemented on January 1, 2001. After this reform, firms with ten or fewer employees were allowed to exempt two workers from being laid off according to the original LIFO principle. This reform took the country by surprise and represented a quasinatural experiment: It was proposed by an unprecedented political coalition and strongly opposed by the ruling party; in late 2000, the reform proposal passed Parliament by a very slim margin. We use this policy shock to examine how unemployment risk affects individuals' decisions to become entrepreneurs. This approach enables us to identify the impact of unemployment risk without requiring explicit measures of individual employees' exposure to unemployment risk.

Our identification strategy is to exploit this exogenous change in labor protection resulting from the LIFO reform to estimate the effects of unemployment risk that are free from endogeneity concerns. Using administrative data, we combine individual-level information with firm-level data to track the dynamics of private businesses and individuals since 1993. The main outcome variable is the decision to transition from salaried employment to incorporated-business (co-) ownership. Our baseline sample includes all non-agricultural private businesses employing 6–14 employees in 1999. The treatment firms have 6 to 10 employees and so were able to exempt two workers following the LIFO reform. Firms with 11 to 14 employees make up the control group. We estimate the likelihood of treatment and control employees transitioning to entrepreneurship annually from 1995 to 2010, observing a distinct shift in this relationship from the pre- to post-LIFO period. The difference becomes notably evident in 2002 and again in 2004, which correspond to the second and fourth years following the LIFO reform's implementation. This evidence strongly supports our empirical design, highlighting a distinct 'kink' in entrepreneurial tendencies across firm sizes when comparing the periods before and after the LIFO reform. Using a cross-sectional setting, we find that a sudden increase in unemployment risk results in a 2.25 percentage point increase in entrepreneurship entry within the first five years following the LIFO reform. This represents an increase of approximately 33% compared to the control group.

An important concern of our identification strategy is that unobserved characteristics among employees from treatment firms (6–10 employees) versus control firms (11–14 employees) may still be correlated with the decision to become entrepreneurs, even after controlling for such individual characteristics as age, gender, income, wealth, marital status, and education. To sharpen the identification, we restrict the treatment firms to those with 10 employees and the control firms to those with 11 employees. The goal is to minimize the differences between the treatment sample and the control sample and to isolate the effects of unemployment risk. Our results confirm that the observed effects on entrepreneurial entry persist even under this more stringent definition.

Moreover, we examine whether the effects are more pronounced for employees with longer tenure. The longer an employee's tenure in a given firm, the greater the protection that employee obtains from the LIFO principle. The 2001 reform shifted unemployment risk from those who were hired late to longer-tenured employees. We find that employees who joined the treatment firms earlier were more likely to become entrepreneurs after the LIFO reform. Overall, our results indicate that a small jolt to employees' job security can greatly stimulate their entry into entrepreneurship.

One might worry that employees of treatment firms rush into starting their businesses without a well-thought-out plan in reaction to the policy shock. Exploiting the longitudinal nature of our administrative data, we examine the long-term dynamics of entrepreneurs' personal income. We find that entrepreneurs who worked for the treatment firms pre-reform and started their own businesses post-reform exhibit similar income and income-growth paths to those of their counterparts from the control firms. Furthermore, we analyze the business performance of the new ventures started by those entrepreneurs who were employees pre-reform. Using various measures including survival rate, value added, sales per employee, and employment size, we find that the firms initiated by entrepreneurs exposed to greater unemployment risk do not underperform compared to their counterparts who were less affected by the LIFO reform. These results are consistent with the hypothesis that the entry decisions made by entrepreneurs exposed to greater unemployment risk are not irrational decisions prompted by a policy shock.

Overall, our study reveals that a rigid employment protection policy is an impediment to entrepreneurship. According to the World Bank in 2015, over 80 other countries had priority rules in case of redundancy similar to Sweden's. Our findings have important implications for designing policies to spur entrepreneurship. For example, on October 1, 2022, the Swedish government further relaxed the LIFO rule by allowing *all* firms, regardless of size, to exempt *three* employees from the LIFO principle.

This paper contributes to three strands of the literature. First, prior studies have documented various outcomes resulting from unemployment risk. Individuals who have been laid off often endure substantial reductions in consumption (Gruber, 1997), long delays before reemployment (Katz and Meyer, 1990), and significant wage cuts after returning to work (Farber, 2005; Gibbons and Katz, 1991). Employees' concerns about becoming unemployed tend to reduce their labor supply (Brown and Matsa, 2016). Some papers study how unemployment rates affect the entry and performance of new entrepreneurs (Kwon and Ruef, 2017). Analyzing a dataset of recent college graduates, Hacamo and Kleiner (2022) find that labor-market declines can lead to not only more firm entries but also better-performing firms. von Greiff (2009) finds that the probability of self-employment is higher after job displacement. However, these papers mostly use some ex post unemployment outcomes as a proxy for unemployment risk; to the best of our knowledge, no prior studies investigate how the *ex ante* risk of being dismissed affects employees' decisions.

Second, economists have long been puzzled by the fact that there is too little entrepreneurship. A large body of literature tries to identify factors impeding entrepreneurship, such as access to capital (Schmalz et al., 2017; Adelino et al., 2015; Bertrand et al., 2007) and entry regulation (Bruhn, 2011; Klapper et al., 2006; Desai et al., 2003); (Branstetter et al., 2014). Our findings reveal that a small reduction in job security can bring about long-lasting positive changes in entrepreneurship.

Third, our paper adds to the literature on the effect of tail risk on entrepreneurship.[1] Evidence suggests that policies designed to miti-

[1]The literature on tail income risk finds that left-tail income risk is cyclical across the earnings distribution. Guvenen et al. (2014) show that long unemployment spells contribute to the rise in tail risk during economic downturns. Cyclical

gate downside risk can foster entrepreneurship. Recent studies have focused on some specific forms of downside protection and their impact on entrepreneurial activities. For instance, Gottlieb et al. (2021) examine the extension of job-protected maternity leave for female employees who give birth, while Hombert et al. (2020) investigate extending unemployment insurance to unemployed individuals starting a business. Catherine (2022) studies the value of the fallback option to return to paid employment from self-employment and finds that this option significantly influences the transition to entrepreneurship.

While these studies show that unemployment-protection reforms promote entrepreneurship by providing a safety net for employees, we show that the LIFO reform exposed employees to job insecurity, nudging them toward entrepreneurship. Further, we study not only the individual decision to become an entrepreneur, but also entrepreneurial firms' performance and entrepreneurs' income over time, thus painting a complete picture of entrepreneurial activity.

The rest of this paper proceeds as follows. We describe the reform of the LIFO principle and its institutional background in Section 2. Then, we discuss the data and variables in Section 3. We report the results on the entry into entrepreneurship in Section 4. We analyze entrepreneurs' personal income outcomes in Section 5 and their ventures' business performance in Section 6. Section 7 concludes.

2 Institutional background and the LIFO reform

Sweden provides a great setting to study the relationship between unemployment risk and entrepreneurship. As a nation with some of the most stringent employment-protected laws (Botero et al., 2004), Sweden ranks in the bottom half among OECD countries for entrepreneurial activity (OECD, 2017).

Seniority rules exist in various forms in many countries. In Sweden, the seniority rule, formulated as the LIFO principle, is the cornerstone of the Swedish Employment Protection Act, which regulates all firms in Sweden (Skedinger, 2008). The LIFO principle stipulates

skewness in the tail risk of labor income has been documented in the United States (Guvenen et al., 2014), Germany, Sweden, and France (Busch et al., 2022).

that in case of redundancies, the employer must follow a priority list based on employees' tenure within the company. According to this principle, the worker(s) with the shortest tenure must be the first to go. A major reform to the LIFO principle came into effect on January 1, 2001, after which firms with 10 or fewer employees could exempt two workers from the priority list by assigning them "key-worker" status. The main intention of the reform was to increase flexibility for small firms to decide who to retain and who to dismiss. The 2001 LIFO reform was initiated by an unusual alliance between the Green Party and right-wing opposition, despite strong opposition from the ruling Social Democratic Party. After a brief inquiry and referral process, the LIFO reform was ultimately passed by a slim margin in October 2000. See Appendix Appendix A for a more detailed description of the reform process.

The reform shifted unemployment risk from shorter- to longer-tenured employees. Figure 1 illustrates the risk of being laid off before and after LIFO reform, as well as how this risk was redistributed. This is demonstrated using an example of a firm with 10 employees that must lay off two workers, a scenario that can be easily adapted to firms of different sizes and numbers of layoffs. Employees are ranked based on their tenure, with the most junior workers on the right. The top section represents the pre-reform scenario, where layoffs followed a strict last-in, first-out policy. As shown, the two most junior workers (Positions 9 and 10, highlighted in red) would be certain to be laid off. The bottom section illustrates the post-reform scenario. After the reform, the risk of being laid off is distributed among the four least-senior workers (Positions 7, 8, 9, and 10), indicated in yellow. Assuming an equal distribution of risk, each of these four employees faces a 50% probability of being laid off. Throughout both periods, several senior employees remain unaffected by the layoffs, and these employees are shown in the green safe zone. Comparing the distribution of unemployment risk before and after the reform, we see a clear decrease in layoff risk for the most junior employees and a corresponding increase for those with slightly longer tenure. This redistribution of unemployment risk from employees with shorter tenure to those with longer tenure persists regardless of variations in the number of layoffs.

[Insert Figure 1 around here.]

The reform indeed affected many workers and firms. The Confederation of Swedish Enterprise (Svenskt Näringsliv) conducted a survey in 2009 on the use of the LIFO rule, with 29% of the 600 firms that had laid off at least one employee the previous year responding. Among these 174 respondents, 32% stated that they had used the key-worker exemption provision (Svenskt Näringsliv [The Confederation of Swedish Enterprise], 2009). Investigating the effects of the reform on firm behavior, von Below and Thoursie (2010) find that both hires and separations increased among the treatment firms (2–10 employees) relative to larger firms (11–15 employees). Bjuggren and Skedinger (2018) find less screening of new hires after the reform, and Butschek and Sauermann (2022) conclude that the reform lowered the hiring quality at the affected firms.

3 Data and variables

To examine the effects of unemployment risk on entrepreneurship, we assemble an employer–employee-matched data set from LISA (Longitudinal Integrated Database for Health Insurance and Labor Market Studies), maintained by Statistics Sweden. LISA contains detailed individual-level data including demographics, employment, and income for the entire adult population in Sweden. The data set also provides comprehensive information about the individuals' workplace including firm-level information such as sales, number of employees, value added, average salary, location, and industry. We merge the LISA data set with data from the Swedish Wealth Register (Förmögenhetsregistret) to obtain information on wealth. Combining these datasets, we construct panel data for all employees aged 25 to 50 for every year between 1993 and 2010 and track their career paths over time.[2] The age range is 25 through 50 to exclude individuals in training or close to retirement from the sample (cf. Hvide and Panos, 2014).

[2]The LISA dataset includes data starting from 1990. However, the coverage of the variables varies across the years and incorporated entrepreneurship is first recorded in 1993.

The Swedish tax authorities record citizens' largest sources of income. We classify individuals as entrepreneurs if the majority of their taxable income comes from a nonagricultural, incorporated business that they fully or partially own.[3] An incorporated business refers to a privately owned limited liability stock company. Åstebro and Tåg (2017) and Lindquist et al. (2015) also use Swedish register data and define entrepreneurs in the same way.[4] We focus on the decision to *become* an entrepreneur as opposed to the status of *being* an entrepreneur. Therefore, our analysis concentrates on individuals whose largest source of income, in a given year, is from wage employment, categorizing them as employees for that year. Specifically, our outcome variable, *Entry*, is a dummy variable that equals one if the individual transitions to entrepreneurship in the subsequent year or within a defined future period.

The granularity of the data allows us to control for several individual characteristics shown to affect the decision to become an entrepreneur: age (Azoulay et al., 2020), gender (GEM, 2022; Ardagna and Lusardi, 2010), and marital status (Taniguchi, 2002). *Male* is a dummy variable equal to one if the individual is a man. *Marital status* is a dummy equal to one if the individual is married or in a registered partnership. We use a granular definition of education to ensure that any observed effects on entrepreneurship are not confounded by variations between fields and in level of education. Specifically, we group individuals into *Educational-level-by-major* groups. Educational level is classified as High school or lower level, Undergraduate, or Postgraduate. For individuals holding at least a bachelor's degree, majors are classified into the following four groups: (1) Science, Technology, Engineering, or Mathematics (STEM); (2) Business administration; (3) Law; and (4) Other majors. Because we do not observe the same major classification for High school or lower levels of education, a total of nine educational-level-by-major groups are formed. Income and personal wealth provide financial and physical capital, facilitating entry

[3]We use an indicator variable in the LISA dataset equal to one if the individual's largest source of taxable income is from a close company that the individual fully or partially owns. In Sweden, a close company is a limited liability company with few owners, often no more than four. The data do not disclose individuals' exact ownership stakes.

[4]Gottlieb et al. (2021) use a similar definition, categorizing individuals as entrepreneurs if they derive at least 50% of total income from self-employment.

into entrepreneurship. *Income* is an individual's total pretax annual income, including labor income as well as capital income (e.g., dividends and return on financial assets). *Wealth* is the market value of an individual's financial and real assets. Finally, it is possible that the reform pushed individuals into entrepreneurship because they had been laid off. To control for this possibility, we include the number of *Unemployment days* equal to the number of days an individual was registered as unemployed in a given year.

4 Entry into entrepreneurship

4.1 Identification strategy

To estimate the effects of unemployment risk on employees, we take advantage of the fact that the 2001 LIFO reform caused a discrete decrease in job security for employees in firms with fewer than 11 employees. As a result, our treatment group includes employees who worked for firms with fewer than 11 employees pre-reform. Based on the discussion in Section 2 and Appendix Appendix A, it is reasonable to assume that few expected the proposal from the unusual coalition of political parties to pass until the autumn of 2000.

Our identification strategy hinges on the condition that the treatment status is uncorrelated with other individual and firm characteristics that could drive entrepreneurship. In Panel A of Table 1, we compare individual profiles between the treatment and control employees. All data on individual characteristics are measured in 1999, except for the main outcome variable; Entry during 2001–2005. Year 1999 is the closest year that is arguably free from potential policy effects related to the 2001 reform. The comparison suggests that the employees in the treatment group (firms with 6–10 employees) are somewhat different from their counterparts in the control group (firms with 11–14 employees). The treatment group has fewer males and is slightly less educated. Also, they have lower income and less wealth and experience more unemployment days.[5] The last row indicates that these treatment employees were more likely to become entrepreneurs within the first five years following the LIFO reform,

[5]In this table, education is a dummy variable equal to one if the individual has at least an undergraduate degree and zero otherwise.

which corresponds to a nonnegligible 26% increase relative to the control group.

In Table B.1, we reduce the range for the treatment and control groups to the tightest possible. Specifically, we assign individuals working in firms with 10 employees as the treatment group and those in firms with 11 employees as the control group. The employees in the treatment group earn marginally less than employees in the control group. Otherwise, the differences in education, age, gender, marital status, wealth, and number of unemployment days are statistically insignificant. From this comparison, we can conclude that the employees in these narrowly defined treatment and control groups are very similar to each other. However, the treated employees are still more likely to become entrepreneurs in the 2001 to 2005 period.

In addition to comparing the employee-level characteristics, we also compare the employer-level characteristics and present the results in Panel B of Tables 1 and B.1. Average salary is similar between treatment and control firms. Not surprisingly, we find that the average total sales and value added are higher in larger firms (i.e., the control group), primarily due to the size effect. However, the difference in labor productivity, as measured by sales per employee, is statistically insignificant.

[Insert Table 1 around here.]

To further explore how firm size influences an employee's transition from wage employment to entrepreneurship, we initially examine whether this shift is directly correlated with the size of the employer firm. To determine the firm size, we assume that one person in each of the firms holds a managerial position, reducing the firm's effective size by one (cf. von Below and Thoursie, 2010; Bjuggren, 2018).[6] To investigate the impact of firm size on entry effects, specifically among

[6]To determine the firm size, the reform proposal stipulates that one should exclude members of the employer's family, workers in management positions, individuals hired to work in the employer's household, and workers in employment-subsidy programs. The data do not allow identification of family links, employees' positions within the firms, or whether the employees have fixed-term or open-ended contracts. The type of contract does not matter: workers with permanent and temporary employment are treated equally.

firms with 6 to 14 employees, we estimate the following equation.

$$Entry_{i,s,t} = \alpha + \lambda_{t-2} + \beta_s \sum_{s=6}^{10} Size_{i,s,t-2} + \beta_s \sum_{s=12}^{14} Size_{i,s,t-2} + \gamma X_{i,t-2} + \varepsilon_{i,s,t} \quad (1)$$

where $Entry_{i,s,t}$ is equal to one if employee i, employed at a firm of size s in year $t-2$ chooses to become an entrepreneur in year t. Individuals who are already entrepreneurs in year $t-1$ are not included in the sample. $Size_{i,s,t-2}$ is assigned the value of one if employee i works for a firm with employment size s in year $t-2$. Size is measured as of year $t-2$ instead of year t for two reasons. First, this approach helps mitigate concerns of endogeneity, as firm size could change in response to employees transitioning into entrepreneurship. Second, the two-year gap is the minimum to ensure employees were unaware of the reform. We maintain this two-year gap throughout the remainder of the paper. The coefficient for 11-employee firms, β_{11}, is the benchmark. $X_{i,t-2}$ is a vector of individual characteristics including age, male, married, educational-level-by-major indicators, and the logarithm of total pretax annual income in year $t-2$. It also includes industry-by-county fixed effects to control for industry-specific and county-level regional characteristics. λ_{t-2} denotes year fixed effects that control for broader macroeconomic changes. Standard errors are clustered at the firm level.

We estimate Eq. (1) using a pooled regression spanning a 10-year period. This period includes five pre-reform years (1996–2000) and five post-reform years (2001–2005). For each year t, the treatment status is determined by the employment size in year $t-2$. We perform separate estimations for the periods before and after the reform, and present the coefficient estimates, β_s, for firm employment sizes ranging from 6 to 14 in Figure 2. For the placebo years (the green line), we document that employment size alone has limited impact on employees' entry into entrepreneurship. For the post-reform years (the red line), we observe a kink around employment size 11, which is precisely the size threshold according to the LIFO-reform mandate. For employees working in firms employing between 11 and 14, the size coefficients are not significantly different from zero, while the coeffi-

cients are indeed positive and significant for firm sizes below 11. The figure also illustrates that the probability of entering entrepreneurship increases within the treated group as firm size decreases. This finding is in line with the intuition that employees in smaller firms are more exposed to the reform: The number of employees that can be exempted from the LIFO rule is fixed at two. The results confirm that the differences in transitioning to entrepreneurship are not merely artifacts of firm size.

[Insert Figure 2 around here.]

Another potential concern is that the LIFO reform may have created perverse incentives for firms to evade or embrace the new rule by adjusting the number of employees. We plot the firm size distribution around the year of the reform (from 1999 to 2002) in Figure C.1. Naturally, the number of firms gradually drops as the firm size increases. Hence, a vast number of employees were exposed to increased unemployment risk as a result of the LIFO reform. When we focus on the number of firms that employ 10 and 11 employees from 1999 to 2002, we do not find any jumps from year to year.

4.2 Event-study results

We proceed to estimate the effects of the LIFO reform on employees in a regression framework. Our primary analysis is carried out using an event-study approach in which we estimate the following linear probability model.

$$Entry_{i,t} = \alpha + \beta\, Treat_{i,t-2} + \gamma X_{i,t-2} + \varepsilon_{i,t-2} \tag{2}$$

where i denotes the individual employee, t denotes the year of entry, and $t-2$ corresponds to the year of employment-size determination, which also decides treatment status. Therefore, $Entry_{i,t}$ is a dummy variable equal to one if employee i becomes an entrepreneur in year t. Hence, the employee must be an employee in year $t-1$. $Treat_{i,t-2}$ is a dummy variable equal to one if employee i works in a firm that employs fewer than 11 employees in year $t-2$ and zero otherwise. $X_{i,t-2}$ is a vector of individual characteristics including age, male, married, educational-level-by-major indicators, and the logarithm of

total pretax annual income. We also control for industry-by-county fixed effects. β is the coefficient of interest, which estimates the treatment effect. Standard errors are clustered at the firm level.

Because the reform in 2001 was largely unexpected, we should not observe any treatment effect before 2000, given that the reform was first announced to the public in the later part of 2000 (indicated by the vertical line in Figure 3). We estimate Eq. (2) for every year between 1995 and 2008 and present the point estimates of β in Figure 3. The estimates are also reported in Table B.2. The figure supports the notion that the LIFO reform, which increased unemployment risk for many, significantly affected the probability of employees in treated firms entering entrepreneurship. The flat line, with most beta coefficients not statistically different from zero observed for the pre-reform years, indicates no treatment effect before the LIFO reform took place. This lack of difference is important because it suggests that any changes post-reform can be attributed to the reform rather than other underlying trends. In contrast, there are discrete increases in the beta coefficients after 2001, reflecting the impact of the increased unemployment risk on employees entering entrepreneurship. We document a significant impact on entry into entrepreneurship in 2002: Employees at treated firms showed a 0.71 percentage point higher probability of transitioning into entrepreneurship, representing a 46% increase compared to the control group's transition rate, which we estimate to be 1.54%. Furthermore, this effect appears to be sustained rather than transitory; by 2004, the increase in entry probability reached 1.75 percentage points, equivalent to a 49% rise relative to the estimated control benchmark of 3.59% for that year.[7]

[Insert Figure 3 around here.]

The data structure allows us to construct a panel consisting of all employees between 1995 and 2008. We estimate a dynamic difference-

[7]The results remain when we assign treatment status based on employment size three years before entry year.

in-differences (DiD) model of the specification below.

$$Entry_{i,t} = \alpha + \lambda_{t-2} + \theta\, Treat_{i,t-2} + \sum_{t=1995}^{2010} \beta_{t-2}(\, Year_{t-2} * Treat_{i,t-2}) + \gamma X_{i,t-2} + \varepsilon_{i,t} \quad (3)$$

In the above equation, we interact year dummies, $Year_{t-2}$, with the treatment dummy, $Treat_{i,t-2}$, to generate a DiD estimate for every year with 1993 as the benchmark. The coefficient estimates of β_{t-2} are plotted in Figure C.3. The panel setting allows us to control for various fixed effects: industry by county, firm, and individual. Standard errors are clustered at the firm level. The results are robust and comparable across these fixed-effect specifications. We confirm that employees in the treatment group are more likely to become entrepreneurs. For example, we find that employees who worked for treated firms in 1999 were, depending on the specification, approximately 0.4 percentage point (26%) more likely to become entrepreneurs during year 2002 compared to their counterparts.

4.3 Cross-sectional results

One might worry that employees and firms had already adjusted to the LIFO reform in 2000. For instance, risk-averse employees may prefer to switch to large firms. To enhance the identification of the treatment effect, we focus on the 1999 cross-section alone. This test also allows us to control for additional variables (wealth and number of unemployment days) due to increased data availability from 1999. The evidence from the event study indicates that it takes time for employees to respond to the reform and prepare for the transition into entrepreneurship. In recognition of this delay, we analyze the post-reform entry within a five-year time window. Specifically, we estimate the following model.

$$Entry_i^{01\text{–}05} = \alpha + \beta\, Treat_i^{99} + \gamma X_i^{99} + \varepsilon_i \quad (4)$$

where $Entry_i^{01\text{–}05}$ is a dummy variable set to one if employee i transitions to entrepreneurship within the first five years following the LIFO reform, during 2001–2005. $Treat_i^{99}$ is a dummy variable that

equals one if employee i works in a firm that employed fewer than 11 employees in 1999 and zero otherwise. X_i^{99} is a vector of individual characteristics equal to those in Eq. (2), but it additionally includes wealth (the market value of an individual's financial and real assets) and number of unemployment days in 1999. As in the event study, we control for industry-by-county fixed effects. β is the coefficient of interest, which estimates the treatment effect of the LIFO reform. Standard errors are clustered at the firm level.

Table 2 reports the results. We document a significant positive coefficient of $Treat_i^{99}$. Employees working in treated firms are 2.25 percentage points more likely to transition into entrepreneurship during the 2001–2005 period. This represents a substantial 33% increase compared to their counterparts in firms with 11–14 employees. This finding aligns with those observed in the event-study setup. Calculating the cumulative effect, based on the estimates reported in Table B.2, from the event study for the 2001–2005 period shows a total increase of 3.03 percentage points for treated employees.[8] Furthermore, the cross-sectional estimate implies that our results are stable upon including additional the control variables—wealth and the number of unemployment days—as these variables do not alter the established effect of unemployment risk on entry, suggesting that our main findings are not confounded by these factors.

To further refine our identification, we reestimate Eq. (4) using a subsample that includes only employees from firm of sizes 10 and 11. The results, presented in Table B.3, show a significant treatment effect of 0.64 percentage point, equivalent to a 9% increase relative to the control group. This analysis, resembling a regression-discontinuity design, confirms that increased unemployment risk significantly boosts entrepreneurship.

[Insert Table 2 around here.]

Turning to the control variables, the results indicate that male employees, married employees, and employees with higher income

[8]The cumulative effect differs conceptually from the impact on the probability of entry over the five-year period. For example, a repeat entrepreneur who transitions twice, once in 2002 and again in 2004, will contribute to the effect in both years. However, when evaluating entry during the 2001–2005 period, these two transitions will be treated as a single event.

and wealth are more likely to become entrepreneurs. These findings are consistent with previous studies(e.g., Ardagna and Lusardi, 2010; Borjas, 1986; Glenn, 2004; Lerner and Schoar, 2010; Lucas, 1978; Hvide and Panos, 2014). We also find that the length of the unemployment spell is negatively associated with an individual's decision to pursue entrepreneurship.

For brevity, we do not report the coefficients of education-level-by-major fixed effects in Table 2. We do however observe that individuals with a STEM undergraduate degree are more likely to become entrepreneurs. It can indeed be argued that STEM graduates are particularly well-suited for entrepreneurship due to their training in problem-solving and technical skills, competencies that are central to successful entrepreneurship (cf. Hacamo and Kleiner, 2022)). In Table B.4, we interact a STEM undergraduate degree dummy with $Treat_i^{99}$ and find a positive and significant coefficient for the interaction term in the baseline sample. The coefficient remains positive, although insignificant, for the subsample consisting of firms with the employment size of 10–11. Our results reveal that treated employees who pursue STEM majors in their undergraduate studies are especially likely to become entrepreneurs compared to treated employees who pursue other majors.

We furthermore investigate the possibility that the treatment effect is driven by two salient subsamples. Sweden witnessed a thriving information and communication technology (ICT) sector before the dot-com bubble burst in 2001, which coincided with the introduction of the LIFO reform. It is possible that the increasing number of layoffs in small ICT companies coupled with a lack of similar employment opportunities compelled individuals in this sector to become self-employed.[9] A second subsample that might have driven our results consists of employees in the Stockholm area. There are more business opportunities in Stockholm than in the rest of the country, making the transition from employment to entrepreneurship relatively more compelling. In addition, many of the ICT companies that went bankrupt around 2001 were located in Stockholm. Table B.5 reports the results from estimating Eq. (4) in the four subsamples using entry during 2001–2005 as the dependent variable. As shown

[9]It is worth noting that in Sweden, at the time of the LIFO reform, approximately 90% of the total labor force had unemployment insurance.

in the first row, all treatment effects remain statistically significant and positive, except in the ICT-only subsample, which is positive but not statistically significant. Overall, these results suggest that our findings are not influenced by any specific industry or geographic location.

4.4 The effects of tenure

The LIFO reform shifted the unemployment risk from the most junior employees to employees with longer tenures within their firms, as illustrated in Figure 1. If the increase in entrepreneurship for the treated employees was due to increased unemployment risk, we should expect the effects to be stronger for employees with longer tenures. In this section, we test this hypothesis.

Based on the employment records dating back from 1993, we construct a variable, $Juniority_i$, which equals the fraction of employees who joined the firm before employee i. Hence, a higher value of *Juniority* corresponds to a shorter tenure within a firm. The data only identify the year, not the exact date when an individual joined a particular firm. In the case of multiple individuals joining a firm in the same year, we assume that the individual with the highest income joined the firm earlier that year as a tie-breaking rule.

Using the tenure measures, we augment Eq. (4) by interacting *Juniority* in 1999 with $Treat_i^{99}$. The results from the baseline sample are reported in Table 3. The main effect of unemployment risk, as indicated by the coefficients for *Treat*, remains positive and significant. The coefficient of *Juniority* is negative and significant, suggesting that junior employees are less likely to start their own businesses. This finding remains robust within the most stringent subsample, only firms of sizes 10 and 11, as documented in Table B.6.

[Insert Table 3 around here.]

To conclude, these results suggest that employees in the treated firms were more likely to become entrepreneurs and these effects were significantly higher for employees who had been with their firm for a longer time period. Taken together, the findings indicate that the treatment effect is weaker for more junior employees, which is con-

sistent with our hypothesis that employees who are more affected by the LIFO reform are more likely to pursue entrepreneurship.

5 Entrepreneurs' income dynamics

The previous results reveal that a sudden increase in unemployment risk stimulated more employees to become entrepreneurs within a short period of time. However, their decisions were not necessarily optimal if these individuals rushed into them without the necessary skills or preparation. Such impulsive decisions might lead to detrimental outcomes for the entrepreneurs. To investigate this possibility, we track individuals' long-term income dynamics after the LIFO reform. To maintain consistency with our previous investigation, we use $Entry_i^{01–05}$ to indicate whether individual i, who was an employee in 1999, entered entrepreneurship within the first five years after the LIFO reform, specifically during the 2001–2005 period. We apply the same framework as in Section 4.3, using a cross-section from 1999. We proceed to estimate the following regression.

$$\begin{aligned} Income_i = \alpha + \beta\, Treat_i^{99} + \delta Entry_i^{01–05} \\ + \gamma\, Treat_i^{99} \times Entry_i^{01-05} + \zeta X_i^{99} + \varepsilon_i \end{aligned} \tag{5}$$

where $Income_i$ denotes one of three income variables: *Income growth rate* is the growth rate of income between 1999 (the base year) and 2010. *Total discounted income*, in log terms, is the total income during the 2000–2010 period discounted at an annual rate of 2% (cf. Hamilton, 2000). *Income volatility* is the standard deviation of annual income during 2000–2010. $Treat_i^{99}$ is a dummy variable equal to one if the individual worked in a treated firm in 1999. X_i^{99} includes the same individual-level controls as in Eq. 4. The interaction term, $Treat_i^{99} \times Entry_i^{01–05}$, is the main variable of interest. A significant coefficient, γ, implies that entering entrepreneurship generates different income dynamics for individuals previously employed at treated firms relative to entrepreneurs previously employed at control firms.

Column (1) of Table 4 reports that, on average, the employees in treated firms do not experience inferior income growth over the examined years. The employees in treated firms experience a 1.04-percentage-point lower growth rate, which is economically negligi-

ble over a 10-year period. The positive and significant coefficients for $Entry^{01-05}$ suggest that entrepreneurs enjoy nearly 15 percentage points higher income growth than individuals who remain in wage employment. The coefficient for the interaction term is insignificant, suggesting that entrepreneurs previously employed at treated firms do not, on average, experience a different income trajectory over the years. To further examine this, we evaluate the annual income growth rate for each year during the 2000–2010 period using an event-study approach where the dependent variable is the income growth rate from 1999 to year t. Figure 4 plots the treatment-year coefficients for the selected firm-size groups. The results show that there is no significant difference in income growth between entrepreneurs who were employed at treated firms in 1999 and those at control firms. Column (2) of Table 4 shows limited differences in the 11-year total discounted income, which corroborates the findings of similar income patterns when comparing treated and untreated entrepreneurs. Column (3) suggests that, while entrepreneurs generally experienced more pronounced income fluctuations—a result consistent with the inherent volatility of entrepreneurship—this effect is notably less pronounced among those who were previously employed at treated firms. We conduct the same analysis for the subsample consisting of firms with 10–11 employees, presenting similar results in Table B.7 and Figure C.2, respectively. Taken together, these results suggest that the treated employees who chose to become entrepreneurs enjoyed similar income outcomes to their counterparts in the control firms.

[Insert Table 4 and Figure 4 around here.]

Using administrative data and carefully chosen treatment and control samples, our results also contribute to the debate on whether entrepreneurs earn more than salaried employees. Åstebro and Chen (2014) conclude that entrepreneurs in general earn more, thus challenging earlier studies that usually find that entrepreneurs earn a lower income than waged employees (e.g., Moskowitz and Vissing-Jørgensen, 2002; Hamilton, 2000). Åstebro and Chen (2014) propose that the income gap can best be explained by entrepreneurs underreporting. We overcome this challenge by extracting individual income from census data. Our findings support the conclusions in Hacamo and Kleiner (2022) and show that *forced entrepreneurs*—those who

experience large, negative shocks upon entering the labor market—do not necessarily perform worse. Meanwhile, the greater income volatility for average entrepreneurs is consistent with the notion that entrepreneurship is a risky pursuit(e.g., Catherine, 2022).

6 Performance of entrepreneurial firms

In this section, we turn our attention to the performance of newly established firms founded by waged employees in 1999. Although we show in Section 5 that the entrepreneurs who are directly affected by the LIFO reform enjoy similar income as comparable entrepreneurs, individual incomes do not necessarily translate to business gains. To this end, we analyze firms founded between 2002 and 2005 that were still operating as of 2005, determining whether their CEOs were previously employees in treatment or control firms in 1999.[10] To ensure meaningful comparisons, we restrict the sample to those firms whose founders were employees in our baseline sample in 1999. Specifically, we estimate the following equation.

$$FirmPerf_i = \alpha + \beta Treat_i^{99} + \delta X_i^{99} + \varepsilon_i \tag{6}$$

where $FirmPerf_i$ denotes one of three alternative performance measures: log(*Value added*), log(*Sales per employee*) or log(*Number of employees*), all of which are measured using the 2010 value to capture long-term performance. In addition, we examine the five-year survival rate of those newly established firms. The dummy variable *Five-year survival* equals one if the firm was still active five years after firm registration. $Treat_i^{99}$ is a dummy variable equal to one if the 2005 CEO of firm i worked in a treatment firm in 1999. X_i^{99} is a vector of the same control variables used in Eq 4. We also control for industry, county, and founding-year fixed effects.

[Insert Table 5 around here.]

[10] We chose 2002 as the starting year instead of 2001 because we lack data on the month of establishment, and it is possible that firms registered early in 2001 were unaffected by the policy reform. Nonetheless, the results are not significantly different if we consider the 2001–2005 time window. One and only one CEO was identified for each firm in 2004. See Andersson and Andersson (2009) for more details on the identification.

From the results presented in Table 5, we conclude that firms founded by the treatment entrepreneurs, who were subject to increased unemployment risk due to the LIFO reform, perform at least as well as the control entrepreneurs. In general, the survival rate appears to be higher for the firms founded by treated employees, although the coefficients are not statistically significant. Furthermore, the results presented in Table B.8, based on the subsample of firms with 10 and 11 employees that define our treatment and control groups, reveal that firms founded by treated employees achieve a 33% higher total value added. However, the 17% higher sales per employee and the 19% higher number of employees, although positive, are not statistically significant.

In short, these results are consistent with the findings in Section 5, indicating that the treated entrepreneurs do not underperform compared to their counterparts.

7 Conclusion

In this paper, we offer novel, causal evidence of the effects of unemployment risk on employees' decisions to become entrepreneurs and their entrepreneurial performance. The reform to the LIFO principle in Sweden provides us with quasi-experimental variations in employees' exposure to unemployment risk. We use rich individual- and firm-level administrative data to address the question.

Our results show that greater unemployment risk leads to an increased tendency for employees to become entrepreneurs, and this effect is more pronounced for employees with longer tenures. One might worry that individuals faced with increased unemployment risk were forced into entrepreneurship without sufficient skills and preparation. Our findings however indicate that the entrepreneurs who were exposed to greater unemployment risk did not underperform relative to otherwise similar entrepreneurs. Policymakers have long been searching for ideas to stimulate entrepreneurship. Our findings indicate that in a country with strong labor protection and generous unemployment insurance coverage, even a slight drop in job security can spur significant and productive entry into entrepreneurship.

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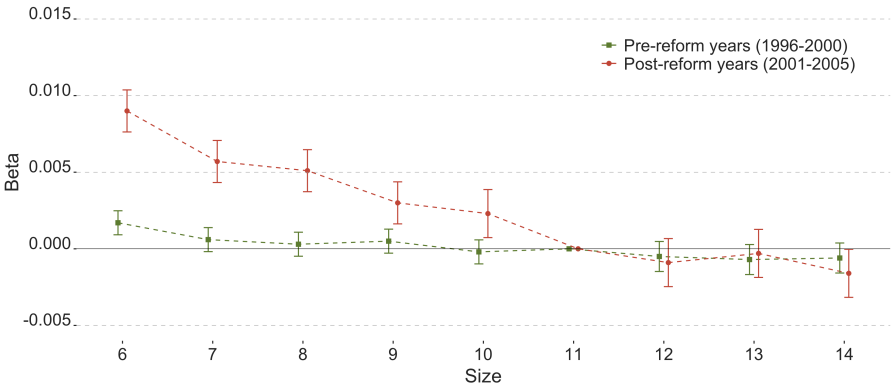
Figure 1: Unemployment risk before and after the LIFO reform

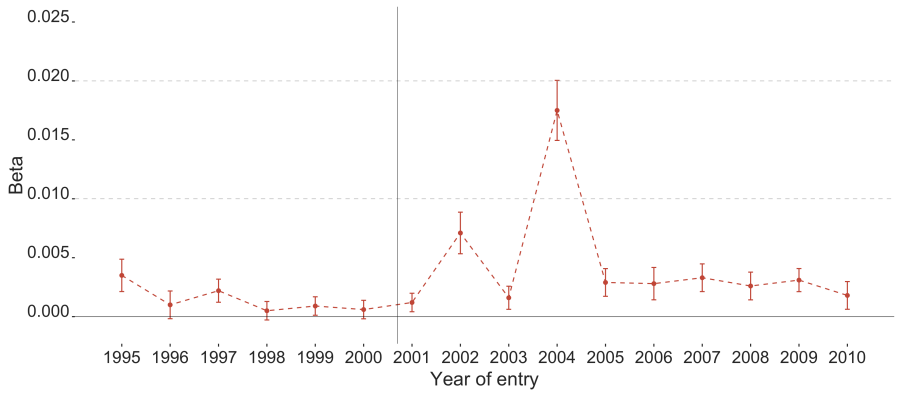
Notes: This figure illustrates the impact of the LIFO reform on layoff probabilities in a firm with 10 employees. The top section represents the pre-reform scenario, where the two most junior employees (highlighted in red) are certain to be laid off. The bottom section shows the post-reform scenario, where the risk is redistributed among the four least senior employees (highlighted in yellow), reflecting the reform's impact on layoff-risk distribution. The green areas in both sections represent the more senior employees who remain unaffected by layoffs.

Figure 2: Entrepreneurship entry and firm employment size



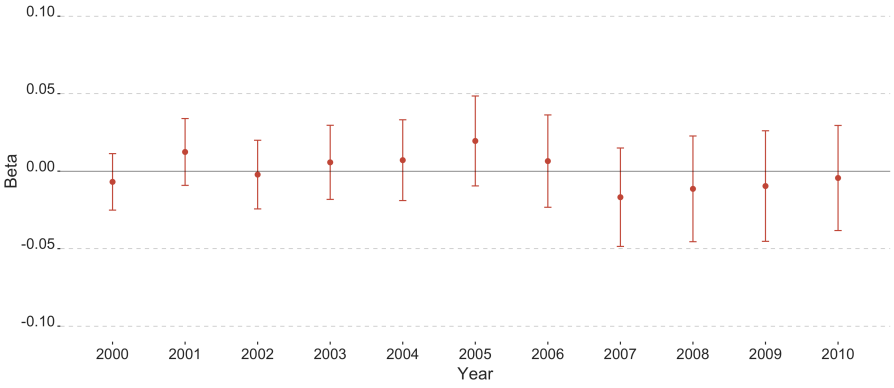
Notes: This figure presents the estimated coefficients of employer firm size on entry into entrepreneurship. Each point corresponds to a coefficient estimate for a given firm size, with vertical lines indicating the 95% confidence intervals. The coefficients for the pre-reform (post-reform) years are in green (red).

Figure 3: Differential likelihood that employees in firms with fewer than 11 employees enter entrepreneurship



Notes: This figure shows the estimated coefficients of treat on entry into entrepreneurship. The year of entry ranges from 1995 to 2010. Each point corresponds to a coefficient estimate for a given year of employment-size determination, assessed two years before entry. This employment size determines treatment status. Vertical red lines indicate the 95% confidence intervals. The gray vertical line indicates the time point when the reform was announced to the public.

Figure 4: Dynamics of income growth rate



Notes: This figure plots the coefficients of treat ×entry on the income growth rate for each year between 2000 and 2010, relative to the level in 1999. Each point corresponds to a coefficient estimate with the vertical lines indicating the 95% confidence intervals.

Table 1: Mean comparison between treatment and control groups

Panel A: Individual-level characteristics				
Firm size	6–10	11–14	Difference	t-stat
Observations	102.190	59.638		
Age	35.932	35.899	0.033	0.86
Male	0.649	0.657	−0.008***	3.25
Married	0.389	0.389	0.000	0.02
Undergrad	0.213	0.222	−0.009***	4.38
Log Income	12.131	12.176	−0.045***	19.62
Log Wealth	13.197	13.371	−0.173***	4.79
Log Unemployment days	0.802	0.742	0.060***	6.83
Entry during 2001–2005	0.087	0.069	0.018***	13.07

Panel B: Firm-level characteristics				
Firm size	6–10	11–14	Difference	t-stat
Observations	16.385	5.901		
Avg employee age	37.947	37.549	0.398***	3.99
% of male employees	0.671	0.678	−0.007*	1.66
Log Average salary	12.274	12.270	0.004	0.78
Log Sales	15.843	16.359	−0.516***	39.76
Log Value added	14.818	15.325	−0.506***	57.28
Log Sales per employee	13.832	13.851	0.0189	1.49

Note: This table reports the means and mean differences of key individual- and firm-level variables as measured in 1999, two years before the policy reform. The main outcome variable is entry during 2001–2005. Panel A tests the individual differences between treatment and control groups, specifically comparing employees from firms with an employment size of 6–10 to those from firms with 11–14 employees as of 1999. Panel B examines the differences across firms using the same criteria for defining treatment and control groups. *, **, and *** indicate significance of the t-test at the 10%, 5%, and 1% levels, respectively.

Table 2: The effect of the LIFO reform on entrepreneurship

	Entry during 2001-2005
Treat	0.0225***
	(0.0019)
Log Age	-0.0051
	(0.0036)
Male	0.0345***
	(0.0016)
Married	0.0293***
	(0.0016)
Log Income	0.0610***
	(0.0022)
Log Wealth	0.0029***
	(0.0001)
Log Unemployment days	-0.0079***
	(0.0003)
Observations	161,828
Educational-level × Major FEs	Yes
Industry × County FEs	Yes
Adj R^2	0.044

Note: This table reports the regression estimates of entry into entrepreneurship. Individuals are defined as entrepreneurs if the majority of their taxable income is derived from an incorporated business they fully or partially own. The dependent variable equals one if an individual becomes an entrepreneur during the 2001–2005 period. Treat is a dummy variable equal to one if the individual worked in a firm with 10 or fewer employees in 1999. The model includes six control variables measured as of 1999: age, gender, married, income, wealth, and number of unemployment days. Income is an individual's total pretax annual income. Wealth is the market value of an individual's financial and real assets. We control for educational-level-by-major and industry-by-county fixed effects. Standard errors are clustered at the firm level and are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 3: The effect of employee tenure on entrepreneurship

	Entry during 2001-2005
Treat	0.0427***
	(0.0041)
Juniority	-0.1029***
	(0.0049)
Treat × Juniority	-0.0514***
	(0.0062)
Observations	161,828
Controls	Yes
Educational-level × Major FEs	Yes
Industry × County FEs	Yes
Adj R^2	0.062

Note: This table reports the regression estimates of entry into entrepreneurship. Individuals are defined as entrepreneurs if the majority of their taxable income is derived from an incorporated business they fully or partially own. The dependent variable equals one if an individual becomes an entrepreneur during the 2001–2005 perdiod. Treat is a dummy variable that equals one if the individual worked in a firm with 10 or fewer employees in 1999. Juniority is the fraction of employees who joined the firm before the employee. The model includes six control variables measured as of 1999: age, gender, married, income, wealth, and number of unemployment days. We control for educational-level-by-major and industry-by-county fixed effects. Standard errors are clustered at the firm level and are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Entrepreneurs' income dynamics

	(1) Inc. growth	(2) Total disc. inc.	(3) Income vol.
Treat	-0.0104*	-0.0144***	-0.0002
	(0.0056)	(0.0022)	(0.0044)
Entry	0.1481***	0.1510***	0.6512***
	(0.0137)	(0.0080)	(0.0177)
Treat × Entry	-0.0044	-0.0114	-0.0834***
	(0.0173)	(0.0096)	(0.0208)
Observations	157,631	159,273	159,326
Controls	Yes	Yes	Yes
Edu. level × Major FEs	Yes	Yes	Yes
Industry × County FEs	Yes	Yes	Yes
Adj R^2	0.056	0.429	0.221

Note: This table presents the relationship between individual income and entry into entrepreneurship. The dependent variables in Columns (1)–(3) are (1) income growth rate, defined as the log growth rate of income between 1999 and 2010; (2) total discounted income during the 2000–2010 period with an annual discount rate of 2%; and (3) income volatility, defined as the standard deviation of annual log total income during 2000–2010. Treat is a dummy variable equal to one if the individual worked in a firm with 10 or fewer employees in 1999. Entry is a dummy variable equal to one if the individual became an entrepreneur during the 2001–2005 period. The models include five control variables based on values in 1999: age, gender, married, income, and number of unemployment days. All models also control for educational-level-by-major and industry-by-county fixed effects. Standard errors are clustered at the firm level and are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Entrepreneurs' business performance

	(1) Five-year survival	(2) Log Value added	(3) Log Sales per empl.	(4) Log Num. of empl.
Treat	0.0172	0.0119	-0.0035	0.0152
	(0.0199)	(0.0740)	(0.0528)	(0.0497)
Observations	1,839	1,208	1,208	1,208
Controls	Yes	Yes	Yes	Yes
Educational-level × Major FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
County FEs	Yes	Yes	Yes	Yes
Founding year FEs	Yes	Yes	Yes	Yes
Adj R^2	0.046	0.062	0.106	0.072

Note: This tables reports estimates of entrepreneurs' firm-performance regressions. The samples include all firms founded during the 2002–2005 period that were actively operating in 2005. Moreover, the CEOs of the firms had to be employees in firms with 6–14 employees in 1999. The dependent variables in Columns (1)–(4) are (1) five-year survival, (2) log of value added in 2010, (3) log of sales per employee in 2010, and (4) log of number of employees in 2010. Treat is a dummy variable equal to one if the individual worked in a firm with 10 or fewer employees in 1999. The models include six control variables based on values in 1999: age, gender, married, income, wealth, and number of unemployment days. All specifications also control for educational-level-by-major, industry, county, and founding-year fixed effects. Standard errors are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

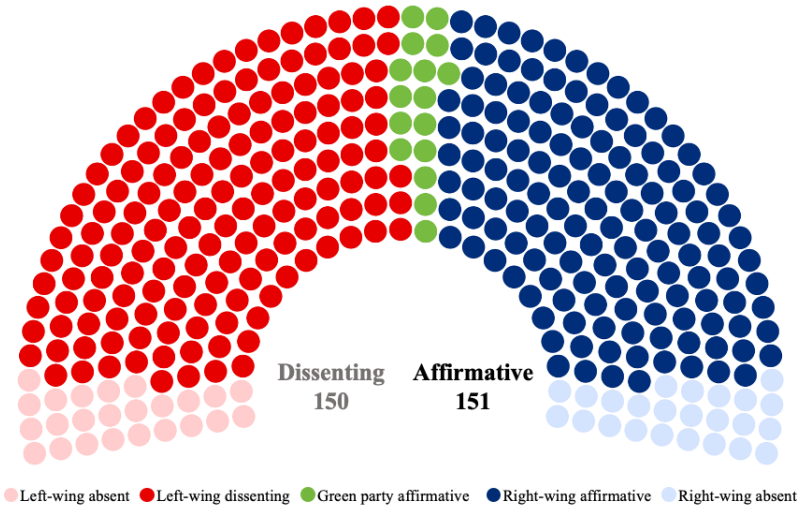
Appendix A The LIFO reform

The 2001 LIFO reform shocked the country (Lindbeck et al., 2006). First, the reform was proposed by an unusual coalition between the Green Party and the right-wing opposition parties. This proposal was strongly opposed by the ruling Social Democratic Party.[11] Second, the inquiry and referral process for this reform were quite short. In April 1999, the coalition requested that the Social Democratic government propose a law that would allow firms to exempt two workers from the LIFO rule. The proposal to reform the Swedish job-security legislation was however not publicly discussed until February 2000 when the Ministry of Industry presented a response to the coalition's request. The Ministry of Industry provided two alternatives: (1) All firms should be allowed to exempt two employees from the LIFO rule or (2) Only firms with fewer than 10 employees can exempt two workers. The Social Democratic government chose to propose alternative (1) to the Parliament with the amendment that exempted individuals should be "key workers" of "specific importance" to the firm, and that such specific importance must be assessed by a court of law. The coalition was against this proposition, arguing that small firms wouldn't be able to afford the legal fees, hence in practice small firms would not be able to benefit from the reform. Furthermore, the Green Party would only accept a reform that targeted small firms. In September 2000, Parliament's Labor Market Committee, therefore, developed a new proposal suggesting that firms with fewer than 11 employees could be allowed to exempt two workers. In addition, the employers were given the right to assign key-worker status. Parliament voted in favor of this proposal on October 11, only one month after the bill was presented. Third, the voting outcome of this reform proposal was expected to be very close. Figure A.1 shows how narrow the margin was: 151 Members of Parliament (the coalition of the Green Party and the right-wing opposition) voted in favor, 150 (the

[11] The formation of the Swedish government is mostly a struggle between two political blocs. The Social Democratic Party and the Left Party form the left-wing Socialist bloc, while the right-wing bloc of the bourgeois parties comprises the Moderate Party, the Christian Democrats, the Centre Party, and the Liberals. After the 1998 general election, the 349 seats in the Parliament were distributed as follows: Social Democratic Party (131), Left Party (43), Moderate Party (82), Christian Democrats (42), Centre Party (18), Liberals (17), and Green Party (16).

left-wing coalition) voted against, and the rest abstained (Parliamentary Protocol 2000/01:9). Eventually, the proposal was passed, as decisions in Parliament are made by a simple majority.

Figure A.1: Parliament voting results on the LIFO reform



Notes: This figure shows the distribution of votes on the parliamentary decision regarding LIFO reform on October 11, 2000. The left-wing in the red-color coalition consists of the Swedish Social Democratic Party (131 seats in total, of which 17 were absent and 114 were dissenting votes) and the Left Party (43 seats in total, of which seven were absent and 36 were dissenting votes). The right-wing coalition in blue colors includes the Moderate Party (82 seats in total, of which 11 were absent and 71 were affirmative votes), the Christian Democrats (42 seats in total, of which six were absent and 26 were affirmative votes), the Centre Party (18 seats in total, of which two were absent and 16 were affirmative votes) and the Liberals (17 seats in total, of which five were absent and 12 were affirmative votes). The Green Party in the green color had 16 seats in total and all of their votes were affirmative.

Appendix B Supplementary Tables

Table B.1: Mean comparison between treatment and control groups, firms size 10–11

Panel A: Individual-level characteristics				
Firm size	10	11	Difference	t-stat
Observations	16,974	16,670		
Age	35.781	35.784	−0.003	0.04
Male	0.655	0.662	−0.007	1.36
Married	0.388	0.382	0.006	1.21
Undergrad	0.217	0.215	0.002	0.45
Log Income	12.151	12.173	−0.022***	4.59
Log Wealth	13.207	13.316	−0.109	1.42
Log Unemployment days	0.764	0.749	0.015	0.83
Entry during 2001–2005	0.079	0.073	0.006**	1.98
Panel B: Firm-level characteristics				
Firm size	10	11	Difference	t-stat
Observations	2,111	1,802		
Average employee age	37.523	37.494	0.029	0.14
Male	0.679	0.682	−0.003	0.38
Log Avg salary	12.265	12.269	−0.003	0.32
Log Sales	16.149	16.218	−0.069***	2.64
Log Value added	15.115	15.203	−0.088***	5.13
Log Sales per employee	13.846	13.820	0.026	1.00

Note: This table reports the means and mean differences of key individual- and firm-level variables as measured in 1999, two years before the policy reform for firms sized 10–11. The main outcome variable is entry during 2001–2005. Panel A tests the individual differences between treatment and control groups, specifically comparing employees from firms with an employment size of 10 to those from firms with 11 employees as of 1999. Panel B examines the differences across firms using the same criteria for defining treatment and control groups. *, **, and *** indicate significance of t-test at the 10%, 5%, and 1% levels, respectively.

Table B.2: Differential entry likelihood for employees in firms with fewer than 11 employees

Year of entry	Coefficient	Std. Error
1995	0.0035***	0.0007
1996	0.0010*	0.0006
1997	0.0022***	0.0005
1998	0.0005	0.0004
1999	0.0009**	0.0004
2000	0.0006	0.0004
2001	0.0012***	0.0004
2002	0.0071***	0.0009
2003	0.0016***	0.0005
2004	0.0175***	0.0013
2005	0.0029***	0.0006
2006	0.0028***	0.0007
2007	0.0033***	0.0006
2008	0.0026***	0.0006
2009	0.0031***	0.0005
2010	0.0018***	0.0006

Note: This table shows the estimated coefficients of treat on entry into entrepreneurship. The year of entry ranges from 1995 to 2010.

Table B.3: The effects of LIFO reform on entrepreneurship, firm size 10–11

	Entry during 2001–2005
Treat	0.0064**
	(0.0029)
Log Age	-0.0181**
	(0.0076)
Male	0.0281***
	(0.0033)
Married	0.0274***
	(0.0032)
Log Income	0.0697***
	(0.0036)
Log Wealth	0.0028***
	(0.0002)
Log Unemployment days	-0.0064***
	(0.0009)
Constant	-0.7737***
	(0.0474)
Observations	33,644
Educational-level × Major FEs	Yes
Industry × County FEs	Yes
Adj R^2	0.052

Note: This table reports the regression estimates of entry into entrepreneurship for a subsample of employees from firms of size 10–11. Individuals are defined as entrepreneurs if the majority of their taxable income is derived from an incorporated business they fully or partially own. The dependent variable equals one if an individual becomes an entrepreneur during the 2001–2005 period. Treat is a dummy variable that equals one if the individual worked in a firm with 10 or fewer employees in 1999. The model includes the following control variables measured as of 1999: age, gender, married, income, wealth, and number of unemployment days. Income is an individual's total pretax annual income. Wealth is the market value of an individual's financial and real assets. We control for educational-level×major and industry-by-county fixed effects. Standard errors are clustered at the firm level and are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table B.4: LIFO reform, STEM education and entrepreneurship

	Entry during 2001–2005	
	(1)	(2)
Firm size	6–14	10-11
Treat	0.0210***	0.0054*
	(0.0018)	(0.0030)
STEM undergrad	0.0137**	0.0267***
	(0.0056)	(0.0075)
Treat × STEM undergrad	0.0188**	0.0129
	(0.0074)	(0.0104)
Observations	161,828	33,644
Controls	Yes	Yes
Industry × County FEs	Yes	Yes
Adj R^2	0.046	0.047

Note: This table reports the estimates of entry into entrepreneurship with treat interacted with the educational-level-by-major category STEM Undergraduate. The regressions are performed on two samples with firm size bandwidths of 6–14 (Column 1) and 10–11 (Column 2), determined in year 1999. The models include six control variables measured as of 1999: age, gender, married, income, wealth, and number of unemployment days. We control for industry-by-county fixed effects. Standard errors are clustered at the firm level and are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table B.5: Subsample analysis: LIFO reform and entrepreneurship

	Entry during 2001-2005			
Subsample	(1) excl ICT	(2) only ICT	(3) excl Sthlm	(4) only Sthlm
Treat	0.0225***	0.0184	0.0208***	0.0304***
	(0.0019)	(0.0149)	(0.0020)	(0.0052)
Observations	158,604	3,224	137,953	23,875
Controls	Yes	Yes	Yes	Yes
Edu level × Major FEs	Yes	Yes	Yes	Yes
Industry × County FEs	Yes	No	Yes	Yes
Adj R^2	0.046	0.044	0.044	0.053

Note: This table reports regression estimates of entry into entrepreneurship for different subsamples depending on whether the individuals worked in the ICT sector and whether they worked in the Stockholm area. All subsamples include individuals employed in firms with 6–14 employees with additional restrictions: Column (1) reports the results for a subsample that excludes employees in the ICT sector, while Column (2) includes only employees in the ICT sector. Column (3) excludes employees in firms in the Stockholm area, whereas Column (4) includes only employees in firms in the Stockholm area. The models include six control variables measured as of 1999: age, gender, married, income, wealth, and number of unemployment days. We control for educational-level-by-major and industry-by-county fixed effects. Standard errors are clustered at the firm level and are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table B.6: The effects of employee tenure on entrepreneurship, firm size 10–11

	Entry during 2001–2005
Treat	0.0164***
	(0.0054)
Juniority	-0.1115***
	(0.0077)
Treat × Juniority	-0.0249**
	(0.0104)
Observations	33,644
Controls	Yes
Educational-level × Major FEs	Yes
Industry × County FEs	Yes
Adj R^2	0.060

Note: This table reports the effect of tenure on entry into entrepreneurship, with a subsample of employees from firms of size 10–11. Individuals are defined as entrepreneurs if the majority of their taxable income is derived from an incorporated business they fully or partially own. The dependent variable equals one if an individual becomes an entrepreneur within the period 2001–2005. Treat is a dummy variable that equals one if the individual worked in a firm with 10 or fewer employees in 1999. Juniority is the fraction of employees who joined the firm before the employee. The model includes six control variables measured as of 1999: age, gender, married, income, wealth, and number of unemployment days. We control for educational-level-by-major and industry-by-county fixed effects. Standard errors are clustered at the firm level and are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table B.7: Entrepreneurs' income dynamics, firm size 10–11

	(1) Inc. growth	(2) Total disc. inc.	(3) Income vol.
Treat	0.0004	-0.0024	0.0088
	(0.0117)	(0.0046)	(0.0092)
Entry	0.1257***	0.1417***	0.6361***
	(0.0278)	(0.0141)	(0.0296)
Treat × Entry	0.0829**	0.0327	-0.0035
	(0.0384)	(0.0199)	(0.0424)
Observations	32,784	33,118	33,131
Controls	Yes	Yes	Yes
Edu level × Major FEs	Yes	Yes	Yes
Industry × County FEs	Yes	Yes	Yes
Adj R^2	0.055	0.430	0.233

Note: This table presents the relationship between individual income and entry into entrepreneurship with a subsample of employees from firms with size 10–11. The dependent variables in Columns (1)–(3) are (1) income growth rate, defined as the log growth rate of income between 1999 and 2010; (2) total discounted income during the 2000–2010 period with an annual discount rate of 2%; and (3) income volatility, defined as the standard deviation of annual log total income during 2000–2010. Treat is a dummy variable equal to one if the individual worked in a firm with 10 or fewer employees in 1999. Entry is a dummy variable equal to one if the individual became an entrepreneur during the 2001–2005 period. The models include five control variables based on values in 1999: age, gender, married, income, and number of unemployment days. All models also control for educational-level-by-major and industry-by-county fixed effects. Standard errors are clustered at the firm level and are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

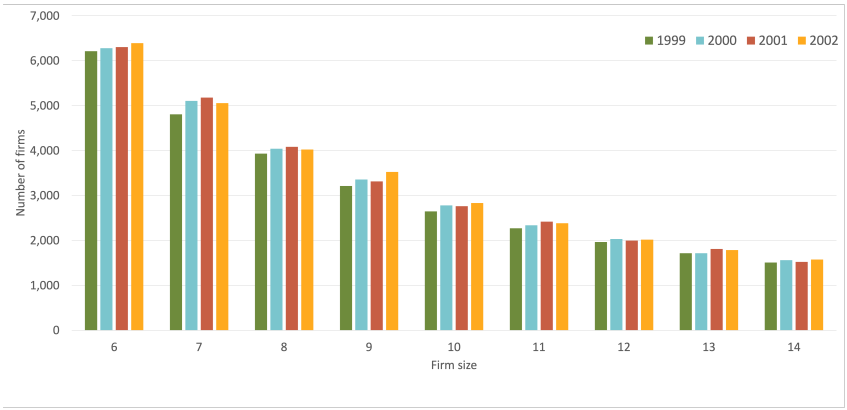
Table B.8: Entrepreneurs' business performance, firm size 10-11

	(1) Five-year survival	(2) Log Value added	(3) Log Sales per empl.	(4) Log Num. of empl.
Treat	0.0165	0.3306*	0.1666	0.1921
	(0.0464)	(0.1768)	(0.1049)	(0.1197)
Observations	390	243	243	243
Controls	Yes	Yes	Yes	Yes
Educational-level × Major FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
County FEs	Yes	Yes	Yes	Yes
Founding year FEs	Yes	Yes	Yes	Yes
Adj R^2	0.015	0.059	0.250	0.064

Note: This tables reports estimates of entrepreneurs' firm-performance regressions for a subsample of employer firm sizes 10–11. The samples include all firms founded during the 2002–2005 period and that were actively operating in 2005. Moreover, the CEOs of the firms had to be employees in firms with 10–11 employees in 1999. The dependent variables in Columns (1)-(4) are (1) five-year survival, (2) log of value added in 2010, (3) log of sales per employee in 2010, and (4) log of number of employees in 2010. Treat is a dummy variable equal to one if the individual worked in a firm with 10 or fewer employees in 1999. The models include six control variables based on values in 1999: age, gender, married, income, wealth, and number of unemployment days. All specifications also control for educational-level-by-major, county, industry, and founding-year fixed effects. Standard errors are presented in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

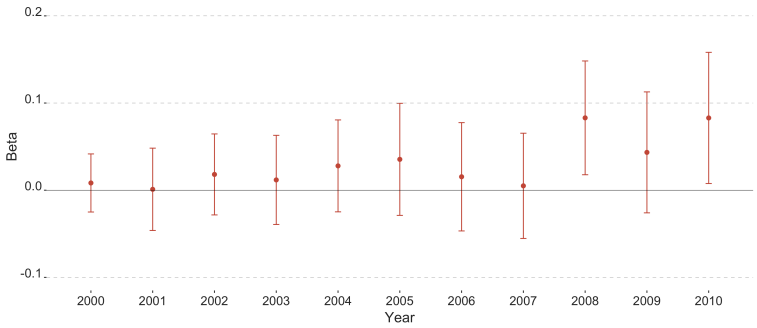
Appendix C Supplementary Figures

Figure C.1: Firm distribution before and after the LIFO reform



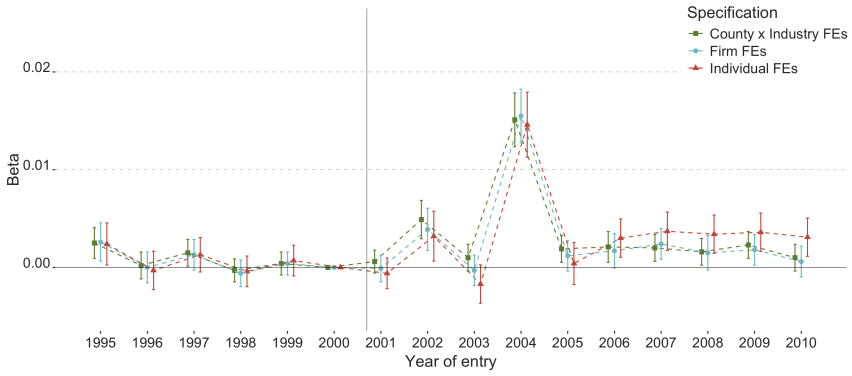
Notes: This figure plots the distribution of firm sizes among firms with 6–14 employees by year from 1999 to 2002.

Figure C.2: Dynamics of income growth rate, firm size 10–11



Notes: This figure plots the coefficients of treat ×entry on the income growth rate for each year between 2000 and 2010, relative to the level in 1999 for a subsample of employees in firms of size 10–11. Each point corresponds to a coefficient estimate with vertical lines indicating the 95% confidence intervals.

Figure C.3: Difference-in-Differences analysis: The effect of the LIFO reform on entrepreneurship entry



Notes: This figure shows the DiD coefficient estimates of year×treat on entry into entrepreneurship from a panel regression for the years 1995–2010. The gray vertical line indicates the time point when the reform was announced to the public. Each point corresponds to a coefficient estimate for a given year of employment-size determination. Year of employment-size determination, which establishes treatment status, is set to two years prior to the year of entry. The vertical green, blue, and red lines indicate the 95% confidence intervals. The colors indicate the use of different fixed effects.

II

Effects of cultural origin on entrepreneurship*

Sara Jonsson and Qinglin Ouyang

Abstract

This paper investigates the effects of cultural origin on entrepreneurship. Using Swedish administrative data on second-generation immigrants and risk appetite measures from the Global Preference Survey (GPS), we investigate whether risk preferences in parents' home countries affect entrepreneurship. We find that children of immigrants from more risk-loving cultures are more likely to start up a business, although of poorer quality. We also find that entrepreneurs with parents from cultures with higher risk appetite earn a lower personal income. Our analysis demonstrates that culturally transmitted risk appetite has significant effects beyond individual and parental socio-economic characteristics.

Keywords: Culture, Entrepreneurial entry, Risk appetite, Firm performance, Personal income

JEL Codes: Z10, G50, L26, D14, G02

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1 Introduction

We study the role of cultural origin on entry into entrepreneurship, firm performance, and entrepreneurs' personal income. Specifically, we examine the effects of a distinct culturally transmissible preference that is important to entrepreneurship: risk appetite (e.g. Bitler et al., 2005; Moskowitz and Vissing-Jørgensen, 2002; Kihlstrom and Laffont, 1979). A challenge in studies on the effects of culture is to separate the effects of culturally transmitted preferences on entrepreneurship from other institutional and economic factors. A culture that drives one type of behavior could also result in institutions and policies that encourage and promote the specific behavior (Guiso et al., 2006). When analyzing cross-country data, it is usually challenging to distinguish whether the decision to become an entrepreneur is due to institutional or cultural factors. To overcome these concerns, we examine the entrepreneurial decisions of second-generation migrants in Sweden, a subsample of the Swedish population who were born in Sweden but have two parents born in the same foreign country, with risk preferences associated with their parents' countries of origin. Our identification strategy uses the opportunity to observe this subsample with varying parental background in the same institutional environment. In this way, culturally explained differences in entrepreneurial activity, firm performance, and entrepreneurs' personal income can be distinguished from other institutional and country-level economic factors. Furthermore, the fact that migrants' home and host countries are spatially separated eliminates the possibility of reverse causality. This is because the economic and institutional conditions in migrants' home countries are no longer relevant for second-generation immigrants because the latter are born and raised in different countries and time periods.

Several studies however find that non-cognitive skills (e.g., risk appetite) transmit from parents to children (Zumbuehl et al., 2013; Dohmen et al., 2012). Furthermore, several studies document that the descendants of immigrants show cultural distinctiveness over several subsequent generations (e.g., Giavazzi et al., 2019; Dohmen et al., 2012; Fernández and Fogli, 2009; Guiso et al., 2006). Using US survey data, Chanda and Unel (2021) find that risk preferences in parents' home countries affect second-generation immigrants' decision

to become entrepreneurs. Their study, however, does not control for important parental characteristics that may affect entrepreneurship. The literature, for example, have suggested that parental entrepreneurship is among the most prominent factor explaining entrepreneurship (Lindquist et al., 2015; Andersson and Hammarstedt, 2011, 2010; Sørensen, 2007; Dunn and Holtz-Eakin, 2000).[1]

We use Swedish longitudinal individual-workplace matched data provided by Statistics Sweden to study how culturally inherited risk appetite affects entrepreneurship. Starting with this dataset, we construct a sample consisting of the population of second-generation migrants in Sweden and merge it with risk preferences in their parents' countries of origin derived from the Global Preference Survey, GPS (Falk et al., 2018). The GPS is an experimentally validated survey dataset of economic preferences, including risk preference, from 76 countries representing approximately 90 percent of the world's population. By analyzing the rich register data that allow controlling for parental entrepreneurship and parental socioeconomic factors, we investigate if culturally inherited risk appetite affects entrepreneurship over and above other important parental characteristics. Our results show that an increase of one standard deviation of culturally inherited risk appetite raises the probability of becoming an entrepreneur by 30 percent, which is economically non-trivial. The findings are robust to a list of stricter specifications.

In our further analysis, we investigate the effects of culturally inherited risk appetite on entrepreneurs' firm- and individual-level performance post the employment-to-entrepreneurship transition. The theoretical prediction that less risk averse individuals become entrepreneurs (Kihlstrom and Laffont, 1979) further implies that these individuals will perform worse as entrepreneurs. The explanation for this is that individuals with higher tolerance for risk are willing to become entrepreneurs in expectation of lower returns, keeping the risk constant. This hypothesis is supported by prior empirical findings. Hvide and Panos (2014) find that once engaged in entrepreneurship, entrepreneurs with a higher portion of wealth invested in stocks perform worse than less invested entrepreneurs. We contribute to these

[1]Explanations of this intergenerational transmission of entrepreneurial activities include inheriting a business (Sørensen, 2007) and less costly acquisition of knowledge and resources (Fairlie and Robb, 2007).

findings by investigating if entrepreneurs' culturally inherited risk appetite affects firm performance. Our results show that firms founded by entrepreneurs with parents from more risk-loving countries exhibit lower revenues, achieve lower value added, are less profitable, and have fewer employees compared to firms founded by entrepreneurs whose parents are from less risk-loving countries. We find a consistent pattern on investigating the effects of culturally inherited risk appetite on entrepreneurs' personal income: Entrepreneurs with parents from more risk-loving countries exhibit lower discounted total income in the ten-year horizon.

This paper contributes to two strands of the literature. First, uncovering potential relations between culture and entrepreneurship, firm performance, and entrepreneurs' personal income should further our understanding of individual background factors that affect entrepreneurship, but also shed light on the variations in entrepreneurship between countries. Cross-country differences could be attributable to institutions and policies. This study specifically assesses the relevance of the cultural factor. We contribute by studying not only the individual's decision to enter entrepreneurship, but also entrepreneurial firms' performance and entrepreneurs' personal income, thus painting a more complete picture of how cultural origin affects entrepreneurial activities. Second, this study contributes to the research on the role parents play in shaping entrepreneurship. Several studies find that parental entrepreneurship substantially increases the probability of their children's entrepreneurship. Controlling for parental entrepreneurship we show that parents matters over and above such parental influence and could act as a mechanism for the effects of cultural heritage.

The reminder of this paper is organized as follows. Section 2 presents the data, variables, and summary statistics. Section 3 analyzes entry into entrepreneurship. Section 4 analyzes firm performance, and in Section 5 we analyze entrepreneurs' personal income. Section 6 presents robustness analyses and Section 7 concludes.

2 Data and variables

We collect individual data from the dataset "Longitudinal integrated database for health insurance and labor market studies" (LISA),

the Workplace and Enterprise registers (Företagsregistret), and the Swedish wealth registry (Förmögenhetsregistret). The LISA dataset is linked to the Workplace and Enterprise registers through individuals' workplaces, providing firm level accounting variables. This dataset contains information on all the individuals who reside in Sweden and are over 16 years old as of November in each year. The LISA dataset also allows for the child-parent connection, which enables us to identify parents' countries of origin for each second-generation immigrant. All these datasets are provided by Statistics Sweden (the government's statistical agency). We restrict the sample to second-generation immigrants with two parents born in the same foreign country in order to ensure that the results are not affected by mixing different cultures. In addition, we restrict our sample to individuals between 25 and 55 years old to eliminate individuals in education or close to retirement. We follow Chanda and Unel (2021) and Fairlie and Meyer (2003) and restrict the sample to individuals with a connection to the labor market (individuals registered as employees during the previous year). We do so in order to mitigate the possibility that an unemployed individual enter entrepreneurship because of a lack of other labor market opportunities. After matching these data with the GPS data, we have a baseline sample of 23,276 individuals. The sample is based on data from 2003.

We define individuals as entrepreneurs if they derive at least 50 percent of their total taxable labor income from an incorporated nonagricultural business they own in full or in part (cf. Gottlieb et al., 2022; Vladasel et al., 2021; Lindquist et al., 2015; Hvide and Panos, 2014).[2] The binary outcome variable *Entry* has a value of one if the individual was *ever* an entrepreneur under the above definition during 2004-2014, and zero otherwise.

Our main variable of interest measures risk appetite associated with second-generation migrants' ancestral countries (i.e., their parents' countries of origin). For this purpose, we use data from the Global Preference Survey (GPS), a validated survey dataset that measures global variation in preferences, including risk preferences, from a sample of 80,000 individuals in 76 countries, representing ap-

[2]Swedish taxes are assessed based on individual income and not on combined spousal income. Hence, our data record self-employment and wage employment for each individual.

proximately 90 percent of the world's population (Falk et al., 2018). The survey is carried out on representative samples within each country. Risk preferences, or risk appetite, are measured through a series of related quantitative questions and one qualitative question. The quantitative survey measure consists of a series of five binary choices. Choices are between a fixed lottery, in which the individual could win x or zero, and varying sure payments, y. Choice of the lottery resulted in an increase of the sure amount being offered (y) in the next question, and vice versa, thereby capturing the individual's certainty equivalent. The qualitative item asks respondents to self-assess their willingness to take risk on an 11-point Likert scale ("In general, how willing are you to take risks?"). To obtain a composite measure of risk appetite, the results from the quantitative and qualitative measures are given roughly equal weights. Each preference is normalized to have mean 0 and standard deviation 1 in the individual-level data. Country averages are computed using sampling weights to ensure correct representation of the population at the country level. The mean remains close to 0, while the standard deviation is 0.30 for the 76 country level observations. Higher values represent higher risk appetite. For more detailed information on the GPS dataset, see Falk et al. (2018).

Although the across-country variation in preferences is substantial, within-country variation is larger, suggesting that individual characteristics are even more important for explaining preference differences than national borders. The willingness to take risk is, for example, lower for females and decreases with age (Falk et al., 2018). We follow the procedure proposed by Chanda and Unel (2021) [3] to account for such demographic heterogeneity and estimate the following equation:

$$\textit{Risk appetite}_{ic} = \beta_c D_{ic} + R_c + \nu_{ic}, \tag{1}$$

where $\textit{Risk appetite}_{ic}$ is the risk level of individual i living in country c, D_{ic} includes age and age squared, R_c are gender-specific country fixed effects, and ν_{ic} is the error term. $\textit{Risk appetite}_{ic}$ and D_{ic} are

[3] We are grateful to Areendam Chanda and Bulent Udel for sharing their STATA code for estimating gender-specific risk appetite.

collected from the individual level GPS. We then use the estimated values of the fixed effects, R_c, as the gender-specific measure of risk appetite in country c. β_c is allowed to vary between countries because risk-taking between countries might change heterogeneously as people age. [4]

A majority (17,506 individuals or three-quarters) of the second-generation immigrants in our sample have two parents who were born in Finland. The second and third largest groups of second-generation immigrants have parents from Germany (1,110 individuals or 4.7 percent) and Turkey (1,034 individuals or 4.4 percent). In the Robustness section, we address those concerns that the results might be driven by individuals with parents from Finland. Excluding these individuals yields similar results.

We control for several individual level factors known to affect entry into entrepreneurship. To avoid endogeneity in the entry, firm, and individual level regressions, we use predetermined values of control variables as of 2003. *Age* is a determinant of entrepreneurship in the sense that the typical entrepreneur is a middle-aged individual (Azoulay et al., 2020). Men (*Male*) are more likely to become entrepreneurs (GEM, 2022). Past research finds that family characteristics, such as marital status and number of children, predict individuals' self-employment (e.g., Taniguchi, 2002; Renzulli et al., 2000). We account for these explanations in the empirical specification. *Marital status* equals to one if an individual is married or in a registered partnership. *Children* measures the number of children under 18 years old still living at home. Since *Education* and *Income* are likely strongly correlated with the skills that are relevant to entrepreneurship, we categorize education into three broad categories based on each individual's highest completed educational level: high school or lower, undergraduate, and post-graduate, and income is captured by an individual's pretax annual all factor income, including total labor income as well as capital income (e.g., dividends, return on financial assets). *Wealth* is likely to be correlated with the opportunity to explore entrepreneurial opportunities, which is measured as an individual's total wealth and is collected from the Swedish Wealth Registry. This registry includes all financial as-

[4]For the list of the gender-specific risk appetite measures across the countries, we refer the readers to the appendix of the published version of this paper.

sets held outside retirement accounts as well as real assets at the end of the tax year, December 31st, reported by a variety of different sources, including the Swedish Tax Agency and financial institutions. The Wealth Registry data cover the period 1999-2007. We restrict the sample to individuals with a connection to the labor market. In addition, we include *Unemployment days* to measure the number of days an individual was registered as unemployed in 2003. We include municipality and industry fixed effects to account for entrepreneurial opportunities within a specific municipality or industry. Municipality refers to the location where an individual lives and Industry to their employment industry. Our study covers individuals residing in 280 municipalities. We define industries by one-digit Nomenclature of Economic Activities (NACE) codes.

Several studies find that parental entrepreneurship substantially increases the probability of their children's entrepreneurship. We therefore include Entrepreneurial parent as a control. Entrepreneurial parent is equal to one if at least one of the parents is in self-employment in 2003. That is, if at least one parent derives at least 50 percent of their total taxable labor income from an incorporated or unincorporated nonagricultural business they own in full or in part. This definition is similar to the baseline specification in Lindquist et al. (2015). Furthermore, our identification assumption will be violated if proxies for cultural preferences are systematically correlated with other factors that affect entrepreneurship; for example, if migrants from countries with a greater risk appetite are better educated, and children of highly educated individuals are more likely to be entrepreneurs. The fact that we can control for several parental characteristics mitigates these concerns. We include the following set of parental level socio-economic controls; parents' total income, parents' total wealth, age of father, age of mother, mother's education, and mather's education. It is possible that individuals with parents who have lived in Sweden for a long time are different in systematic ways from the rest of the sample. They could, for example, have better access to the network resources necessary to become entrepreneurs. We therefore also control for parent's duration of stay by computing *Years since immigration*.[5] This variable is defined as the number of years since

[5]It can also be argued that the effects of culturally inherited risk appetite are stronger for individuals whose parents only recently immigrated to Sweden and

the parent who has lived the longest time in Sweden immigrated. All individual and parental level controls are from 2003. Table 1 presents the descriptive statistics of these individual and parental characteristics. We note from panel A that about 5.1 percent of the individuals in our sample (individuals with employment in 2003) were entrepreneurs for at least one year during the period 2004-2014.

[Insert Table 1 around here.]

To investigate the effects of culturally inherited risk appetite on firm performance, we use the following dependent variables: (1) *Revenues*, (2) *Value added*, (3) *Profit margin*, (4) *Employees* $\geq$ *1* (i.e., the extensive margin), (5) *Number of employees* (i.e., the intensive margin) and (6) *Five-year survival*. *Employees* $\geq$ *1* is equal to one if the firm has at least one employee (excluding the entrepreneur) and zero otherwise. *Number of employees* is the firm-reported number of employees, excluding the entrepreneur. *Profit margin* is calculated as EBIT plus interest income over revenues. *Firm value* added is value of production minus value of depletion.

We assess entry into entrepreneurship during the period 2004-2014. The firm outcome analysis is based on yearly accounting data for the period 2004-2018. Panel A of Table 2 reports descriptive statistics for the firm-level variables for the start-up year. This panel tracks every firm in the sample from its first year onward until its exit (if applicable). For a subsample of individuals who became entrepreneurs during 2004-2014, we investigate if culturally inherited risk appetite affects personal income. Specifically, we investigate the effects on *Discounted total income* with a 2% discount for the period 2004-2014 (cf. Hamilton, 2000). Panel B of Table 2 presents the mean, median, and standard deviation of discounted income for this subsample.

[Insert Table 2 around here.]

thus weaker for individuals who have lived in Sweden for a long time. Thus, the interaction effects of risk appetite and Log(Years since immigration) could be negative. We test this assumption but find that the coefficient for the interaction term is insignificant.

3 Entry into entrepreneurship

To assess the effects of parents' cultural heritage on the probability to enter entrepreneurship we estimate the following linear probability model:

$$Entry_{ic} = \alpha + \beta \hat{R}_c + \gamma X_i + \delta Z_c + \varepsilon_{ic} \tag{2}$$

where $Entry_{ic}$ is equal to one if individual i with parents from country c became an entrepreneur during the period 2004-2014. $\hat{R}_c$ represents the adjusted value of gender-specific risk-taking in parents' birth country, as estimated from Eq. (1). X_i refers to a set of individual level control variables including dummies for male interacted with marital status, age (quadratic), children, education, total income, wealth, and unemployment days; and parental controls including a dummy indicating whether at least one of the parents is an entrepreneur (entrepreneurial parent), parents' total income, parents' total wealth, age of father, age of mother, mother's education, father's education, and years since immigration. This set of controls also includes industry and municipality fixed effects. Z_c is a set of geographical country level controls found to affect cross-country development outcomes, including absolute latitude, landlocked dummy, island dummy, average elevation (meters), roughness of terrain, and distance to the sea or navigable rivers (cf. Chanda and Unel, 2021). These data, as well as the detailed descriptions, are provided by Galor and Özak (2016). To alleviate endogeneity concern of reverse causality, we use predetermined values from 2003 for the control variables. ε_{ic} is the error term, clustered at the level of parental countries of birth.

Columns 1 to 4 of Table 3 reports the coefficients based on the linear probability model outlined in Eq. (2). Column 1 shows the results of regressing Entry on gender-specific risk-taking in parents' birth country, $\hat{R}$. We gradually add more controls in the following columns; Column 2 shows the results including individual level controls; in Column 3 we also include parental level controls; and, ultimately, Column 4 also includes parents' birth country geographical controls. The coefficients for adjusted risk appetite are significant at least at the five-percent level and economically meaningful in all

four specifications. The estimated effect ranges from 0.1320 to 0.0401 for the most saturated model (Column 4). Hence, the coefficient estimates for ancestral risk appetite indicate that such risk appetite increases the probability of entering entrepreneurship. Including all covariates will likely result in a more accurate estimation of the effect of culturally inherited risk appetite. We find that a one standard deviation (0.38) increase in risk appetite increases the probability to enter entrepreneurship by at least 1.5 percentage points compared to the mean of 5.1 percent. This is equivalent to a non-negligible 30 percent increase.

We further re-specify Eq. (2) to a panel setting by replacing the dependent variable with $Entrepreneur_{ict}$, which is a binary variable equal to one if individual i with parents born in country c is identified as an entrepreneur in year t.[6] This specification enables us to include year fixed effects in order to control for time trends. Previous research for example finds that the Great Financial Crisis during 2007-2009, fostered "forced entrepreneurs" (Hacamo and Kleiner, 2022). The results presented in Column 5 show that the effect of risk appetite on entrepreneurship persists. The coefficient is 0.0088, suggesting that a one standard deviation increase in risk appetite raises the probability of being an entrepreneur by 0.33 percentage point, which is equivalent to a 16 percent increase compared to the sample mean. These finding are comparable to Chanda and Unel (2021) who analyze U.S. data and find that culturally inherited risk appetite increases the probability of entrepreneurship by 18 percent.

Turning to the control variables, the results indicate that wealth and income are positively associated with the probability of entering entrepreneurship. Our dataset allows unique access to parental controls. Comparing the coefficient estimates in the specification without parental controls (Column 2) to the specification with parental controls (Column 3) indicates that the effect of culturally inherited risk appetite is somewhat underestimated in the specification with-

[6] We replace the dependent variable because the *Entry* dummy was evaluated based on entry into entrepreneurship sometime during the time-period from 2004 to 2014, rendering the variable inapplicable in a panel setting. We did not construct a one-year entry dummy in the same vein, because such a variable cannot capture one's remaining entrepreneurial status after entering. In other words, the *Entry* dummy will take the value of one when and only when the individual switches to entrepreneurship from employment.

out such controls. The results reported in Columns 3- 5 confirm previous research that having entrepreneurial parents significantly increases the probability to enter entrepreneurship (e.g., Lindquist et al., 2015).

[Insert Table 3 around here.]

Including numerous observable controls does not necessarily exclude the possibility that unobservables are driving our results to a large extent. To alleviate this concern, we provide Oster (2019)'s δ statistic which suggests how important unobservables need to be compared to observables to fully explain our results by omitted-variable bias. We set R^2_{max}, the R-squared from a hypothetical regression of the outcome variable on risk appetite, observables and unobservables, to be 1.3 $\widetilde{R}^2$, which is obtained from the baseline regression presented in Table 2. The calculated δ-statistic is around 1.58, suggesting that unobservables need to be more important than the observables to produce a risk appetite effect of zero. Altonji et al. (2005) and Oster (2019) provide a practical cutoff for δ of 1, based on which we can confidently argue that our results are not mainly driven by unobserved characteristics.

4 Firm performance

Next, we examine whether firm performance is associated with entrepreneurs' culturally inherited risk appetite. The analyses are based on yearly accounting data. All the firms included in this exercise were founded no earlier than 2004, thus providing a meaningful comparison and reducing the number of incidents where an individual became an entrepreneur by joining a well-operating firm and became a major shareholder. Our dataset enables us to connect firms to their CEO, whereby for each firm only one CEO is identified (Andersson and Andersson, 2009) and is considered to be an entrepreneur. We analyze the performance for a yearly panel for the period 2004-2018. Specifically, we estimate the following equation:

$$Firm\ performance_{jckmt} = \alpha + \beta\hat{R}_c + \gamma X_i + \delta Z_c + \zeta ln(Start\ equity)_j + \lambda ln(Firm\ age)_{jt} + \eta_k + \theta_m + \nu_t + \varepsilon_{jckmt} \quad (3)$$

Where $Firm\ \ performance_{jckmt}$ denotes either revenues, value added, profit margin, employee ≥ 1 (a dummy equal to one if the firm has more than one employee), or number of employees at time t for the firm j of industry k in municipality m with the entrepreneur's (CEO's) parents being originally from country c. In addition, we examine a firm's five-year business survival since firm establishment (5-year survival). The independent variable of interest is the adjusted risk appetite in an entrepreneur's parents' country of origin- $\hat{R}_c$. The coefficient of interest is β. We use equity during the start-up year in logarithmic terms to control for a firm's start-up size or financing (Hvide and Panos, 2014). X_i and Z_c are lists of the same individual and country level predetermined controls used in Eq. (2), where i refers to the entrepreneur and c to the country of the entrepreneur's parents. $Firm\ age_{jt}$ denotes firm j's age at year t. We include industry (η_k) and municipality (θ_m) fixed effect to control for growth opportunities within a specific industry or municipality, and year (ν_t) fixed effect to control for business cycle effects. ε_{jckmt} is the error term clustered at firm level to account for serial correlations between repeated observations by the same firm. The panel data approach examines the entire lifespan within the 2004-2018 period for each firm in the sample, from inception until exit (if applicable). Table 4 reports the results.

Our analyses suggest that culturally transmitted risk appetite is negatively associated with firm performance. One standard deviation (0.38) increase in an entrepreneur's risk appetite is associated with approximately 25 percent lower revenues, as well as value added, and a 3-percentage-point lower profit margin. The sample mean profit margin is around 18% in the first year of firm operation. Furthermore, the probability of hiring at least one employee is lower but non-significant, and the number of employees is reduced by 2 if an entrepreneur's risk appetite rises by one standard deviation. The survival rate evaluated according to a 5-year period is lower for firms

with more risk-loving entrepreneurs, although the coefficient is not statistically significant.

[Insert Table 4 around here.]

We conclude that individuals with parents from more risk-loving countries are more likely to start up a firm, although of poorer quality. These findings are in line with theoretical predictions that less risk averse individuals are willing to accept lower expected returns for given risk. The findings are also in line with empirical findings on the effects of risk tolerance on entrepreneurial performance. Hvide and Panos (2014) find that entrepreneurs with a larger share of their wealth invested in stocks perform worse than less invested entrepreneurs. Our findings show that culturally inherited risk preferences have a similar effect.

5 Entrepreneurs' personal income

In this section, we investigate the effects of culturally inherited risk appetite on entrepreneurs' financial wellbeing proxied by their total personal income. For a subsample of individuals who entered entrepreneurship during 2004-2014, we estimate the following regression:

$$\textit{Discounted total income}_{ic} = \alpha + \beta \hat{R}_c + \gamma X_i + \delta Z_c + \varepsilon_{ic} \qquad (4)$$

where $\textit{Discounted total income}_{ic}$ denotes present discounted total income (labor and capital income) for the period 2004-2014 for entrepreneur i with parents from country c. The present values are calculated using a 2% discount rate, which was chosen to align with studies on entrepreneurial income (e.g., Hamilton, 2000). The independent variable of interest is the adjusted risk appetite in an entrepreneur's parents' country of origin, $\hat{R}_c$. The coefficient of interest is β. X_i and Z_c include the same individual and country level predetermined controls used in Eq. (2), where i refers to the entrepreneur and c to an entrepreneur's parents' country of origin. X_i also includes the year of entry fixed effects to control for business cycle effects. The

results presented in Table 5 indicate that entrepreneurs with parents from more risk-loving countries have lower total present discounted incomes. The coefficient -0.1392, significant at a 10 percent level, implies that one standard deviation higher risk appetite correlates with a 5 percent lower total income. To conclude, the results from the personal level income analysis are in line with the results from the firm performance analysis. Culturally inherited risk appetite affects entrepreneurs' personal financial well-being once they are entered into entrepreneurship.

[Insert Table 5 around here.]

6 Robustness

6.1 Alternative culturally inherited risk appetite measures

Our identification strategy relies on the spatial separation between individuals living in Sweden and their parents' countries of origin. It is unlikely that cross-sectional variations in the decision to engage in entrepreneurship in Sweden should have an impact on risk appetite between countries. However, one objection could be that the GPS survey data were collected in 2017 and that we assess entrepreneurial entry during the period 2004-2014. Because cultural values are persistent and formed over long time periods (Zucker, 1977), it is highly likely that the cross-country variation in risk-appetite is persistent. However, as a robustness check, we follow Ek et al. (2022) and use a more historical measure of cultural risk-taking, providing an intuitive justification for the origin of cultural differences in risk appetite.

Countries differ in terms of the types of recreational activities, or games, that citizens engage in. Roberts et al. (1959) distinguish between three types of competitive games: physical skill, chance, and strategy. While games of physical skill must involve physical effort and possibly strategy or chance (e.g., running a marathon), games of strategy should not include physical effort but strategic thinking and possibly chance (e.g., playing poker). Games of chance must include chance but not physical effort or strategy (e.g., dice games). Engaging in games with a chance component conveys risk taking. Hence, game

heterogeneity can be used as a variable for measuring risk appetite in a society. We collect data on games from the Ethnographic Atlas (Murdock, 1965). The Ethnographic Atlas is a historical dataset with information on pre-industrial societies, covering various aspects of life including games. The Atlas classifies societies' games where any of the three elements, physical effort, strategy, or chance, were present. We proxy risk-taking in the parents' countries of origin with the share of people whose ancestors played games that involved chance (cf. Ek et al., 2022; Giuliano and Nunn, 2018). Table 6 presents the findings. Specifically, we investigate if children who descended from cultures where their ancestors' games were more based on chance, rather than physical effort or strategy, are more likely to enter entrepreneurship. Consistent with our baseline findings we find that children with an ancestral culture of risk taking are more likely to enter incorporated entrepreneurship. To conclude, this analysis confirms that cultural traits descended from centuries ago influence individuals' tendencies to enter entrepreneurship today and that the effect is similar to more contemporary measures of risk appetite (Falk et al., 2018).

[Insert Table 6 around here.]

6.2 Additional robustness analyses

In this section we present additional robustness analyses including (1) controlling for the preferences patience and trust, (2) excluding individuals with parents from Finland from the sample and (3) excluding the Great Financial Crisis period by narrowing the timeframe to the period 2004-2006. While this study focuses on risk appetite, other preferences could potentially also affect entrepreneurship. Patience is important in entrepreneurship since starting a new business requires initial investments along with delayed and uncertain returns. Furthermore, patience and willingness to take risks are positively correlated preferences in the GPS (Falk et al., 2018). The Patience measure in the GPS combines the responses of two survey measures, one quantitative and one qualitative. The quantitative survey measure consists of a series of hypothetical binary choices between immediate and delayed financial awards. In each of the five questions, the respondents have to choose between receiving a payment today or a larger payment in 12 months. The qualitative measure of patience

is given by the respondents' self-assessment regarding their willingness to wait using an 11-point Likert scale ("How willing are you to give up something that is beneficial for you today in order to benefit more from it in the future"). Trust is positively correlated with entrepreneurship (Guiso et al., 2006). Trust is essential for the efficient operation of a market economy and entrepreneurship, because in economies characterized by high levels of trust, actors are able to enter into transactions with only limited information about the other parties (Raiser, 1999). The Trust measure in the GPS is based on one item, which asks respondents whether they assume that other people only have the best intentions (measured on a Likert scale from 0 to 10). Similar to the risk-appetite measure, we use gender-specific estimated values for patience and trust.

In Column 1, Table 7, we include Patience and Trust in the regression, and re-estimate Eq. (2). The results show that the coefficient for risk appetite remains significant at a 5 percent level and is economically meaningful.

A large portion (75 percent) of the individuals in our sample have parents who were born in Finland. Finland and Sweden share geographical proximity, a common history, and a shared common language (Swedish and Finnish are both official languages in Finland). The countries are also similar in terms of societal values, education, and social structure. Furthermore, interactions between Finland and Sweden are relatively frequent. Because of these circumstances, individuals with parents from Finland might have better access to resources that are valuable to entrepreneurship compared to individuals with parents from other countries. These conditions could potentially undermine our findings. To rule out our results being driven by individuals whose parents were born in Finland, we estimate Eq. (2) in a subsample that excludes these individuals. From Column 2, Table 6 we conclude that the baseline findings hold: Individuals with parents from more risk-loving cultures are more likely to become entrepreneurs.

In our baseline setting, the dependent variable, Entry, is equal to one if the individual enters entrepreneurship during the period 2004-2014. This time period covers the Great Financial Crisis, and it is possible that our results are driven by the fact that many individuals were forced into entrepreneurship during this period (cf.

Hacamo and Kleiner, 2022). To investigate this possibility, we redefine Entry to be equal to one if the individual enters entrepreneurship during the period from 2004 to 2006, thus excluding the crisis period. The results reported in Column 3 indicate a persistent strong effect from risk appetite. Although the magnitude of the coefficient drops to 0.0182, the economic significance does not shrink, given that the sample mean for entry within the narrower time window is 0.020. A one standard deviation increase in risk appetite corresponds to a 35 percent increase in the probability to enter entrepreneurship, which is almost identical to our baseline estimation.

[Insert Table 7 around here.]

7 Conclusion

This paper investigates the effects of cultural origin on entrepreneurship. By combining Swedish registry data on second-generation immigrants with risk appetite measures in their parents' countries of origin, we investigate if culturally inherited risk appetite affects entrepreneurship. We find that the children of immigrants from more risk-loving cultures are more likely to engage in entrepreneurship and start firms that perform worse. Previous studies relate corporate CEO heterogeneity in cultural values to heterogeneity in corporate performance (Pan et al., 2020; Nguyen et al., 2018). Our findings suggest that individual cultural heterogeneity is also important to understand the performance of young firms. Furthermore, we document that culturally inherited risk appetite affects entrepreneurs' personal income in a negative way. While most previous studies on return from entrepreneurship typically compare employment with entrepreneurship (Catherine, 2022; Åstebro, 2012; Hamilton, 2000), our findings indicate that culturally transmitted risk appetite may explain income heterogeneity among entrepreneurs.

In this study, we show that culturally transmitted risk appetite affects entrepreneurship beyond the impact of individual and parental socio-economic characteristics. This effect is also independent of parents' entrepreneurship. Our study provides insights into the effects of cultural heritage on entrepreneurship and the differences in entrepreneurial activity between countries. We show that culture, and

how it is transmitted down through generations, is another mechanism by which parents influence their children's decision to enter entrepreneurship as well at the economic outcomes of that entrepreneurship.

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Table 1: Individual and parents' descriptive statistics

Panel A: Individual-level characteristics (N = 23,276)			
	Mean	Median	Std. Dev.
Entry into entrepreneurship	0.051		
Male	0.507		
Married	0.307		
Education			
High school or lower	0.683		
Undergraduate	0.313		
Graduate	0.005		
Age	32.77	32	5.71
Number of kids	0.94	1	1.09
Number of unemployment days	16.48	0	52.15
Total wealth	347.16	137.97	463.22
Income	225.17	218.60	88.96
Panel B: Parents characteristics (N = 23,276)			
	Mean	Median	Std. Dev.
Entrepreneurial parents	0.067		
Father's education			
High school or lower	0.910		
Undergraduate	0.085		
Graduate	0.005		
Mother's education			
High school or lower	0.888		
Undergraduate	0.111		
Graduate	0.002		
Father's age	61.02	60	7.23
Father's age	58.13	57	7.07
Parents' total income	384.49	366.80	131.37
Parents' total wealth	1,000.71	741.29	993.63
Avg years since immigration	37.87	36	8.42

Note: This table reports descriptive statistics of pre-entry characteristics for both individuals (Panel A) and their parents (Panel B) as of 2003. Monetary values are in thousands SEK.

Table 2: Descriptive statistics of post-entry developments

Panel A: Firm performance (N = 376)			
	Mean	Median	Std. Dev.
Revenues	3,674.03	1,222	10,249.97
Value added	1,358.56	688	4,048.44
Profit margin	0.19	0.11	0.35
$\mathbb{I}$[Employees$\geq$1]	0.475		
Number of employees	2.72	1	55.16
Five-year survival	0.568		
Startup equity	536.36	189	2,308.69
Panel B: Individual income (N = 959)			
	Mean	Median	Std. Dev.
Discounted total income 2004-2014	3,702.74	3,315	1,911.06

Note: This table shows descriptive statistics of post-entry performance at firm level (Panel A) and at individual level (Panel B). Panel A includes all new firms that were established during 2004-2018. The performance variables are evaluated at the first year of business after firm establishment. Panel B covers all individuals who entered entrepreneurship during 2004-2014. The discounted total income is the sum of discounted annual income with a discount rate of 2 percent. Monetary values are in thousands SEK.

Table 3: Entry into Entrepreneurship

	(1) Entry	(2) Entry	(3) Entry	(4) Entry	(5) Entrepreneur
Risk appetite	0.1320***	0.0560**	0.0601**	0.0408***	0.0088**
	(0.0312)	(0.0243)	(0.0261)	(0.0107)	(0.0039)
Entrepreneurial parents			0.0361***	0.0340***	0.0186***
			(0.0064)	(0.0062)	(0.0026)
Observations	23,276	23,276	23,276	23,276	251,898
Individual controls	No	Yes	Yes	Yes	Yes
Parental controls	No	No	Yes	Yes	Yes
Geo controls	No	No	No	Yes	Yes
Industry FE	No	Yes	Yes	Yes	Yes
Municipality FE	No	Yes	Yes	Yes	Yes
Year FE	N/A	N/A	N/A	N/A	Yes
Adj R-square	0.0118	0.0396	0.0412	0.0433	0.0305

Note: This table reports estimates of entry regressions into entrepreneurship as well as annual status of being an entrepreneur. Entry is equal to one if the individual became an entrepreneur between 2004-2014. Entrepreneur is a dummy variable indicating whether an individual is identified as an entrepreneur in year t. Risk appetite is the gender-specific estimated risk appetite measure. All other individual and parental explanatory variables are from 2003. Individual level variables include age (quadratic), an interaction term between gender and married dummies, children, education, income, wealth, and unemployment days. Education is a three-level variable; high school and lower, undergraduate, and post-graduate. Income is the total taxable income and wealth includes the market value of all assets (real and financial). Entrepreneurial parent is a dummy with a value of one if at least one parent was an entrepreneur (incorporated or unincorporated) in 2003. The parental controls include log (total wealth of parents), log (total income of parents), age, education, and log (years since immigration). The geographical controls include absolute latitude, landlocked dummy, island dummy, average elevation (meters), roughness of terrain, and distance to the sea or navigable rivers. The standard errors are clustered at the level of the parents' countries of birth and are shown in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Firm performance

	(1) Revenues	(2) Value added	(3) Profit margin	(4) Emp. ≥ 1	(5) #Emp.	(6) 5-year survival
Risk appetite	-0.6506**	-0.6391***	-0.0744**	-0.0170	-5.3866***	-0.1564
	(0.2392)	(0.1898)	(0.0352)	(0.1065)	(1.0009)	(0.3097)
Log(startup equity)	0.3433***	0.3244***	0.0829***	0.0629*	0.9953***	0.0175
	(0.0575)	(0.0547)	(0.0145)	(0.0330)	(0.3253)	(0.0351)
Observations	2,580	2,580	2,580	2,580	2,580	376
Controls	Individual, Parental, Geographical and Firm age					
Fixed effect	Industry, Municipality and Year					
Adj R-square	0.444	0.404	0.134	0.354	0.345	0.233

Note: This table reports the results of firm performance regressions for incorporated firms registered between 2004 to 2014. The performance measures, except for the 5-year survival rate, are evaluated for each year during 2004-2018 whenever applicable. Revenues and value added are evaluated in logarithmic term. Profit margin is earnings-before-interest-and-taxes plus interest income over sales. Emp. ≥ 1 has a value of one if the firm hires at least one employee in the given year. #Emp. is the number of employees in the given year. Risk appetite is the gender-specific estimated risk appetite measure. Start-up equity is equity in the start-up year. All individual and parental explanatory variables are from 2003. Individual level variables include age (quadratic), an interaction term between gender and married dummies, children, education, income, wealth, and unemployment days. Income is the total taxable income and wealth includes the market value of all assets (real and financial). Entrepreneurial parent is a dummy with a value of one if at least one parent was an entrepreneur (incorporated or unincorporated) in 2003. The parental controls include log (total wealth of parents), log (total income of parents), age, education, and log (years since immigration). The geographical controls include absolute latitude, landlocked dummy, island dummy, average elevation (meters), roughness of terrain, and distance to the sea or navigable rivers. The standard errors are clustered at the firm level to account for serial correlations between repeated observation by the same firm and are shown in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Entrepreneurs' personal income

	Discounted total income
Risk appetite	-0.1392*
	(0.0762)
Observations	959
Individual controls	Yes
Parental controls	Yes
Geo controls	Yes
Year of transition FE	Yes
Industry FE	Yes
Municipality FE	Yes
Adj R-square	0.353

Note: This table reports the association of risk appetite on discounted total personal income for the subsample of individuals who entered entrepreneurship during the period 2004-2014. Total income includes labor and capital income. Discount rate is 2 percent. The rest of the specification coincides with Table 3. The standard errors are clustered at the level of the parents' countries of birth and are shown in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Ancestral games

	Entry into entrepreneurship
Chance games	0.0112**
	(0.0051)
Observations	23,131
Individual controls	Yes
Parental controls	Yes
Geo controls	Yes
Industry FE	Yes
Municipality FE	Yes
Adj R-square	0.043

Note: This table reports the estimates of entry regressions into incorporated entrepreneurship between 2004-2014. Entry is equal to one if an individual became an entrepreneur between 2004-2014. Entrepreneur is defined as an individual who receives at least 50 percent of their total taxable income from an incorporated business they own in full or in part. Ancestral chance games are a measure of ancestral risk taking- indicating the share of people whose ancestors played games that involved chance. The rest of the specification coincides with Table 3. The standard errors are clustered at the level of the parents' countries of birth and are shown in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Additional robustness analyses

	(1) Add other traits	(2) Exclude Finland	(3) Entry during 04-06
Risk appetite	0.0311**	0.0373**	0.0182**
	(0.0137)	(0.0140)	(0.0092)
Patience	-0.0044		
	(0.0128)		
Trust	0.0226		
	(0.0190)		
Observations	23,276	5,729	23,227
Individual controls	Yes	Yes	Yes
Parental controls	Yes	Yes	Yes
Geo controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes
Adj R-square	0.0433	0.0549	0.0269

Note: This table reports additional robustness analyses. Column 1 estimates Eq. (2), but also includes patience and trust as controls. Column 2 estimates entry into entrepreneurship between 2004-2014 for a subsample of second-generation immigrants with neither parent born in Finland. In Column 3 the time window for entry is 2004-2006. Risk appetite, patience, and trust are gender-specific estimated measures. The rest of the specification coincides with Table 3. The standard errors are clustered at the level of the parents' countries of birth and are shown in brackets. *** p<0.01, ** p<0.05, * p<0.1.

III

In and Down: The Costs of Immigrant Investors*

Qinglin Ouyang

Abstract

This paper examines the portfolio diversification gap between immigrant and native-born investors using a comprehensive administrative dataset from Sweden. Leveraging a carefully matched investor sample, I document that immigrant investors incur a 37% higher return loss compared to natives, driven predominantly by underdiversification instead of high risky share. This gap persists even among second-generation immigrants, suggesting intergenerational disparities in wealth accumulation. I identify two key drivers: social integration and financial literacy. Immigrants with native-born partners or from countries with higher financial literacy levels experience lower return losses. However, merely extending the duration of stay in Sweden does not mitigate the gap. These findings highlight the need for policies that facilitate social integration and promote financial education to improve immigrants' financial outcomes.

Keywords: Return loss, Portfolio diversification, Financial literacy, Social integration
JEL Codes: G11, G41, G50

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1 Introduction

A key issue confronting both researchers and policymakers is understanding how well immigrants integrate into the economic sphere of their host countries. Several studies document that immigrants have substantially lower wealth levels and allocate their assets differently (Amuedo-Doranles and Pozo, 2002; Hao, 2004; Cobb-Clark and Hildebrand, 2006). Further research indicates that immigrants are less likely to own stocks and mutual funds (Osili and Paulson, 2008; Seto and Bogan, 2013). Recognizing the heterogeneity within the immigrant population, studies find that cultural and institutional differences in countries of birth explain heterogeneity in stock market participation within the immigrant population (e.g. Asgharian et al., 2024; Haliassos et al., 2017). These prior studies have shed light on the disparities between native and immigrant engagement in financial markets—the "in-or-out" aspect of participation. However, the performance of immigrants who do participate, to the best of my knowledge, remains overlooked. This paper aims to answer the "up-or-down" question, namely, investigating whether the portfolios of immigrants who do participate in stock markets differ from natives' portfolios in terms of underdiversification. Understanding the extent of underdiversification is crucial, as poor diversification exposes investors to idiosyncratic risk and suboptimal returns, which can hinder wealth accumulation, exacerbate economic inequality, and reduce financial resilience in the face of economic shocks. Moreover, exploring this issue provides insights into whether immigrants who overcome participation barriers are able to achieve similar financial outcomes as their native-born counterparts, or if they continue to face systemic disadvantages in portfolio efficiency.

To investigate the potential immigrant-native gap in portfolio diversification, I employ the return loss measure proposed by Calvet et al. (2007) in their seminal work. This measure quantifies the underdiversification penalty as the opportunity cost incurred by investors who maintain a sub-optimally diversified portfolio compared to the benchmark market portfolio. Essentially, it represents the forgone gains that could have been realized through investment in the efficient market portfolio. After matching Swedish registry data on individuals' holdings of individual assets with market data, I manage

to reconstruct investors' portfolios. To account for the substantial socio-economic discrepancies between native-born and immigrant investors, I apply matching approaches on a number of individual-level characteristics and obtain the baseline sample consisting of 171,615 natives and 75,906 immigrants who actively participate in the stock market. The findings reveal that immigrant investors experience a significantly larger return loss than their native counterparts, and this finding is robust to various specifications. Specifically, the baseline analysis documents that immigrants face a 38-basis-points (bps)—or approximately 30%—greater annual return loss than that of natives. Put differently, the immigrants who are "in" the stock market are actually also relatively "down." Notably, the return loss gap is most pronounced among investors who are male and less educated.

Next, I explore potential explanations for these results. Early studies find that households, in general, own underdiversified portfolios of individual stocks (Barber and Odean, 2000; Polkovnichenko, 2005). Goetzmann and Kumar (2008) find that diversification level increases with age, income, wealth, education, and investment experience. Echoing these findings, Calvet et al. (2007) document significant cross-sectional variation in the efficiency of equity investments among Swedish households, concluding that more sophisticated households with higher wealth and education invest more efficiently. A key driver of these differences is financial literacy, which includes an understanding of risk diversification (Lusardi and Mitchell, 2011). Prior research suggests that many retail investors fail to recognize the extent to which idiosyncratic risk can be mitigated through portfolio diversification (e.g., Van Rooij et al., 2011). Empirically, von Gaudecker (2015) shows that households with lower financial literacy and who rely on their own judgment incur higher return losses. This paper extends the literature by investigating whether financial literacy mitigates the return loss gap between immigrants and natives. As individual-level financial literacy data is unavailable, I proxy it using the financial literacy level of immigrants' country of origin, as measured by the 2014 Global Financial Literacy Survey conducted by Standard & Poor's. The analysis reveals that a one-standard-deviation increase in the home country's financial literacy level is associated with a 19-bps reduction in return loss among immigrant investors.

While internal knowledge endowment matters, interaction with the external environment is also expected to play a crucial role. The literature on immigrants' participation in financial markets has emphasized the role of cultural and institutional influences from their birth countries (Asgharian et al., 2024; Ek et al., 2023; Haliassos et al., 2017; Osili and Paulson, 2008). Although these factors shape market participation, the extent of portfolio underdiversification is likely influenced by a broader set of determinants. Social integration is particularly relevant, as immigrants may face barriers in accessing financial knowledge, investment opportunities, and local financial institutions due to language limitations and unfamiliarity with domestic investment norms. Social networks can facilitate financial learning and information diffusion, which in turn can improve portfolio efficiency. Prior research has primarily focused on how social interaction affects stock market participation (e.g., Hong et al., 2004; Kaustia and Torstila, 2011; Bonaparte and Kumar, 2013; Georgarakos and Pasini, 2011), but less is known about whether these interactions enhance portfolio quality. This paper contributes to this discussion by examining whether stronger social integration leads to more diversified portfolios through mechanisms of social learning.

To assess the role of social integration, I examine multiple indicators, including the length of residence in Sweden, second-generation immigrant status, and partnership with a native Swede. These proxies capture different dimensions of social embeddedness, yielding varying results. The analysis reveals that merely extending the duration of stay in Sweden does not significantly mitigate return loss, suggesting that passive exposure to the host country's financial system is insufficient for improving investment efficiency. Furthermore, the return loss gap persists intergenerationally, as second-generation immigrants whose parents were both foreign-born experience a 19-bps higher return loss than natives with native-born parents. However, the presence of a native-born partner is associated with a 22-bps reduction in return loss, suggesting that closer social ties with natives can facilitate financial knowledge acquisition and spur investment decision-making.

The main contribution of this paper is three-fold. Firstly and most importantly, the paper answers an important follow-up question about immigrant investors' performance after entering the lo-

cal stock market. Earlier studies primarily examine the immigrant-native gap in extensive margin and intensive margin of stock market participation (e.g., Seto and Bogan, 2013), as well as the potential explanations thereof, including institutional quality in immigrant's home country (Asgharian et al., 2024; Osili and Paulson, 2008), cognitive and non-cognitive abilities (Luik and Steinhardt, 2016), culture background (Ek et al., 2023; Haliassos et al., 2017) and proficiency in local language (Gan et al., 2022). However, there is little evidence on the post-entry performance of immigrant's portfolio. One of the very few exceptions is from Calvet et al. (2007) who include immigrant as a dummy to explain the difference of return loss among Swedish households. This paper deviates from their setting by shifting household-level to individual-level analysis so that the return loss gap could be clearly captured without needing to identify the household head. Household-level portfolios also tend to be mechanically more diversified as they aggregate assets across multiple investors. This argument can be extended for other individual-level characteristics, thus revealing their association with return loss. Second, the paper offers new evidence to the relation between financial literacy and portfolio performance. Li et al. (2020) analyze data from a Chinese household survey, concluding that financial literacy does not lead to significantly higher investment returns. I augment the empirical design by using a better established performance measure. So far, the most relevant research on this issue comes from von Gaudecker (2015) who documents that investors who have a below-median financial literacy and rely primarily on their own judgments incur higher portfolio return loss. By using a setup where there is arguably less variation in the primary source of financial advice among immigrants, I show that the effect of financial literacy is actually significantly positive. Finally, this paper sheds light on the role of social integration in investment outcome. A large body of studies have documented how social interaction can spur participation in stock market participation via the channel of information diffusion (e.g., Changwony et al., 2015; Georgarakos and Pasini, 2011; Kaustia and Torstila, 2011; Hong et al., 2004). In a recent work, Girshina et al. (2024) shows that stock market participation by immigrants could increase the probability of native-borns' participation via the channel of social learning. Nevertheless, it remains unclear whether the information diffusion via social

interaction improves portfolio performance, and this paper attempt to provide some novel evidence. The findings, taken together, carry policy-making implications as understanding the potential channels is beneficial for facilitating immigration integration and alleviating wealth inequality.

The remainder of the paper is organized as follows. Section 2 describes the data and provides an overview of the immigrant-native return loss gap. Section 3 presents the baseline results. Section 4 examines financial literacy, while Section 5 explores the role of social integration. Finally, Section 6 concludes the paper.

2 Data and Variables

2.1 Data Sources

The sample is constructed by matching three datasets: (i) financial asset data from the Swedish Wealth Register, (ii) demographic and socioeconomic data from the Longitudinal Integrated Database for Health Insurance and Labor Market Studies (LISA), and (iii) asset price history from Refinitiv Eikon. The first two datasets are maintained by Statistics Sweden (SCB).

The Wealth Register records all financial assets held outside retirement accounts as of December 31 each year, compiled from sources such as the Swedish Tax Agency, welfare agencies, and financial institutions. Assets, as well as various types of liabilities, are reported at the individual level and include bank accounts, stocks, and mutual funds, both domestic and foreign.[1] Importantly, the dataset also covers nontaxable securities and assets held by individuals below the wealth tax threshold. Since the data are based on reports from financial institutions and provide full population coverage, concerns over measurement error and selection bias are minimal. The dataset spans from 1999 to 2006, after which Sweden abolished its wealth tax.[2] Each financial asset entry in the Wealth Register specifies the

[1] Taxable wealth also includes capital insurance products, real estate, cars, and boats, though these are not directly relevant to this study.

[2] One potential concern is the underreporting of overseas assets due to tax evasion. To address this, in an unreported analysis, I exclude immigrants who arrived in Sweden after age 20, under the assumption that those migrating before

number of shares held and is identified by its International Security Identification Number (ISIN). Overall, the Swedish Wealth Register is an exceptionally detailed database covering all residents.

This study employs cross-sectional data rather than panel data, as immigrant status is time-invariant. Specifically, the analysis focuses on the 2006 cross-section. Between 1999 and 2005, banks were required to report only small bank accounts accruing more than 100 SEK[3] in annual interest. From 2006 onward, banks had to report all accounts exceeding 10,000 SEK. Additionally, focusing on 2006 captures a larger group of immigrant investors, enhancing statistical power.

2.2 The Universe of Financial Asset

Following prior literature on stock market participation (e.g., Andersen et al., 2019), this study focuses on equity shares and mutual funds, as these are the most accessible financial assets for typical investors. After excluding missing values and clearly erroneous entries, the wealth registry contains approximately 7,000 stocks and mutual funds. To reduce computational complexity and account for the fact that many assets are held by only a few investors, this study focuses on a representative sample of financial assets.

To construct this asset universe, I begin by randomly selecting 10,000 individuals and screening their financial asset holdings in the wealth registry. For each asset, I collect price history and compute monthly returns from January 1991 (or from its inception date, if later) to December 2006, yielding a maximum of 192 monthly observations per asset. When calculating mutual fund returns, I use net asset values, which reflect investor returns after deducting various fees (cf. Pástor and Vorsatz, 2020; Busse et al., 2021).[4] For later

entering the labor market are more likely to open local investment accounts subject to tax authority oversight. The results remain largely unchanged and are available upon request. Calvet et al. (2007) conclude that unreported foreign assets account for only a modest fraction of Swedish household wealth. Generally, illegal overseas investments involve fixed costs and are only relevant for the very wealthy.

[3] 100 SEK is roughly 14.60 USD as of the last trading day in 2006.

[4] A large body of literature uses gross returns when evaluating mutual fund performance, particularly in terms of abnormal returns (e.g., Irvine et al., 2024). In an unreported analysis, I find that the results remain largely similar when

beta estimations, I exclude assets with fewer than 24 monthly return observations. The final dataset consists of 766 financial assets, comprising 457 non-money-market mutual funds, 15 money-market mutual funds (treated as risk-free assets equivalent to cash), and 294 stocks.

For each asset j, I estimate its monthly expected return using the global CAPM:

$$r^e_{i,t} = \beta_j r^e_{m,t} + \varepsilon_{j,t}, \tag{1}$$

where $r^e_{j,t}$ and $r^e_{m,t}$ denote the excess returns of the individual asset and the market portfolio during month t, respectively. Since Sweden is a small and open economy, Swedish investors can invest in global assets to mitigate concentration in domestic stocks. Under covered interest parity, currency risk from global assets can be hedged using forward or futures contracts, ensuring that the corresponding domestic excess return in SEK is equal to the USD excess return measured as the index return over the US Treasury bill rate. Effectively, the global CAPM assumes that the currency-hedged world index is mean-variance efficient for Swedish investors.[5] Between January 1991 and December 2006, the benchmark market portfolio yielded an annual excess return of $\mu_b = 4.40\%$. Given its standard deviation of $\sigma_b = 13.2\%$, this implies a Sharpe ratio of $S_b = \mu_b/\sigma_b = 33.2\%$.

2.3 The Individual Sample and Their Portfolios

Investor-level data are obtained from the LISA dataset, which provides comprehensive demographic and socioeconomic information on individuals' age, gender, place of residence, employment status, industry of employment, education level, marital status, and total income (including labor earnings and capital gains). The LISA database also records individual immigration histories, including the year of immigration and country of origin, facilitating empirical identification.

For each individual, financial assets are defined as the sum of risk-free assets (bank account balances and money-market mutual funds)

estimating betas using gross returns.

[5] I refer the readers to the Online Appendix of Calvet et al. (2007) for a more detailed and rigorous description.

and risky assets (non-money-market mutual funds and stocks) in SEK at year-end 2006. To ensure that portfolio holdings are economically meaningful and empirically feasible, I restrict the sample to adults who hold at least 10,000 SEK in risky assets and whose portfolios contain only assets included in the asset universe defined in Section 2.2 (cf. von Gaudecker, 2015). Immigrants who have resided in Sweden for more than 30 years are excluded.

To address potential differences in socioeconomic characteristics between immigrants and native-born individuals, I employ a matching procedure combining exact matching and nearest-neighbor matching. Exact matching is performed on gender, marital status, bachelor's degree attainment, county of residence, and employment type to ensure that each treated individual (immigrant) is matched only to control individuals (native-born) with identical values for these categorical variables. Within these exact-matched strata, I apply nearest-neighbor matching on continuous variables, including age, total wealth, income, financial assets, real assets, and debt. These covariates have been widely documented as determinants of stock market participation and risk-taking behavior (Campbell, 2006, for a comprehensive review). For instance, leverage, especially housing mortgage, affects portfolio choice. The effect has been documented with the potential channels of consumption commitment of housing (Chetty et al., 2017) and debt retirement (Becker and Shabani, 2010). Specifically, each immigrant is matched to two native-born individuals without replacement. The final sample consists of 247,521 investors, of whom 171,615 are native-born and 75,906 are immigrants.

The primary outcome variable is annual return loss (RL), as proposed by Calvet et al. (2007), which quantifies the costs of underdiversification. Given full details on portfolio composition, I calculate the weight vector ω and obtain the expected excess return μ_i and risk σ_i for each investor's risky portfolio, deriving their Sharpe ratio as $S_i = \mu_i/\sigma_i$. Relative to the benchmark market portfolio, return loss is computed as:

$$RL_i = \omega_i \cdot (S_b\sigma_i - \mu_i). \tag{2}$$

Table 1 presents summary statistics for individual and portfolio characteristics, split by immigrant identity. While most covariates are well-balanced, immigrants tend to have slightly higher income

but lower real assets and total wealth. However, the return loss difference is substantial: immigrants incur an excess return loss of 39 basis points on an annual basis, approximately 31% higher than the mean for native-born investors. This disparity appears to stem from portfolio inefficiency rather than differences in risk-taking behavior, as both groups allocate similar proportions (around 50%) of their portfolios to risky assets.

[Insert Table 1 around here.]

As noted, a key departure from the approach of Calvet et al. (2007) is my focus on individual-level rather than household-level portfolio data. This choice is motivated by both conceptual and empirical considerations. First, since this study examines differences in portfolio performance between native and immigrant investors, an individual-level perspective provides a more direct and intuitive measure of financial decision-making under the assumption that investors within the same household manage their own portfolio independently. Defining household-level immigrant status introduces complexities, as one must determine the household head's identity and account for mixed households, where an immigrant may benefit from the financial knowledge or network of a native-born spouse. This could bias the estimated differences in portfolio efficiency, as mixed households may exhibit characteristics that are not representative of either purely immigrant or native-born households. Similar concerns apply to other demographic and socioeconomic attributes, which further justifies the use of individual-level data in previous studies on portfolio choice (e.g., Florentsen et al., 2019; Goetzmann and Kumar, 2008).

Second, individual-level portfolios allow for a more precise identification of investment behavior and diversification choices. Household portfolios, by construction, tend to be more diversified than individual ones, as they aggregate holdings across multiple investors with potentially different risk preferences and levels of financial literacy. This mechanical diversification effect could attenuate differences in return loss, making it more difficult to detect systematic disparities between native and immigrant investors.

A potential drawback of this approach is that it does not account for intra-household financial decision-making, where spouses or other

household members may coordinate their investments.[6] However, focusing on individual investors ensures that the estimated return loss differences stem from personal investment decisions rather than joint household strategies. This distinction is crucial for understanding the specific constraints that immigrant investors face in the stock market.

3 The Immigrant-Native Gap in Return Loss

As illustrated before, a simple mean comparison reveals a clear gap between native-born and immigrant investors in terms of underdiversification costs. To further investigate the return loss gap and its determinants, I estimate the following OLS model:

$$RL_i = \alpha + \beta Immigrant_i + \gamma X_i + \varepsilon_i \tag{3}$$

where the dependent variable RL_i represents the return loss due to holding a suboptimal portfolio, as defined in Eq. 2. The key explanatory variable, $Immigrant_i$, takes a value of one if the individual is an immigrant and zero otherwise. X_i is a vector of covariates identified in the literature as relevant for financial decision-making and used for sample matching. Continuous variables in X_i are log-transformed to account for potential nonlinear relationships and improve statistical properties. Additionally, the specification includes city fixed effects to control for geographic differences in information access and investment costs. For example, financial information may circulate more efficiently in densely populated areas.

To disentangle the main drivers of return loss, I take the logarithm of Eq. 2 under the assumption that all terms are positive:

$$\ln RL_i = \ln \omega_i + \ln \left(S_b \sigma_i - \mu_i \right) \tag{4}$$

The first term measures portfolio aggressiveness, while the second term captures portfolio inefficiency. These components serve as the basis for further analysis throughout the paper.

[6] Spouses could have heterogeneous risk preferences that evolve over time. For instance, Addoum (2017) finds that couples significantly alter their financial allocations after retirement, whereas singles' allocations remain relatively stable.

Table 2 presents the regression results. Column (1) shows that immigrants incur an average return loss that is 38 basis points (bps) higher than that of native-born investors, representing a 30% increase relative to the native-born benchmark of 125 bps.[7] The estimated effect is consistent with the raw gap observed in Table 1, indicating that sample matching has accounted for most confounding factors. This return loss gap is economically meaningful—comparable in magnitude to the gender gap, as reflected by the coefficient on the $Male$ dummy variable. Given that the average immigrant investor holds approximately 350,000 SEK in financial assets, the additional return loss amounts to 1,330 SEK per year (38 bps $\times$ 350,000 SEK). While this may seem modest in absolute terms, it compounds over time, exacerbating wealth inequality. Indeed, Bhamra and Uppal (2019) show that when accounting for familiarity bias in asset allocation and intertemporal consumption-savings decisions, the long-term welfare loss is amplified by a factor of four.

A decomposition of return loss in Columns (2)–(4) of Table 2 indicates that portfolio inefficiency is the sole driver of the return loss gap. Immigrants' portfolios exhibit lower Sharpe ratios and/or higher volatility.[8]

[Insert Table 2 around here.]

The baseline results also indicate that return loss decreases with several measures of financial sophistication, such as financial and real asset holdings, income, and education level. The decomposition shows that investors with higher financial assets and income exhibit both lower portfolio aggressiveness (i.e., they allocate a smaller fraction of wealth to risky assets) and lower inefficiency. By contrast, individuals with a bachelor's degree benefit from lower inefficiency but not from reduced aggressiveness. These findings align with Calvet et al. (2007), who document that financial sophistication is generally associated with higher portfolio efficiency. However, they also

[7] As described in Section 2.3, the return loss is computed based on the MSCI World Index. A robustness check using the MSCI Europe Index produces highly similar results, as shown in Table A1.

[8] More precisely, the term $(S_b\sigma_i - \mu_i)$ in Eq. 4 can be rewritten as $(S_b - \frac{\mu_i}{\sigma_i})\sigma_i$. The results in Table A2 show that both components are significant: the annualized volatility of immigrants' risky portfolios is 2.6 percentage points higher, while their Sharpe ratios are 1.2 percentage points lower than those of native-born investors.

find that wealthier and more sophisticated households tend to take on greater investment risk, leading to higher absolute return losses. My results echo those of Florentsen et al. (2019), who document widespread underdiversification among Danish investors, particularly among individuals with low education, income, and wealth.

The baseline analysis suggests that certain investor characteristics are strongly associated with return loss. To explore whether these factors amplify or mitigate the return loss gap between immigrants and native-borns, I introduce interaction terms in Eq. 3. Specifically, I examine the effects of gender and education, two factors that have drawn attention in prior literature and play a significant role in the baseline results.

Panel A of Table 3 shows that the return loss gap is larger for male immigrants. While immigrants overall do not invest more aggressively than native-borns, male immigrants allocate a significantly larger share of their portfolios to risky assets and exhibit lower diversification efficiency, leading to a 24-bps larger return loss gap compared to female immigrants. Related to the finding that men trade more excessively (Barber and Odean, 2001), one plausible explanation is that male immigrants may exhibit greater overconfidence and be less likely to recognize their informational disadvantage in the Swedish stock market, which could result in suboptimal portfolio choices.

Panel B of Table 3 suggests that higher education helps reduce the return loss gap. Immigrants with a bachelor's degree face a significantly smaller return loss gap, which appears to stem from better portfolio diversification rather than lower risk exposure. This finding is consistent with research indicating that better-educated immigrants are more likely to overcome financial disadvantages when integrating into a new economic environment (Turper et al., 2015; Hainmueller and Hopkins, 2015).

[Insert Table 3 around here.]

4 Financial Literacy in Country of Origin

Immigrants differ significantly in their exposure to financial systems prior to arriving in Sweden, including the level of financial literacy in their country of origin. Cross-country evidence suggests that nations

with higher financial literacy tend to offer better access to and usage of financial services (Grohmann et al., 2018). At the micro level, von Gaudecker (2015) finds that, on average, investors in the Netherlands achieve reasonably effective portfolio outcomes. However, individuals with below-median financial literacy who rely primarily on their own judgment incur 50 bps higher return losses. The study further concludes that financial literacy does not play a significant role for individuals who seek external financial advice, but overconfidence may be a key factor for those at greater risk of return losses, as they tend to trust their own investment decisions excessively.

This study revisits the relationship between financial literacy and return loss in a setting where immigrants face barriers to consulting local financial advisors, leading to less variation in access to external financial advice. In other words, immigrant investors are more likely to rely on their own ability to collect and process financial market information. While individual-level financial literacy is unobservable in my dataset, I use country-level financial literacy as a proxy. This data is obtained from the S&P Global Financial Literacy Survey (Klapper et al., 2015), which is particularly relevant to this study as it includes a direct question on risk diversification. The survey also tests knowledge of inflation, numeracy, and compound interest, and an individual is classified as financially literate if they correctly answer at least three out of four questions. The global average financial literacy rate is 33%, but there is substantial variation across countries (see Table A3).

To formally examine the relationship between financial literacy and return loss, I estimate the following model using the immigrant subsample:

$$RL_{ic} = \alpha + \beta FL_c + \gamma X_i + \varepsilon_{ic} \tag{5}$$

where the key explanatory variable, FL_c, measures the fraction of financially literate adults in an immigrant's country of origin c. The vector of individual-level covariates, X_i, remains largely unchanged from Eq. 3, except for the inclusion of years since immigration, a commonly used control in studies on immigrant financial behavior (cf. Osili and Paulson, 2008; Gan et al., 2022). Standard errors are clustered at the country-of-origin level.

Table 4 presents the results. Column (1) suggests that a one-standard-deviation increase in financial literacy (17 percentage points) is associated with a 19 bps reduction in return loss. Columns (2)–(4) further decompose return loss using Eq. 4, confirming that financial literacy improves portfolio efficiency but does not significantly affect portfolio aggressiveness. Additionally, it is worth noting that longer residence in Sweden does not significantly reduce return loss, a finding that will be explored further in Section 5.1.

[Insert Table 4 around here.]

To further understand the impact of financial literacy, I examine the number of assets held in an investor's portfolio, a commonly used heuristic for assessing portfolio diversification (Barber and Odean, 2000; Goetzmann and Kumar, 2008; Florentsen et al., 2019). Specifically, I construct two dummy variables indicating: (1) whether an investor holds only one asset in their portfolio, and (2) whether that single asset is a stock rather than a mutual fund. Intuitively, holding a single asset does not necessarily imply underdiversification if that asset is a well-diversified mutual fund (e.g., an index fund). However, holding a single individual stock exposes investors to substantial idiosyncratic risk and results in severe underdiversification.

I then replace the dependent variable in Eq. 3 with the two dummy variables described above and estimate the model on both the exact-matching sample and the immigrant-only sample. The results, shown in Table 5, indicate that immigrant investors are 5.9 percentage points more likely to hold only one asset, representing a 20% increase relative to native-born investors (for whom 29% hold a single asset). Moreover, conditional on holding only one asset, immigrants are 15.7 percentage points more likely to hold a stock rather than a mutual fund, compared to a native-born average of less than 19%.

These findings suggest that immigrants have a stronger preference for individual stocks over mutual funds, which may contribute to their higher return loss. A plausible interpretation is that this pattern reflects differences in financial literacy, as Sweden ranks among the highest in financial literacy in the global survey. Columns 3 and 4 further confirm that higher financial literacy, even measured

at country-of-origin level, is associated with lower probability of exemplary underdiversification. Specifically, a one-standard-deviation increase in financial literacy could reduce the probability of holding one asset (or holding one stock instead of one fund in the single-asset portfolio) by 3.4 (or 6.8) percentage points. Taken together, these results suggest that financial literacy not only promotes stock market participation (as documented by Van Rooij et al., 2011), but also helps retail investors make better portfolio choices by mitigating underdiversification.

[Insert Table 5 around here.]

5 Social Integration

5.1 Duration of stay

A common assumption is that immigrants who have lived in Sweden for an extended period will exhibit financial behaviors and decision-making patterns more similar to those of native-born Swedes. This hypothesis has been validated in the U.S. context, where a longer duration of stay is associated with higher stock market participation, both at the extensive and intensive margins (Osili and Paulson, 2008; Gan et al., 2022). However, it remains unclear whether a longer residence in Sweden is correlated with lower return loss.

To examine this, I estimate the following specification using the immigrant-only sample:

$$RL_{ict} = \alpha + \lambda_c + \beta_t \sum_{t=2}^{30} YSI_t + \gamma X_i + \varepsilon_{ict}, \tag{6}$$

where RL_{ict} represents the return loss of immigrant investor i from country c who has resided in Sweden for t years. The key explanatory variable, YSI_t, is a set of indicator dummies for years since immigration. Country-of-origin fixed effects (λ_c) are included to account for systematic differences in financial literacy and investment habits across source countries. Standard errors are clustered at the country-of-origin level.

The results, plotted in Figure 1, indicate that the duration of stay alone does not exhibit a monotonic relationship with return loss

after controlling for home country fixed effects. This finding is somewhat counterintuitive, as one might expect prolonged exposure to the Swedish financial environment to naturally improve investment efficiency.

A plausible explanation is that many immigrants maintain strong financial and informational ties to their country of origin, which may limit their passive acquisition of financial literacy in Sweden. Despite Sweden's high financial literacy rankings according to the S&P Global Financial Literacy Survey, immigrants may not automatically internalize these advantages through mere exposure. Instead, understanding the nuances of the Swedish stock market may require active engagement with local financial networks rather than simply spending more time in the country. This result further motivates an investigation into whether social integration and network effects can help improve immigrants' portfolio performance.

[Insert Figure 1 around here.]

5.2 Partnership with a Native-born

Compared to native-born Swedes, immigrants face greater challenges in acquiring both general and financial market-specific information. Given the information-sensitive nature of financial markets, it is particularly relevant to examine immigrants' access to local financial information. Prior studies have shown that active participation in local society can yield informational benefits. For instance, Hong et al. (2004) find that households who interact more with their neighbors or attend religious services are more likely to participate in the stock market, as these social settings facilitate the exchange of investment-related information. Similarly, other studies document that social interaction—including engagement in local political matters (Kaustia and Torstila, 2011; Bonaparte and Kumar, 2013), membership in social groups (Georgarakos and Pasini, 2011; Changwony et al., 2015), and religious beliefs (Renneboog and Spaenjers, 2012)—plays a role in shaping financial decision-making.

In line with this literature, I propose a straightforward proxy for immigrants' social integration: whether an immigrant has a native-born partner. This includes registered partnerships, cohabitation, civil marriages, and similar arrangements. Having a native partner

is likely to be strongly correlated with: (1) Swedish language proficiency, which facilitates access to financial news and market updates; (2) improved exposure to local financial information, reducing the costs of acquiring and processing relevant knowledge; and (3) greater familiarity with Swedish financial institutions, potentially leading to better investment outcomes.

To test this hypothesis, I modify the baseline specification by introducing a native-partner dummy:

$$RL_{ic} = \alpha + \lambda_c + \beta Native\,partner_i + \gamma X_i + \varepsilon_{ic} \tag{7}$$

where $Native\,partner_i$ is a dummy variable indicating whether immigrant investor i has a native-born partner. The vector of control variables X_i remains the same as in Eq. 5.

A potential concern is that immigrants from certain countries (e.g., other Scandinavian nations) are naturally more likely to have a native partner, due to cultural and linguistic similarities. These immigrants may also inherently experience lower return losses, regardless of their partner's nationality. To mitigate this concern, I include country-of-origin fixed effects (λ_c) in the model. Standard errors are clustered at the country-of-origin level.

Table 6, Column (1), shows that immigrants with a native-born partner experience an average reduction in return loss of 22 bps compared to those with an immigrant partner. Columns (2)–(4) decompose return loss and reveal that this improvement is entirely driven by a higher Sharpe ratio, suggesting that having a native spouse is associated with better-constructed investment portfolios.

[Insert Table 6 around here.]

However, this finding raises an important question: Does the benefit stem from improved access to financial information, or simply from learning from the native partner's higher financial literacy? This concern is particularly relevant given that Sweden ranks among the most financially literate countries in the world, with 71% of adults classified as financially literate according to the S&P Global Financial Literacy Survey. If financial literacy is the primary driver, then similar benefits should be observed among immigrants whose partners come from other highly financially literate countries.

To address this issue, I construct a "control" group of immigrants whose partners are from Canada (68% financial literacy), Israel (68%), the United Kingdom (67%), Germany (66%), or the Netherlands (66%). I exclude Nordic countries for the same reason stated above. The "treatment" group consists of immigrants whose partners are native-born Swedes. The underlying assumption is that both groups have similar exposure to financially literate partners, but only the treatment group benefits from superior access to local market information.

I re-estimate Eq. 7 using only these two groups. The results, presented in Table A4, indicate a similar but slightly smaller effect of 19 bps after controlling for country-of-origin fixed effects. This suggests that both financial literacy and local information access play a role, but the latter remains an important channel in explaining immigrants' improved portfolio performance.

[Insert Table A4 around here.]

5.3 Second-Generation Immigrants

The results from the previous section indicate that a longer stay in Sweden alone does not significantly reduce the return loss of first-generation immigrants' portfolios. Given that the persistent gap is linked to financial literacy in the home country and social embeddedness, one might expect the return loss gap to shrink or even disappear when comparing second-generation immigrants with other native-born individuals.

To test this hypothesis, I construct a variable that further distinguishes between different groups of native-born individuals. The LISA database allows for linking individuals to their parents and identifying parental birthplace. Following the definition used in Ek et al. (2023), an individual is classified as a second-generation immigrant if at least one parent was born abroad. However, the degree of exposure to Swedish society is expected to be stronger for those with one native-born parent, potentially influencing portfolio choices. To capture this variation, I introduce a categorical dummy variable, $Second_gen$, which divides the sample into three groups: both parents were born in Sweden (baseline group); one parent was born abroad; or both parents were born abroad.

It is important to note that this subsample includes only native-born individuals, excluding first-generation immigrants. The *Second_gen* variable replaces the *Immigrant* dummy in Eq. 3, and the results are presented in Table 7.

[Insert Table 7 around here.]

In general, the return loss gap is smaller for second-generation immigrants than for their first-generation immigrant parents, though it does not completely disappear. Specifically, individuals whose parents were both foreign-born experience an average return loss that is 19 bps higher than that of the baseline group (native-born individuals with two native-born parents). The decomposition in Columns 2–4 reveals that portfolio inefficiency remains significant for individuals whose both parents were immigrants. However, the return loss gap is substantially smaller for those with one native-born parent.[9]

This finding can be interpreted through two key mechanisms. One is direct parental influence. Second-generation immigrants are more likely to be socially integrated and financially literate if at least one parent is native-born. This suggests that having a native-born parent provides direct financial knowledge benefits that help mitigate the disadvantages observed in first-generation immigrants. The other mechanism relates to implications of intermarriage: cross-origin marriages imply that the immigrant parent may have been more socially integrated than immigrants who married another immigrant. Demographic studies suggest that intermarriage is more likely to occur between individuals who are ethnically or socioeconomically similar, as documented by Behtoui (2010) in the Swedish context. Thus, second-generation immigrants with one native-born parent may experience similar levels of societal integration as fully native-born individuals, helping to eliminate the return loss gap.

These results not only reinforce the previously identified mechanisms of financial literacy and social integration but also highlight the long-term, intergenerational disadvantage that immigrants face in terms of investment performance. By examining return loss, this analysis extends previous research on parental influences on risk-taking attitudes (Dohmen et al., 2012) and investment decisions (Zhao

[9]In an unreported further analysis, there seems to be no evidence that the gender of the native-born parent influences the return loss gap.

and Cui, 2021; Ek et al., 2023). Additionally, Knüpfer et al. (2023) explicitly test portfolio similarities between investors and their parents, confirming the existence of bidirectional and intergenerational social learning in investment behavior.

6 Concluding Remarks

The household finance literature has long emphasized that stock market participation is, in general, suboptimal for many households (Haliassos and Bertaut, 1995), and immigrants tend to participate even less frequently than native-born individuals. These findings, when considered together, might suggest that immigrants should be encouraged to invest in the stock market to improve their financial well-being. However, a crucial question remains: Do immigrant investors who participate in the financial market achieve similar returns as their native-born counterparts? Prior research has not provided a clear answer to this question.

Leveraging a highly detailed administrative dataset, this paper documents a significant portfolio performance gap between immigrants and natives. Measured in terms of underdiversification loss, immigrant investors experience a 30% (or 38 bps) higher return loss than native-born investors. This key result, encapsulated in the paper's title, underscores that those immigrants who are "in" (participating in the market) are also "down" (facing greater losses).

To understand the mechanisms underlying this disparity, the paper explores two primary channels: financial literacy and social embeddedness. The findings suggest that immigrants who are better integrated into Swedish society and those from countries with higher financial literacy tend to have lower return losses. Moreover, the persistence of the return loss gap even among second-generation immigrants suggests that wealth inequality between immigrants and natives is likely to persist across generations, reinforcing concerns about long-term disparities in financial well-being.

Despite using a cross-section of 2006, the findings of this paper remain highly relevant in light of the growing importance of immigrants in Sweden and globally. Since early 2000s, the immigrant population in Sweden has nearly doubled from about one million to over two million, constituting 19% of the total population as of 2023 according

to Statistics Sweden. Similar trends are observed across advanced economies, where immigrants play an increasingly significant role in shaping national economies and societal dynamics (OECD, 2024). The persistent immigrant-native gap documented in this study aligns with disparities observed in other economic domains, such as wages and employment (Dustmann et al., 2022; Aslund et al., 2022). Using a more recent 2012 sample of Danish investors, Florentsen et al. (2019) show that immigrants bear higher costs of underdiversification with a simpler measure without re-constructions of portfolio. Taken together, addressing these gaps is timely and crucial for promoting long-term economic equality and social cohesion. In this vein, these findings have important policy implications. For example, improving financial access for immigrants through more inclusive financial services could help mitigate the performance gap. One concrete step could be encouraging trading platforms to offer an English-language interface, reducing language barriers that hinder informed decision-making. Additionally, immigrant-specific financial guidance could be integrated into trading platforms and banks, ensuring that new investors receive targeted investment education before opening an investment account.

While immigrant investors face higher return losses, their expected excess return remains positive, suggesting that stock market participation can still be beneficial. However, it is important to acknowledge that a positive expected return is not sufficient to ensure that participation is welfare-improving for risk-averse individuals. A higher expected return must also compensate for the additional risk taken, particularly for investors who are less financially sophisticated or more prone to suboptimal portfolio choices.

This distinction is crucial because risk-averse agents may be worse off if the additional expected return does not sufficiently outweigh the costs associated with poor diversification and excess volatility. In other words, while the average return of participation may exceed the risk-free rate, some immigrant investors could still experience lower overall utility due to higher exposure to idiosyncratic risk. This is particularly relevant if they have, for instance, the Prospect Theory preference (Kahneman and Tversky, 1979).

Future research could further explore the welfare implications of financial market participation for immigrants, focusing on whether

specific interventions—such as subsidized financial literacy programs or risk-reducing investment options—can increase welfare-enhancing participation rather than simply increasing participation rates.

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Table 1: Summary statistics

	Full sample		Native-born	Immigrant	%Diff	t-stat
	Mean	Std. Dev.	Mean	Mean		
Age	43.22	14.16	43.17	43.34	0.39%	2.92
Male	0.46	0.50	0.46	0.46	0.00%	0.19
Single	0.36	0.48	0.36	0.36	0.00%	0.20
Bachelor	0.53	0.50	0.53	0.53	0.00%	0.14
Income	280,069	245,329	276,192	287,815	4.21%	10.06
Total debt	418,066	1,039,621	417,674	418,849	0.28%	0.30
Financial assets	347,728	2,015,949	345,708	351,764	1.75%	0.76
Real assets	966,961	2,479,438	991,957	917,024	-7.55%	8.11
Total wealth	1,344,648	4,327,913	1,358,858	1,316,260	-3.13%	2.22
Primary employment	1.34	0.95	1.34	1.34	0.00%	0.20
Unemployed	0.09		0.09	0.10		
Employed	0.69		0.66	0.75		
Self-employed	0.09		0.13	0.01		
Student	0.05		0.05	0.06		
Pensioner	0.07		0.07	0.07		
Return loss (%)	1.38	1.56	1.25	1.64	31.20%	55.43
Portfolio Inefficiency(%)	2.54	2.14	2.33	2.96	27.04%	67.43
Risky share	0.55	0.31	0.55	0.56	1.82%	6.90
# Observations	247,521		171,615	75,906		

Note: This table presents a summary of demographic and socio-economic characteristics of individuals as well as the portfolio features on the matched sample as of 2006. All the investors within the sample hold complete portfolios which must consist of at least one risk-free asset and one risky asset. *Single* is a dummy taking value of one if the individual is not associated with any kind of partnership including registered partnership, cohabitation and civil marriage. *Bachelor* is a dummy indicating whether the investor holds at least a bachelor's degree. *Primary employment* is determined by the largest fraction of income source, and it is a categorical variable taking values of zero to four. *Income* refers to all-factor annual income including both labor and capital earnings. *Return loss* is defined by Eq. 2. The column %Diff is computed by the difference between the two means divided by the mean of natives.

Table 2: Gap in return loss and its contributors

	RL (1)	Log(RL) (2)	Log(Aggres.) (3)	Log(Ineff.) (4)
Immigrant	0.375***	0.185***	-0.003	0.188***
	(0.006)	(0.004)	(0.003)	(0.003)
Male	0.414***	0.268***	0.012***	0.256***
	(0.006)	(0.004)	(0.003)	(0.003)
Log(Age)	0.148***	0.025***	-0.033***	0.059***
	(0.012)	(0.008)	(0.006)	(0.006)
Single	-0.111***	-0.067***	0.001	-0.069***
	(0.008)	(0.005)	(0.004)	(0.004)
Bachelor	-0.052***	-0.005	0.005	-0.010***
	(0.006)	(0.004)	(0.003)	(0.003)
Primary employment				
Employed	-0.213***	-0.092***	-0.004	-0.088***
	(0.013)	(0.009)	(0.007)	(0.006)
Self-employed	-0.163***	-0.121***	-0.140***	0.019***
	(0.015)	(0.010)	(0.007)	(0.007)
Student	-0.119***	0.051***	0.181***	-0.130***
	(0.019)	(0.013)	(0.009)	(0.009)
Pensioner	-0.149***	0.012	0.093***	-0.081***
	(0.017)	(0.012)	(0.009)	(0.008)
Log(Real assets)	-0.004***	0.002***	0.001***	0.001***
	(0.001)	(0.0004)	(0.0003)	(0.0003)
Log(Fin. assets)	-0.241***	-0.227***	-0.221***	-0.006***
	(0.003)	(0.002)	(0.001)	(0.001)
Log(Debt)	0.022***	0.013***	0.003***	0.010***
	(0.001)	(0.0005)	(0.0003)	(0.0003)
Log(Income)	-0.022***	-0.017***	-0.016***	-0.002**
	(0.002)	(0.001)	(0.001)	(0.001)
Municipality FE	Yes	Yes	Yes	Yes
# Observations	257,521	257,521	257,521	257,521
Adjusted R^2	0.078	0.096	0.121	0.079

Note: This table presents the results of the OLS regression specified in Eq. 2. Column 1 documents the baseline result, while Columns 2-4 shows the decomposition according to Eq. 4. *Aggressiveness* refers to the fraction of risky assets in one's complete portfolio, while *Inefficiency* is the return gap between fully-diversified market portfolio and one's risky portfolio. *Single* is a dummy taking value of one if the individual is not associated with any kind of partnership including registered partnership, cohabitation and civil marriage. *Bachelor* is a dummy indicating whether the investor holds at least a bachelor's degree. *Primary employment* is a categorical dummy where being unemployed is the base level. *Income* refers to all-factor annual income including both labor and capital earnings. *p<0.1, **p<0.05, ***p<0.01.

Table 3: Gender, Education and Return Loss Gap

Panel A: Gender				
	RL	Log(RL)	Log(Aggres.)	Log(Ineff.)
	(1)	(2)	(3)	(4)
Immigrant	0.264***	0.127***	-0.021***	0.148***
	(0.009)	(0.006)	(0.004)	(0.004)
Male	0.334***	0.227***	-0.001	0.228***
	(0.007)	(0.005)	(0.004)	(0.003)
Immigrant×Male	0.239***	0.125***	0.040***	0.085***
	(0.013)	(0.008)	(0.006)	(0.006)
Individual Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
# Observations	257,521	257,521	257,521	257,521
Adjusted R^2	0.079	0.097	0.121	0.080
Panel B: Education				
	RL	Log(RL)	Log(Aggres.)	Log(Ineff.)
	(1)	(2)	(3)	(4)
Immigrant	0.455***	0.240***	0.029***	0.211***
	(0.009)	(0.006)	(0.005)	(0.004)
Bachelor	-0.002	0.029***	0.025***	0.004
	(0.008)	(0.005)	(0.004)	(0.004)
Immigrant×Bachelor	-0.149***	-0.101***	-0.059***	-0.043***
	(0.013)	(0.008)	(0.006)	(0.006)
Individual Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
# Observations	257,521	257,521	257,521	257,521
Adjusted R^2	0.078	0.097	0.121	0.079

*Note:*This table relates to the modified regression model Eq. 2 in which interaction terms $Immigrant \times Male$ and $Immigrant \times Bachelor$ are introduced respectively. All other individual controls and the decomposition remain the same as in the baseline regression. *p<0.1, **p<0.05, ***p<0.01.

Table 4: Financial Literacy and Return Loss

	RL (1)	Log(RL) (2)	Log(Aggres.) (3)	Log(Ineff.) (4)
Financial literacy	-0.011***	-0.005***	0.0004	-0.005***
	(0.003)	(0.001)	(0.001)	(0.001)
Log(YSI)	-0.015	0.004	0.012	-0.007
	(0.021)	(0.014)	(0.009)	(0.012)
Individual Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
# Observations	63,096	63,096	63,096	63,096
Adjusted R^2	0.091	0.103	0.125	0.095

*Note:*With the subsample consisting of only immigrants, this table presents the results of the OLS regression specified in Eq. 5. Column 1 documents the baseline result, and Columns 2-4 exhibit the result of decomposition according to Eq. 4. *Financial literacy* is obtained from the 2014 S&P's Global Survey, and measures the fraction of financially literate adults in a given country. The YSI stands for years since immigration to Sweden. All other individual controls remain the same as in the baseline regression. Standard errors are clustered at country-of-origin level. *p<0.1, **p<0.05, ***p<0.01.

Table 5: Immigrant, Financial Literacy and Exemplary Underdiversification

	Only one asset (1)	Only one stock (2)	Only one asset (3)	Only one stock (4)
Immigrant	0.059***	0.157***		
	(0.002)	(0.003)		
Financial literacy			-0.002***	-0.004***
			(0.0004)	(0.001)
Sample	Matched	Matched	Immigrant	Immigrant
Individual Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
# Observations	257,521	77,579	63,096	21,927
Adjusted R^2	0.068	0.137	0.070	0.151

Note: This table presents results of the examination on two particular portfolio compositions using the baseline regression Eq. 3 with two alternative dependent variables: (1) a portfolio consisting of only one asset, and (2) that only asset being a stock instead of a mutual fund. Columns 1 and 2 use the sample from matching, while Columns 3 and 4 use the sub-sample consisting of only immigrants. *Financial literacy* is obtained from the 2014 S&P's Global Survey, and measures the fraction of financially literate adults in a given country. *p<0.1, **p<0.05, ***p<0.01.

Table 6: Social Integration and Return Loss

	RL	log(RL)	Log(Aggress.)	Log(Ineff.)
	(1)	(2)	(3)	(4)
Native partner	-0.207***	-0.097***	-0.005	-0.092***
	(0.030)	(0.018)	(0.010)	(0.011)
Individual Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
Country-of-origin FE	Yes	Yes	Yes	Yes
# Observations	48,617	48,617	48,617	48,617
Adjusted R^2	0.110	0.112	0.101	0.108

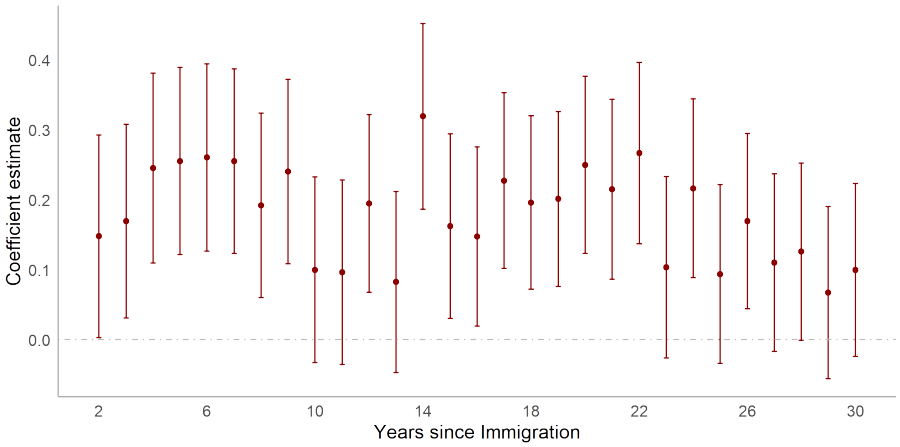
Note: Using the model specified in Eq. 7, this table exhibits whether immigrants' social integration, captured by whether their partners are native-borns, affects return losses. The sample only consists of immigrants who have a partner, a cohabitant or a spouse. *Native partner* is a dummy taking value of one if the immigrant's partner is a native-born. All other individual-level controls remain the same as in the baseline regression. Standard errors are clustered at country-of-origin level. *p<0.1, **p<0.05, ***p<0.01.

Table 7: Return Loss of Second-generation Immigrants

	RL (1)	Log(RL) (2)	Log(Aggres.) (3)	log(Ineff.) (4)
Second-gen Immigrant				
One native parent	0.078***	0.028***	-0.017***	0.046***
	(0.005)	(0.004)	(0.003)	(0.002)
No native parent	0.203***	0.078***	-0.041***	0.119***
	(0.008)	(0.006)	(0.005)	(0.004)
Individual Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
# Observations	1,744,673	1,744,673	1,744,673	1,744,673
Adjusted R^2	0.065	0.091	0.106	0.055

Note: With the sub-sample consisting of only native-borns, this table presents the results of modified Eq. 3. Instead of the *Immigrant* dummy, the variable of interest is a categorical dummy *Second_gen* indicating one of the three alternatives regarding their parents: (1)both parents are native-borns (the benchmark), (2)one native-born parent and one immigrant parent, and (3) both parents are immigrants. Column 1 documents the baseline result, and Columns 2-4 exhibit the result of decomposition according to Eq. 4. All other individual-level controls remain the same as in the baseline regression. *p<0.1, **p<0.05, ***p<0.01.

Figure 1: Stay Duration and Return Loss



Note: Using the immigrant-only sample, this figure plots the results from Eq. 6 and depicts the relation between return loss and immigrant's length of stay, measured by the number of years since their first-time registration as a Swedish resident. The 95% confidence intervals of estimate are illustrated. Standard errors are clustered at country-of-origin level.

A Supplementary tables

Table A1: Return Loss Gap with Alternative Benchmark

	RL (1)	Log(RL) (2)	Log(Aggres.) (3)	Log(Ineff.) (4)
Immigrant	0.475*** (0.008)	0.155*** (0.004)	-0.003 (0.003)	0.157*** (0.003)
Individual Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
# Observations	257,521	257,521	257,521	257,521
Adjusted R^2	0.078	0.096	0.121	0.079

Note: The benchmark market portfolio is MSCI Europe Index, instead of MSCI World Index used in the baseline setting. Otherwise the specification is the same as in Table 2. *p<0.1, **p<0.05, ***p<0.01.

Table A2: Further Decomposition of Portfolio Inefficiency

	Volatility (1)	Sharpe Ratio (2)
Immigrant	0.026***	-0.012***
	(0.0004)	(0.0002)
Individual Controls	Yes	Yes
Municipality FE	Yes	Yes
# Observations	257,521	257,521
Adjusted R^2	0.076	0.053

Note: The specification embedded to this table is identical to Eq. 3, except that the dependent variable is replaced by volatility and the Sharpe ratio, respectively. *Volatility* measures the annualized standard deviation of monthly excess returns.*p<0.1, **p<0.05, ***p<0.01.

Table A3: Financial Literacy Survey Results by Country

Country	Fin Lit	Country	Fin Lit
Afghanistan	0.14	Jordan	0.24
Algeria	0.33	Kenya	0.38
Argentina	0.28	Lithuania	0.39
Australia	0.64	Mexico	0.32
Bangladesh	0.19	Moldova	0.27
Bolivia	0.27	Netherlands	0.66
Bosnia and Herzegovina	0.24	Nicaragua	0.20
Botswana	0.52	Nigeria	0.26
Brazil	0.35	Pakistan	0.26
Cambodia	0.18	Peru	0.28
Cameroon	0.38	Philippines	0.25
Canada	0.68	Poland	0.42
Chile	0.41	Portugal	0.26
China	0.28	Romania	0.22
Colombia	0.32	Russia	0.38
Costa Rica	0.35	Rwanda	0.26
Croatia	0.44	Saudi Arabia	0.31
Czech Republic	0.58	Serbia	0.38
Egypt	0.27	South Africa	0.42
Estonia	0.54	South Korea	0.33
Finland	0.63	Spain	0.49
France	0.52	Sri Lanka	0.35
Georgia	0.30	Sweden	0.71
Germany	0.66	Switzerland	0.57
Ghana	0.32	Tanzania	0.40
Greece	0.45	Thailand	0.27
Guatemala	0.26	Turkey	0.24
Hungary	0.54	Uganda	0.45
India	0.24	Ukraine	0.40
Indonesia	0.32	United Arab Emirates	0.38
Iran	0.20	United Kingdom	0.67
Iraq	0.27	United States	0.57
Israel	0.68	Venezuela	0.25
Italy	0.37	Vietnam	0.24
Japan	0.43	Zimbabwe	0.41

Note: The table presents the relevant part of the Global Financial Literacy Survey. The survey pertains to four questions regarding inflation, numeracy, compound interest and risk diversification, respectively. A person is defined as financially literate when they correctly answers at least three out of the four financial questions described above. The column of Financial Literacy indicates the proportion of financially literate adults. The full list can be found in Klapper et al. (2015).

Table A4: Social Integration and Return Loss with Subsample

	RL	log(RL)	Log(Aggress.)	Log(Ineff.)
	(1)	(2)	(3)	(4)
Native partner	-0.185***	-0.126***	-0.030*	-0.096***
	(0.052)	(0.028)	(0.015)	(0.023)
Individual Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
# Observations	21,134	21,134	21,134	21,134
Adjusted R^2	0.070	0.087	0.102	0.067

Note: The sample only contains immigrants whose partner is either native-born or from Canada, Israel, United Kingdom, Germany and Netherlands. Other details can be found in the notes stated in 6. *p<0.1, **p<0.05, ***p<0.01.

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ISBN 978-91-8107-186-3

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