



|              |                                                                             |
|--------------|-----------------------------------------------------------------------------|
| Title        | Behavioral Finance and Behavioral Economics:An Empirical Analysis           |
| Author(s)    | 久田, 貴紀                                                                      |
| Citation     | 大阪大学, 2019, 博士論文                                                            |
| Version Type | VoR                                                                         |
| URL          | <a href="https://doi.org/10.18910/72447">https://doi.org/10.18910/72447</a> |
| rights       |                                                                             |
| Note         |                                                                             |

*The University of Osaka Institutional Knowledge Archive : OUKA*

<https://ir.library.osaka-u.ac.jp/>

The University of Osaka

Behavioral Finance and Behavioral Economics: An  
Empirical Analysis  
(行動ファイナンスと行動経済学：実証分析)

Takanori Hisada

## Abstract

Why do gender, race and liquidity differences arise in contemporary society?

This study investigates how and why these disparities occur, beginning with an examination of the gender gap in start-up activities to determine whether family status or employment status is responsible for the observed disparity. We consider independent entrepreneurship and intrapreneurship as two different start-up modes, and focus on this fundamental distinction to identify the parameters of our empirical model. Using nationally representative U.S. data, we find that the effects of being a part-time worker on the likelihood of becoming an independent entrepreneur differ across genders. The results suggest similar findings for intrapreneurship, but in opposite directions. Furthermore, our results suggest that, for both entrepreneurship and intrapreneurship, the gender differences in the employment-related variables are more significant than those in the family-related variables in affecting the observed gender gap-negatively for entrepreneurship or positively for intrapreneurship.

This study also examines racial differences, specifically differences in risk tolerance and asset allocation among white, black, and Hispanic households in the United States. Regressions were run using a sample chosen by propensity score matching, because substantial differences occur in the distributions of covariates among race and ethnicity. This study finds that white, black, and Hispanic households are more likely to have similar risk tolerances, as well as similar asset allocations. However, in practice, wealth inequality exists between whites and nonwhites. These results imply that differences among race and ethnicity do not affect risk tolerance and asset allocation, and therefore, wealth inequality between whites and nonwhites is not attributed to asset allocation.

Additionally, this study investigates liquidity differences before and after exchange mergers, specifically the relationships between an exchange merger, investor sentiment, and liquidity by analyzing data from the 2013 merger of the Tokyo Stock Exchange and Osaka Securities Exchange. In contrast to prior studies, this study considers the investor sentiment effect of the merger. Synergy and the investor sentiment effect occur in the short run with liquidity increases, while the investor sentiment effect occurs more strongly in small stocks.

Various differences in gender, race, and liquidity are present in contemporary society. Clarifying the sources of these differences, and where they should be reduced or eliminated, requires policy improvements.

# Chapter 1

## Introduction

Why do differences arise in contemporary society? For example, females and nonwhites have a wage gap relative to males and whites (Blau and Kahn, 1992), while females have higher rates of unemployment than males (Azmat, Goell and Manning, 2006), and nonwhites have higher rates than whites (Ritter and Taylor, 2011). Moreover, there is the glass ceiling, which represents gender and nonwhite inequalities in workplace power (Elliott and Smith, 2004). Wealth inequality also arises between males and females or whites and nonwhites. According to the 2010 Survey of Consumer Finances, males' average net worth is roughly \$650,000 relative to \$210,000 for females, whereas whites' average net worth is approximately \$675,000 relative to \$105,000 for blacks and \$117,000 for Hispanics. On the other hand, when considering liquidity before and after an exchange merger, there are differences that increase liquidity after the merger. This study investigates gender differences, racial differences, and liquidity differences.

In the second chapter, this study investigates gender differences. Start-up activities that create new business opportunities are the source of long-term economic growth. There is increasing global recognition of the importance of startup activities as a remedy for the stagnating world economy. On the other hand, gender equality campaigns such as the United Nations' HeForShe show active efforts worldwide to bridge gender differences and equalize the distribution of economic and social opportunities through inclusion. This study conducts an empirical analysis to explore the background factors of gender differences in start-up activities in the United States in recent years.

The original contribution of this research is that the empirical analysis conducted includes not only independent entrepreneurs (entrepreneurship),

as emphasized in the past, but also includes intra-company entrepreneurship (intrapreneurship). The former involves the risk that one or a few individuals will bear most of the responsibility for the startup activities, so that in the case of success, the payback is large; however, in the event of failure, the losses must also be suffered. On the other hand, in intrapreneurship, there are negative factors such as the potential impact on future promotion if the activities fail, but unlike entrepreneurship, no large financial burden is involved. At the same time, much of the return in the case of success is supposed to be returned to the individual who initiated the intrapreneurship or the organization to which the person or group belongs. In contemporary society, both independent entrepreneurship, the traditional entrepreneurship concept, and intrapreneurship are important as “start-up activities”.

How do gender differences emerge in startup activities with these different properties? In this research, we used the Panel Study of Entrepreneurial Dynamics provided by the University of Michigan, Institute for Social Research in the United States, and examined the actual nationwide start-up activities from 2005 to 2006. In the data used in this research, women accounted for 51% of the group of individuals not involved in either independent entrepreneurship or intrapreneurship, 36% of the group of individuals engaged in independent entrepreneurship, and 30% of the group of individuals involved in intrapreneurship. The data show that the proportion of women participating both types of start-up activities is low. At the start of the study, the research group predicted that the family attributes of individuals might play an important role in the factors that contribute to the gender differences. Our hypothesis was, for example, that if women have children, women are more likely to engage as independent entrepreneurs (but their level of engagement compared to men would be lower regardless of the presence or absence of children) and women would be less likely to engage in intrapreneurship. This may be an exceptional case, but on the whole it seems that independent entrepreneurs are relatively flexible in terms of time, whereas intrapreneurships are more time-constrained commitments.

However, as a result of empirical analyses from several angles, findings show that family attributes themselves, such as the presence of children, state of marriage, and number of family members, are not strong factors in explaining gender differences in either independent entrepreneurship or intrapreneurship. In the process of proceeding with the review work, we found instead that the personal labor situation attribute plays a more important role. More specifically, there is a gender difference related to part-time versus full-time work.

As expected, the proportion of women working part-time is higher than

that of men, but it was discovered that gender differences in this employment category have opposite effects on independent entrepreneurship and intrapreneurship. In other words, it is found that women engage in part-time work to reduce gender differences among independent entrepreneurs, while part-time work expands gender differences in intrapreneurship. This result suggests that it is important for women to engage in part-time work to secure the preparation period needed to make their independent startup easier, whereas it is important for women to engage in full-time work to engage in more intrapreneurship. Individuals can choose opportunities to have more time off through part-time work, or individuals who want full-time work can secure opportunities regardless of gender. This suggests that gender differences will be resolved in both entrepreneurship and intrapreneurship.

In the third chapter, this study investigates racial differences. The research specifically targeted white compared to black people. Wealth inequality of races has been studied since the 1970s, and the imbalance of wealth has developed into political problems. The government supports entrepreneurs in an attempt to solve such imbalances because the opportunity to improve an individual's working conditions might not be easily obtained within existing organizations. For example, the US Small Business Agency has a webpage for minority-owned-businesses. Cagetti and Nardi (2008) explain that income, taxation, inheritance, human capital, and portfolio choice influence wealth inequality. This study focuses on portfolio choice.

The contribution of this research is two-fold. First, the study uses a novel analysis method. Prior studies have used primarily simple regression methods, such as logit models, to investigate whether differences in race and ethnicity influence risk tolerance and asset allocation. Variables that influence risk tolerance and asset allocation, such as income and education, are added as covariates and as a result, the prior literature suggests that differences in race and ethnicity influence risk tolerance and asset allocation. However, characteristics differ substantially by race and ethnicity, especially between whites and nonwhites. For example, whites have higher average income and education relative to nonwhites. In particular, households with income of more than \$100 million tend to be white. Cochran (1965) and Rubin (2001) suggest that regression analysis cannot reliably control for differences in covariates when there are substantial differences in the distribution of covariates within the groups. Prior studies have analyzed the influence of the differences among race and ethnicity with an entire sample composed of a high average income and education group and a low average income and education group, and have found that the coefficients of race and ethnicity are statistically significant and that racial differences influ-

ence risk tolerance and asset allocation. However, those results may have low reliability. In contrast, this study conducts analysis using a method that performs the regression after a sample with similar characteristics of race and ethnicity is chosen using propensity score matching (PSM). If the differences in the coefficients of race and ethnicity are statistically significant even when using a sample with similar characteristics, the results showing that differences in race and ethnicity influence risk tolerance and asset allocation are reliable. In fact, combining regression and matching substantially reduces bias (Rubin, 1973, 1979; Rubin and Thomas, 2000; Glazerman et al., 2003; Abadie and Imbens, 2011).

The second contribution of this study is that it investigates not only risky assets but assets with various levels of risk and whether a particular race or ethnicity is more likely to hold a particular asset. Prior studies have mainly focused only on risky assets, such as stock. However, investigating only risky assets does not reveal whether a particular race or ethnicity is more likely to hold a particular asset.

As described above, in practice, there is wealth inequality between whites and nonwhites. Prior studies suggest that the reason wealth inequality arises between whites and nonwhites is that nonwhite households are less likely to take risks and hold risky assets than white households. However, white, black, and Hispanic households take risks at a similar level and have similar asset allocations. Differences among race and ethnicity do not necessarily influence risk tolerance and asset allocation. Therefore, these results imply that wealth inequality between whites and nonwhites is not attributed to asset allocation.

In the fourth chapter, this study investigates liquidity differences before and after exchange mergers. Exchange mergers have recently increased because of competition among exchanges. For instance, there have been mergers involving the JPX, Euronext, OMX, NYSE-Euronext, and NASDAQ-OMX. The contribution of this study is three-fold. First, this study considers investor sentiment. Investor sentiment is defined as optimism or pessimism about the future stock market (Baker and Wurgler, 2006). Previous studies do not consider the investor sentiment effect; however, this effect is important, because if investors believe that an exchange merger is a positive phenomenon, then liquidity will increase.

The second contribution of this study is that, unlike previous studies, this study considers one year after the merger. Although previous studies have not looked at merger effects after a year has passed, it is important to understand whether liquidity is increasing or decreasing from a longer term perspective.

The third contribution of this study is the effect of small stocks. Retail (small) trade imbalances move stock prices and forecast future returns, suggesting that retail trade moves markets. Retail (individual) investor trades are most likely to be especially influential among small stocks (Barber et al., 2009).

Finally, as described above, there are gender differences, racial differences, and liquidity differences in practice. Because these differences are reflected in policy, it is important to understand why they occur and lessen the differences if needed.

# Bibliography

Abadie A, Imbens GW. 2011. Bias-Corrected Matching Estimators for Average Treatment Effects. *Journal of Business & Economic Statistics* **29** (1): 1–11.

AZMAT, GHAZALA, MAIA GÖELL, AND ALAN MANNING. 2006. “Gender Gaps in Unemployment Rates in OECD Countries.” *Journal of Labor Economics*, **24**(1), 1-37.

Barber, M. B., Odean, T., and Zhu, N., 2009. Do Retail Trades Move Markets? *Review of Financial Studies*, **22**(1), 151–186.

Baker, M., and Wurgler, J., 2006. Investor Sentiment and the Cross-Section of Stock Returns. *Journal of Finance*, **61**(4), 1645–1680.

BLAU, FRANCINE D., AND LAWRENCE M. KAHN. 1992. “Race and Gender Pay Differentials.” NBER Working Paper, No. 4120.

Cagetti M, De Nardi M. 2008. Wealth Inequality: Data and Models. *Macroeconomic Dynamics* **12**: 285–313.

Cochran WG. 1965. The Planning of Observational Studies of Human Populations. *Journal of the Royal Statistical Society. Series A* **128** (2): 234–266.

ELLIOTT, JAMES R., AND RYAN A. SMITH. 2004. “Race, Gender, and Workplace Power.” *American Sociological Review*, **69**(3), 365-386.

Glazerman S, Levy DM, Myers D. 2003. Nonexperimental versus Experimental Estimates of Earnings Impacts. *Annals of the American Academy of Political and Social Science* **589** (1): 63–93.

RITTER, JOSEPH A., AND LOWELL J. TAYLOR. 2011. “Racial Disparity in Unemployment.” *Review of Economics and Statistics*, **93**(1), 30-42.

Rubin DB. 1973. The Use of Matched Sampling and Regression Adjustment to Remove Bias in Observational Studies. *Biometrics* **29** (1): 185–203.

Rubin DB. 1979. Using Multivariate Matched Sampling and Regression Adjustment to Control Bias in Observational Studies. *Journal of the American Statistical Association* **74** (366): 318–328.

Rubin DB. 2001. Using Propensity Scores to Help Design Observational Studies: Application to the Tobacco Litigation. *Health Services and Outcomes Research Methodology* **2** (3): 169–188.

Rubin DB, Thomas N. 2000. Combining Propensity Score Matching with Additional Adjustments for Prognostic Covariates. *Journal of the American Statistical Association* **95** (450): 573–585.

## Chapter 2

# Gender Differences in Entrepreneurship and Intrapreneurship: An Empirical Analysis

Takanori Adachi and Takanori Hisada , *Small Business Economics*

### 2.1 Introduction

Entrepreneurship is often promoted as an opportunity for women to improve their working lives, which might not be easily achieved in the labor market.<sup>1</sup> For instance, the Small Business Administration (SBA) in the U.S. has an Office of Women’s Business Ownership to promote women entrepreneurs.<sup>2</sup> There are several reasons for this. First, women may encounter the proverbial glass ceiling in the workplace (e.g. Cotter et al. 2001; Elliott and Smith 2004). In addition, it is also known that women experience wage gaps relative to men (e.g. Blau and Kahn 2006; Fotin 2008). At the same time, *intrapreneurship*, which is essentially “entrepreneurship within an existing organization” (Antoncic 2007, p.310), also provides women with opportuni-

---

<sup>1</sup>An abridged version of this chapter was published as “Gender Differences in Entrepreneurship and Intrapreneurship: An Empirical Analysis” in *Small Business Economics* (Vol.48, No.3 (March 2017), pp. 447-486)

<sup>2</sup>See <https://www.sba.gov/offices/headquarters/wbo> (accessed July 2016).

ties to engage in a start-up activity.<sup>3</sup> It is increasingly recognized as being equally important as traditional entrepreneurship since it is crucial to the established firm’s growth and profitability.<sup>4</sup>

However, in the data we use for this study (see Section 3 below for details), women are underrepresented in both modes of start-up activity. They represent 36% of nascent entrepreneurs and 30% of nascent intrapreneurs—far less than 50%—and these gender differences are statistically significant when compared to the group of uninvolved employees (see Table 2.2 below). What are the factors responsible for this gender gap in start-up activities? While gender differences in independent entrepreneurship have been studied extensively (see the next section), there are far fewer insights when the concept of entrepreneurship is broadened to include intrapreneurship as well. In this paper, we examine how gender leads to differences in the determinants of intrapreneurship as well as those of independent entrepreneurship. Throughout this paper, “entrepreneurship” and “intrapreneurship” are considered as two mutually exclusive alternatives, and we use “entrepreneurship” and “independent entrepreneurship” interchangeably.

Our main findings are summarized as follows. First, we find that women are *less* likely to choose entrepreneurship presumably because of their aversion to risk, the existence of credit constraints or discrimination. Furthermore, marriage, children, and family size have *additional positive* effects on women’s entrepreneurship. However, part-time work has additional *negative* effects. We also find that women are *less* likely to become intrapreneurs. The presence of children has additional *negative* effects on intrapreneurship for women, suggesting that intrapreneurship may deprive women of time flexibility. We also find that part-time work is not so disadvantageous for women to become an intrapreneur. Next, we find that the counterfactual rate of independent entrepreneurship by women, who acquire the same (in the distributional sense) observed characteristics as men, is lower than the actual rate of men’s independent entrepreneurship. Similarly, the counterfactual rate of intrapreneurship by women, who have the same character-

---

<sup>3</sup>Parker (2009, p.31) also states that “[d]ependent spinoffs are ventures formed in collaboration with an incumbent firm (sometimes termed ‘intrapreneurship’), whereas independent spin-offs are pursued entirely separately from an incumbent (‘entrepreneurship’).” Intrapreneurship is sometimes called “corporate entrepreneurship.” In this study, we use “intrapreneurship” and “intrapreneurs” throughout because we do not view intrapreneurship as specific to corporations.

<sup>4</sup>See, e.g., Miller (1983), Pinchot (1985), Rule and Irwin (1988), Hisrich (1990), Covin and Slevin (1991), Lumpkin and Dess (1996), Morris and Sexton (1996), Antoncic and Hisrich (2001), Antoncic and Hisrich (2003), Antoncic (2007), Hellmann (2007), and Baruah and Ward (2015).

istics as men, is also lower than the actual rate of men’s intrapreneurship. These two results suggest that women may be in a disadvantageous position when becoming an independent entrepreneur or an intrapreneur. Lastly, our decomposition results suggest that for both entrepreneurship and intrapreneurship, the gender differences in the employment-related variables are more significant than those in the family-related variables in affecting the observed gender gap negatively (for entrepreneurship) or positively (for intrapreneurship).

This paper uses Parker’s (2011) definition of (nascent) intrapreneurs: intrapreneurs are those considering starting a business *for their employer*. In our conceptual framework presented below, an individual first chooses whether to work independently. If he or she does, he or she is called an *independent entrepreneur*. Independent entrepreneurship here is a broad concept: it includes both self-employment and business ownership. If the individual does not choose to be an independent entrepreneur, he or she may become an *intrapreneur*.<sup>5</sup> To formalize this conceptual framework, we employ an empirical model, in which the structure of these two selections is considered, and estimate it by using an individual-level survey that is nationally representative of the United States (Panel Study of Entrepreneurial Dynamics, II, or PSED II). Our empirical model of “double selection” is essentially a bivariate probit with the structure of sample selection as explained above. It is superior to a nested or multinomial logit model because the unobserved variable in the selection of entrepreneurship and intrapreneurship is found to be negatively correlated and statistically significant.<sup>6</sup> We can deal with such an asymmetrical relationship in the triangularity of entrepreneurship, intrapreneurship, and other (i.e., not being involved in a start-up); this cannot be accommodated in a nested or multinomial logit model.

In this study, we stress the fundamental difference between entrepreneur-

---

<sup>5</sup>In this study, we do not describe the details of this organizational decision process. In the conceptual framework proposed in Subsection 4.1 below, we assume that an individual chooses one of the three alternatives that give him/her the best utility. If an individual who wants to be an intrapreneur cannot become one because of limited capacities, he/she does not always choose the best alternative. We do not model such frictions mainly because of data limitations. In some cases, an employee may be “ordered” to be an intrapreneur within a company against his/her will. However, De Clercq et al. (2011) argue that being selected as an intrapreneur is usually financially rewarding. Thus, we would not lose much validity even if we assume that an individual chooses the alternative that gives him/her the highest level of utility.

<sup>6</sup>See Bethlehem et al. (2011) for an argument of why the bivariate probit model with sample selection (“double selection”) is better than other models such as, the multinomial logit, nested logit, and multilevel models.

ship as an *outside*-organization activity and intrapreneurship as a *within*-organization activity. In conceptual frameworks of existing studies, such as those by Parker (2011), Tietz and Parker (2012), and Martiarena (2013), an individual first chooses whether to engage in a start-up activity and then *conditional on* the choice of start-up activity, he or she becomes either an entrepreneur or an intrapreneur (Parker 2011; Tietz and Parker 2012), or is indifferent to the two alternatives (Martiarena 2013). Thus, in these frameworks, individuals do not fundamentally distinguish between entrepreneurship and intrapreneurship: in the former case, a distinction is made based on whether an individual has a start-up plan in mind; in the latter, no special distinction is made among the three alternatives.

However, a decision on whether to work independently, and thus whether to be able to access capital and take risks, would be as important as whether to engage in a start-up activity. Therefore, in this paper, we view entrepreneurship and intrapreneurship as economically two different start-up modes. In particular, we note that many empirical studies find that credit matters significantly to the individual's decision to become involved in independent entrepreneurship.<sup>7</sup> Thus, an important economic distinction between entrepreneurship and intrapreneurship lies in the difference in access to capital and risk-taking. In independent entrepreneurship, entrepreneurs need to raise capital by themselves, and are fully responsible for failures, whereas in intrapreneurship, almost all the financial burden is on established organizations.<sup>8</sup> As Knight (1921, p.299) claims, "the entrepreneur ... takes over all the uncertainty of the business along with control over it." Not only does this economic difference motivate our empirical model, it also plays an important role in identifying its parameters (see Subsection 4.1 below).

In contrast, a distinction is made between start-up activities (including both independent entrepreneurship and intrapreneurship) and doing something else (including unemployment) in Parker's (2011) conceptual framework. Parker (2011) argues that this decision is affected by family status. This is because start-up activities are presumably more intensive, and

---

<sup>7</sup>See, e.g., Evans and Leighton (1989a, b), Evans and Jovanovic (1989), Holtz-Eakin et al. (1994a, b), Hamilton (2000), Parker (2000), Kawaguchi (2003), Hurst and Lusardi (2004), Kan and Tsai (2006), Buera (2009), Mondragón-Vélez (2009), Malchow-Møller et al. (2010), Fairlie and Krashinsky (2012), and McCann and Folta (2012). Rybczynski (2009) examines an issue similar to the one central to this study and finds that a gender gap in self-employment earnings can mostly be ascribed to liquidity constraints.

<sup>8</sup>However, this is not to say that intrapreneurs are not incentivized; if they fail, it becomes difficult for them to be promoted or rewarded financially.

thus an individual would care about his or her family status when choosing whether to work for a start-up. However, once he or she decides to involve in a start-up activity, family status no longer matters to the choice of independent entrepreneurship or intrapreneurship. Parker (2011) uses this feature to identify his empirical model. Unfortunately, because of this identification strategy, one cannot use Parker’s (2011) framework to study how family status is related to the two start-up modes independently. In contrast, our conceptual framework not only reflects the importance of the economic distinction between entrepreneurship and intrapreneurship, but also has a methodological advantage in empirically examining the gender gap in start-up activities because family status should presumably not be ignored to study this issue.

However, our conceptual framework is not a panacea. To estimate our empirical model, individuals in the second stage, who are either intrapreneurs or employees, must have the same covariates. As explained in Subsection 3.1 below, PSED II consists of two parts: the initial screening process and the follow-up. The follow-up part of PSED II has detailed information, such as Parker’s (2011) “employer size,” on entrepreneurs and intrapreneurs. The disadvantage of employing our conceptual framework is that we are not able to use the follow-up part of PSED II to include a richer set of covariates than the initial screening process has.<sup>9</sup> Thus, we focus on the decisions by those who are currently employed, and thus, the non-employed is excluded from our sample, whereas in Parker’s (2011) framework it is possible to include non-employed individuals in the initial stage. However, we recognize the importance of controlling for the size of the organization that the individual works for. To do so, we match the March 2005 version of the Current Population Survey (CPS) with PSED II because it has information on firm size for each individual who is currently employed. In short, Parker’s (2011) conceptual framework and ours complement each other, and the latter reflects our interest in the gender gap in the two modes of start-up activity.

The rest of the paper is organized as follows. Section 2 presents our hypotheses by discussing existing studies that are most closely related to our study. After describing the data used for this study in Section 3, we present the empirical analysis in Section 4. We not only provide parameter estimates of the alternative specifications but also compute the actual and counter-

---

<sup>9</sup>However, it is possible to use the follow-up part for the purpose of identifying who *actually* started a business after statement in the initial screening process. Our main results do not change significantly even if we use the follow-up part. The details are available upon request.

factual probabilities of becoming an entrepreneur or intrapreneur, and show the decomposition results for gender differences. Section 5 concludes the paper.

## 2.2 Related literature and hypothesis building

We aim to contribute to the understanding of gender differences in start-up activities by broadening the concept of start-up to include intrapreneurship as well. As such, this paper lies at the intersection of the two strands of the literature: (i) gender differences in (independent) entrepreneurship and (ii) how (independent) entrepreneurship and intrapreneurship differ.<sup>10,11</sup>

To the best of our knowledge, Kacperczyk (2015) is the only study lying at this intersection to examine the gender gap in entrepreneurship in a broader context that includes corporate entrepreneurship as an entrepreneurial activity as well. Using detailed data from 1980 to 2005 of fund managers in the mutual funds industry, Kacperczyk (2015) finds that women are more likely to pursue intrapreneurship than start-up entrepreneurship because they can make use of maternity benefits, such as maternity leave, within the firm, while being rewarded financially at the same time. This balance may not be easily attained when women pursue start-up entrepreneurship. However, Kacperczyk (2015) does not support the presumption that gender differences in risk-taking behavior cause the observed gender gap in entrepreneurial activities. In contrast, this paper, by using nationally representative data and additional information to control for firm size, suggests that women would find it more difficult to become intrapreneurs than independent entrepreneurs, implying that women, on average, may be facing more solid “ceilings” within established organizations than in the marketplace. In addition, women who work in the financial industry may be relatively homogenous in terms of attitudes toward risk, as evidenced by Johnson and Powell (1994), who find that gender differences with respect to

---

<sup>10</sup>In a different vein, Moriano et al. (2014) examine how managerial leadership styles affect intrapreneurial behavior and find that transformative leadership—in which, e.g., a mission is shared, mentoring is provided, and innovative thinking is encouraged—is more effective to intrapreneurship than transactional leadership—in which, e.g., employees are extrinsically incentivized, and job scopes are predetermined. See Honig (2001), Monsen et al. (2010), and Zhang and Bartol (2010) for other psychological studies of intrapreneurship.

<sup>11</sup>For other studies that compare different groups of start-up participants, see Sardy and Alon (2007) on franchise and nascent entrepreneurs, Renko (2013) on social and conventional entrepreneurs, Kim et al. (2015) on leisure-based and conventional entrepreneurs, and Parker (2014) on serial and portfolio entrepreneurs.

risk attitudes are quite small in the managerial subsample, whereas in the non-managerial subsample, women show more risk aversion than men.

To consider how gender differences matter to entrepreneurship and intrapreneurship, recall first that entrepreneurship presumably entails risk or uncertainty, as explained in the Introduction.<sup>12</sup> This idea is seen in existing empirical studies showing that individuals with lower risk aversion are more likely to become entrepreneurs (e.g. Ekelund et al. 2005; Caliendo et al. 2009; Ahn 2010; Caliendo et al. 2015). In relation to our interest in both entrepreneurship and intrapreneurship, Douglas and Fitzsimmon (2013) and Martiarena (2013) find that intrapreneurs are more risk-averse than entrepreneurs. As for the relationship between risk aversion and gender, existing studies in experimental economics have repeatedly found strong evidence that, controlling for other demographic characteristics such as age, educational attainment, occupation, and cultural background, women are on average more risk averse than men both in the laboratory (usually, in the context of lottery choices) and in the field (usually, in the context of investment decisions).<sup>13</sup>

At the same time, however, entrepreneurship can give women greater autonomy, and this especially benefits them, depending on their family structure (e.g. Lombard 2001; Edwards and Field-Hendrey 2002). The studies by Macpherson (1988) and Carr (1996) are among the first to put forth the view that women with children favor self-employment owing to the flexibility with respect to time management that it offers. Hundley (2000) also finds that in the self-employment sector, the gender gap in earnings is more sensitive to family structure. In particular, self-employed women with children spend significantly less work time than those without children. On the other hand, Wellington (2006) finds that married women with more family workload are more likely to choose self-employment. This tendency is stronger for more educated women. Furthermore, using data from several European countries, Noseleit (2014) finds that the presence of children raises the women’s probability of becoming self-employed, and establishes the causal relationship for this; self-employment per se does not raise fertility. Patrick et al. (2016), us-

<sup>12</sup>In this paper, we do not distinguish between risk aversion and uncertainty aversion, as opposed to Knight’s (1921) emphasis on this distinction. Skeptical views toward Knight’s (1921) distinction can be found in, e.g., Schultz (1980), LeRoy and Singell (1987), Demsetz (1988), and Runde (1998).

<sup>13</sup>Croson and Gneezy (2009) point out the following three reasons for these gender differences: (i) emotions (according to psychological studies, women react to uncertain situations more emotionally and fear adverse outcomes more than men do), (ii) overconfidence (men are more overconfident than women), and (iii) perception of risk as challenges or threats.

ing detailed data on demographics from U.S. metropolitan areas from 1994 to 2008, also find that household workload owing to the presence of children is positively associated with the rate of self-employment for married women. In contrast, Taniguchi (2002) does not find a clear effect of children on women’s self-employment. Similarly, using U.K. data, Saridakis et al. (2014) find that household variables are less significant than economic environments for both men and women in explaining self-employment choices. This finding holds in both the short-run and long-run trends.

Thus, there would be several countervailing factors working as determinants of independent entrepreneurship by women. Indeed, Fossen (2012) finds that only a tiny portion of women’s lower rate of entrepreneurial entry is explained by their higher risk aversion, suggesting various types of discrimination toward women entrepreneurs may be the reason. We therefore establish the following hypothesis on the relationship between gender and independent entrepreneurship.

**Hypothesis 1a** Women are *more* likely to become entrepreneurs than men are if they highly value the greater autonomy and flexibility that entrepreneurship offers. They are *less* likely to become entrepreneurs if they strongly avoid the greater risk that entrepreneurship entails or if they face more severe challenges that make it difficult for them to become entrepreneurs, such as credit constraints or discrimination.

In contrast, less complex factors would be involved in the lower rate of women’s intrapreneurship. It is, more or less, a result of an internal process of organization, and we expect that women are *less* likely to become intrapreneurs. This is because, first, it may still entail greater uncertainty than wage work does. More importantly, intrapreneurship might require individuals to devote much time to it. This effect might be stronger for women with children than for men with children. In relation to this point, Becker (1985) argues that married women invest less in their human capital than married men do even when they work for the same number of hours, because women are mainly responsible for childcare and other household activities. Furthermore, women may be treated unequally in the workplace, as discussed in the first paragraph of the Introduction. It may also be that men are in a more advantageous position for intrapreneurship. Indeed, employers and co-workers may discriminate against women employees (e.g. Becker 1957). Employers may also have prejudices against female workers that they are less capable or less reliable on average than male workers (e.g. Phelps 1972). For all these reasons, we have the following hypothesis on

the relationship between gender and intrapreneurship.

**Hypothesis 1b** Women are *less* likely to become intrapreneurs than men are.

Based on the argument above, we also presume that entrepreneurship and intrapreneurship may mean different things for married individuals with children, establishing the following hypotheses.

**Hypothesis 2a** Women with children are *more* likely to choose entrepreneurship than their male counterparts.

**Hypothesis 2b** In contrast, women with children are *less* likely to be an intrapreneur than their male counterparts.

Finally, we also examine whether part-time work has different meanings across genders.

**Hypothesis 3a** Female part-time workers are *more* likely to choose entrepreneurship than their male counterparts.

**Hypothesis 3b** In contrast, female full-time workers are *less* likely to be an intrapreneur than their male counterparts.

To conclude this section, one can think of the two selection problems as interrelated. In the empirical model presented below, we consider this possibility by allowing correlation between unobserved factors in the choice of entrepreneurship and in the choice of intrapreneurship. These unobserved factors would conceivably be related to “entrepreneurial skills/talents” (Lucas 1978) in general.

## 2.3 Data

### 2.3.1 Sample construction

The data for this study is constructed from the Panel Study of Entrepreneurial Dynamics II (PSED II), provided by the Survey Research Center at the University of Michigan.<sup>14</sup> PSED II intends to be nationally representative as

---

<sup>14</sup>PSED II is freely downloadable at <http://www.psed.isr.umich.edu/>. For general references for PSED II, see Reynolds and Curtin (2009), Davidsson and Gordon (2012), and Gartner and Shaver (2012).

a longitudinal dataset that comprises individuals in the process of business formation (i.e., nascent entrepreneurs), and is an improved version of PSED I. From September 2005 to February 2006, an initial screening was conducted to identify a cohort, and in total, 31,845 individuals were selected as a nationally representative sample of the U.S. population. Their age is recorded as a categorical variable, ranging from “18 to 20” and “75 and up”. Then, follow-up interviews were conducted for these nascent entrepreneurs once a year until 2010. Thus, in total, there were six waves: 2005, 2006, 2007, 2008, 2009, and 2010.

For our empirical analysis, we use data from the initial screening process in PSED II.” Originally, it had 31,845 individuals, including those who are currently business owners (that is, those who answer “yes” to the question, “Are you, alone or with others, currently the owner of a business you help manage, including self-employment or selling any goods or services to others?” (QFF1c)). They represent 14.4% of the total or 4,573 individuals. Because our conceptual framework (presented in the next section) targets those who are currently working for an established organization, we exclude current business owners, other races than Blacks, Hispanics, and Whites, retirees, and the non-employed. That leaves us with 13,724 individuals. To help us define *nascent entrepreneurs* and *nascent intrapreneurs*, we use the following two questions:

1. “Are you, alone or with others, currently trying to start a new business, including any self-employment or selling any goods or services to others?” (QFF1a)
2. “Are you, alone or with others, currently trying to start a new business or a new venture for your employer, an effort that is part of your normal work?” (QFF1b)

If a respondent answers “yes” to QFF1a and “no” to QFF1b, then he is deemed a nascent entrepreneur (see Table 2.1). Nascent intrapreneurs are those who answer “yes” to QFF1b. If a respondent answers “no” to both questions, he is neither a nascent entrepreneur nor an intrapreneur. Thus, we have three categories: (i) a *nascent entrepreneur* (631 individuals), (ii) a *nascent intrapreneur* (622 individuals), and (iii) not involved in a start-up (12,471 individuals).

Furthermore, among these nascent entrepreneurs, only those who answer positively to the following two questions are deemed real *nascent entrepreneurs*: (i) “Over the past 12 months, have you done anything to help

start a new business, such as looking for equipment or a location, organizing a start-up team, working on a business plan, beginning to save money, or any other activity that would help launch a business?” (QFF2) and (ii) “Will you personally own all, part, or none of this new business?” (QFF3). The number of *nascent entrepreneurs* is 380. The rest (251 individuals) are categorized as *not being involved in a start-up*.

Next, among those initially categorized as potential intrapreneurs, only those who answer positively to QFF2 above are deemed real *nascent intrapreneurs*. They do not necessarily have to own a part of the new business. The number of such individuals is 370 and the rest (252 individuals) are categorized as *not being not involved in a start-up*. Unfortunately, in the screening process to determine nascent business starters (entrepreneurs in PSEDII language), information on work experience is not collected. Thus, age is interpreted as a rough measure of work experience. As for household income, we transform categorical values into continuous values, ranging from \$10,000 to \$125,000. We then take the logarithm of these values.<sup>15</sup>

PSED II also misses the size of the firm for which an individual works. This is important because the meaning of intrapreneurship would vary across firm sizes. Thus, we use the method of propensity score matching to merge the data with the March 2005 version of the Current Population Survey (CPS) to add these two variables to our constructed sample.<sup>16</sup> We also add another important piece of information, which is whether the respondent is U.S. born. This is because, race, which would presumably be an important factor in the context of entrepreneurship and intrapreneurship, would matter differently if we do or do not control for whether English is the individual’s first language. As a result of this merger, the sample size for estimation is 11,113, with 322 independent entrepreneurs, 311 intrapreneurs, and 10,480 individuals who are involved in neither activity.

### 2.3.2 Summary statistics

Table 2.2 shows the summary statistics of all 11,113 individuals in the entire sample for each (exclusive) occupational mode. All variables are dummy variables (taking 0 or 1) except “household size” and “income” (as well as “unemployment rate”, “homestead exemption”, “median home price,” and

---

<sup>15</sup>More specifically, these values take \$10,000, \$20,000, \$27,500, \$32,500, \$37,500, \$45,000, \$55,000, \$67,500, \$87,500 and \$125,000.

<sup>16</sup>This method of ‘data fusion’ is justifiably strengthened by the fact that PSED II uses the 2005 March CPS to compute the weight variable, “WT\_SCRN” (see page 2 of [http://www.psed.isr.umich.edu/psed/download\\_node/157](http://www.psed.isr.umich.edu/psed/download_node/157)).

three tax rates; we will explain these variables when we discuss identification of our model in the next section). As explained above, age is used as a categorical variable in the original screening part of PSED II, and its categorization is arranged in the same manner as Parker (2011).

Notably, when compared with the uninvolved individuals, the ratios of women are significantly smaller for both the entrepreneurship and intrapreneurship groups. As for family variables, the number of household members is the highest for the entrepreneurship and intrapreneurship groups. The ratio of child presence (under age 11) is also higher in the entrepreneurship and intrapreneurship groups. The ratio of married individuals is the highest and the family size is the lowest in the no-involvement group. The mean income is the highest among nascent intrapreneurs (\$67,030), followed by non business starters (\$65,810) and the nascent entrepreneurs (\$65,330). This may be consistent with Hamilton’s (2000) finding that suggests the importance of nonpecuniary benefits from independent entrepreneurship. Furthermore, this seems to support our hypotheses (1a) and (1b); individuals may be required to devote much time to intrapreneurship. As a result, married women with children may not favor intrapreneurship, while male counterparts do not. Regarding work status, the ratio of full-time workers is higher for the intrapreneurship group. Interestingly, in each group, 30%–35% work for organizations of less than 25 workers, and another 35–40% work for organizations of 1,000 workers or more. Note also that 40–50% work for organizations of 100 workers or less in each group.

Next, the ratios of black individuals are higher in the entrepreneurship and intrapreneurship groups than in the no-involvement group. This is also true for Hispanic individuals. In the no-involvement group, 36% are aged 18 to 34, whereas 43% of the nascent entrepreneurs and 49% of the nascent intrapreneurs are 18 to 34 years old. On the other hand, 14% of those not engaged in start-up activities are aged 55 or older, whereas the percentages are 7% for the entrepreneurs and 7% for the intrapreneurs. These numbers imply that the groups of business starters consist of younger individuals. Regarding education, the ratio of individuals with some college education is particularly high for entrepreneurship. Both in the uninvolved and the intrapreneurship groups, college graduates (including those with postgraduate degrees) account for about 40%. This percentage is slightly lower for entrepreneurs.

To look at our estimation sample from a viewpoint of gender, Table 2.3 presents the means of variables for each gender.<sup>17</sup> The average household

---

<sup>17</sup>The reason for statistical significances in the age groups would be ascribed to the fact

income of male interviewees (\$68,000) is higher than that of female interviewees (\$63,700). While the ratios of male entrepreneurship is higher than that of female (4.1% and 2.3% respectively), the ratio of male intrapreneurship (4.5%) is higher than that of female intrapreneurship (1.9%). The ratio of women working part-time (22%) is much higher than that of men (12%). It is also observed that women tend to work for a middle-sized firm. Finally, the ratio of women with a college degree or more among all women (43%) is higher than the corresponding ratio for men (37%).

## 2.4 Empirical analysis

In this section, we first explain our bivariate probit model with sample selection. Then, we show the estimates of the model with different specifications. Finally, we show decomposition results to argue how much gender differences matter to the choices of entrepreneurship and intrapreneurship, with focus on one's family and employment status.

### 2.4.1 Estimates of the bivariate probit model with sample selection

We now propose and estimate a sample selection model based on the following conceptual framework. First, an individual chooses whether to work independently. If he chooses this option, he is called an *entrepreneur*.<sup>18</sup> If he does not become an entrepreneur, then he chooses whether to become an *intrapreneur*. The individual chooses one of the three alternatives that gives him the best utility (see Footnote 4 above).

More formally, let  $d_i \in \{0, 1\}$ , where  $d_i = 1$  indicates individual  $i$  choosing to opt out from working independently, and  $d_i = 0$  indicates  $i$  becoming an *entrepreneur*, and let  $l_i \in \{0, 1\}$  denote whether individual  $i$ , conditional on  $d_i = 1$ , becomes an *intrapreneur* ( $l_i = 1$ ) or not ( $l_i = 0$ ). If individual  $i$  chooses  $d_i = 0$ , then his utility is written as

$$u_i = \alpha_0 + \alpha_1 female_i + \mathbf{x}_i' \boldsymbol{\alpha} + \epsilon_{1i}, \quad (2.1)$$

where  $female_i$  is a dummy variable that indicates individual  $i$ 's gender, and  $\mathbf{x}_i$  and  $\epsilon_{1i}$  include other control variables and all unobservable factors,

---

that on average women live longer than men do.

<sup>18</sup>In line with our conceptual framework described here, our empirical analysis does not make a distinction between the self-employed and business owners, and treats them as entrepreneurs. In addition, the qualification "nascent" is dropped for simpler expressions.

respectively. Similarly, individual  $i$ 's utility as an intrapreneur is written as

$$v_i = \beta_0 + \beta_1 female_i + \mathbf{z}_i' \boldsymbol{\beta} + \epsilon_{2i}, \quad (2.2)$$

where  $\mathbf{z}_i$  indicates control variables, and  $\epsilon_{2i}$  collects all unobserved factors, while he obtains (normalized) zero utility from  $l_i = 0$ . Thus, individual  $i$ , conditional on  $d_i = 1$ , becomes an intrapreneur (i.e.,  $l_i = 1$ ) if and only if  $v_i \geq 0$ . Knowing this order structure, individual  $i$  first chooses entrepreneurship (i.e.,  $d_i = 0$ ) if and only if  $u_i \geq v_i$ .

For identification of the parameters, it must be that  $\mathbf{x}_i \neq \mathbf{z}_i$  (i.e., the exclusion restriction). In this study, we assume that  $\mathbf{z}_i \subset \mathbf{x}_i$  and that  $(\mathbf{x}_i - \mathbf{z}_i)$  contains variables that are considered related to individual  $i$ 's *personal wealth*. In particular, "bankruptcy exemption in 2005" and "median home value in 2005" are included in  $(\mathbf{x}_i - \mathbf{z}_i)$ . These two variables vary across states, and are assumed to provide exogenous variations. The existing studies stress that capital constraints would prevent potential entrepreneurs from start-up activities.<sup>19</sup> However, capital constraints would be much less relevant when an individual does not work independently. This is the economic justification for excluding these two variables from  $\mathbf{z}_i$ . Additionally, we also include the 2005 annually averaged state-specific unemployment rate, as well as taxes for individual income, corporate income, and sales. See Appendix 1 for more details on these variables.<sup>20</sup>

We further assume that  $(\epsilon_{1i}, \epsilon_{2i})$  is distributed identically and independently across individuals, and is independent of  $(female_i, \mathbf{x}_i)$  and  $(female_i, \mathbf{z}_i)$ .<sup>21</sup> The distribution is bivariate normal with mean  $(0, 0)$ , and we allow for correlation between  $\epsilon_{1i}$  and  $\epsilon_{2i}$ , with the correlation coefficient denoted by  $\rho$ . The parameters of Eqs (1) and (2) are jointly estimated by the maximum likelihood method.

<sup>19</sup>See the references in Footnote 6 above, as well as, e.g., Fan and White (2003), Berkowitz and White (2004), Paik (2013), Rohlin and Ross (2016), and Cerqueiro and Penas (2016) for bankruptcy exemption and entrepreneurship, and Blanchflower and Oswald (1998), Taylor (2001), Adelino et al. (2015), and Schmalz et al. (2016) for housing and entrepreneurship.

<sup>20</sup>This additional state-level information was merged with the original PSED II at the Institute of Social Research, University of Michigan, as per our request. See <http://www.psed.isr.umich.edu/psed/home> for a procedure (accessed July 2016).

<sup>21</sup>We do not use household income as an explanatory variable in fear of its possible correlation with  $\epsilon_{1i}$  or  $\epsilon_{2i}$ .

### Selection of entrepreneurship (Eq. (1))

The estimation results of Eq. (1) are presented in Table 2. 4. These are average (for discrete variables) and marginal (for continuous variables) effects (Table 2.15 in Appendix 2 shows the parameter estimates). We consider five specifications. In Specification 1, no interactions of gender with other variables are considered. In Specification 2, we consider interactions of gender with family-related variables (marriage, children, and size). Specification 3 has interactions of gender with employment-related variables (work status and firm size), and Specification 4 considers both types of interactions. Finally, interactions with education are considered in Specification 5. Note that, by construction, positive signs of coefficients mean negative effects on entrepreneurship, and vice versa.

First, Specification 1 shows that the effect of being a woman is positive with 1% statistical significance, meaning that women are, *ceteris paribus*, *less* likely to become entrepreneurs. This result supports the idea in Hypothesis 1a that women are eager to avoid entrepreneurial risk or face more severe credit constraints or discrimination. In other words, the benefits from autonomy and flexibility do not outweigh these costs and inefficiency losses. This part is statistically significant for all of the other four specifications. In contrast with our prior expectation, family size and the presence of children have no such statistically significant effects, although, as expected, they have *positive* effects entrepreneurship in all of the specifications.<sup>22</sup> Marriage, in contrast, has *negative* effects, and in Specifications 2 and 4, the effect is statistically significant. Regarding employment-related variables, the size of the firm that the individual currently works for has no statistically significant effects. In Specifications 1, 2, and 5, where no interactions of gender with firm size are considered, it is observed that being in a large firm has a *stronger positive* effect on entrepreneurship than being in a small firm. Being a part-time employee also has a *positive* effect, and except in Specification 2, the effect is statistically significant. Generally, this suggests that part-time employees are *more* likely to pursue entrepreneurship than are full-time employees.<sup>23</sup>

Now, turning our attention to interactions of gender with family and employment variables, we find that the presence of children has additional *positive* effects for women (Specifications 2 and 4), although the effect is

---

<sup>22</sup>We also considered information on the presence of pre-school children. However, it did not yield significant results.

<sup>23</sup>This issue would be further pursued if a measure of voluntary part-time work is available. We thank Kate Rybczynski for pointing this out.

not statistically significant. Thus, Hypothesis 2a is weakly supported, and this result is in accordance with Noseleit’s (2014) study, which finds that having a child raises women’s probability of becoming self-employed.<sup>24</sup> Marriage and family size also have additional *positive* effects for women. This is consistent with the findings of Patrick et al. (2016) that married and unmarried women have heterogeneous preferences for self-employment. It may be the case that married women have access to greater wealth because of their husbands’ income/wealth. Regarding employment-related variables, being a part-time employee has a *negative* effect on entrepreneurship for women (Specifications 3 and 4), offsetting the positive effect of part-time work alone. Thus, Hypothesis 3a is *not* supported. This suggests that the meaning of part-time work may differ across genders: men may work part-time to prepare for entrepreneurship, whereas this may not be the case for women. It is also observed that women who work for a large firm have an additional *positive* effect on the choice of entrepreneurship, although the effect is not statistically significant.

Interestingly, Specification 5 in Table 2.4 shows that for women, education works *positively* for entrepreneurship (and the effects are all statistically significant), whereas the opposite is true for men. This result is consistent with, among others, Macpherson (1988), Evans and Leighton (1989a, b), Devine (1994), Bates (1995), and Carr (1996). This finding might indicate that women may be at a disadvantage in their workplace, and therefore, that education may help them try independent entrepreneurship.

Regarding other control variables, first, black individuals are *more* likely to pursue entrepreneurship, whereas individuals who were born outside the U.S. are less likely to do so. Next, middle-aged individuals are more likely to become entrepreneurs. The relationship between age and entrepreneurship is known as an inverse U-shape (e.g. Lévesque and Minniti 2006; Kautonen et al. 2014). Here, too, we find an inverse U-shaped relationship, as seen in Table 2.4: starting from “age 18 to 24” (the baseline is “age 55 or higher”), the highest absolute value of the coefficient is achieved at “age 35 to 44,” and a lower value is observed for “age 45 to 54” in each specification. The effect of internet use works *positively* for entrepreneurship in all the specifications, with 1% statistical significance. This finding is consistent with Fairlie (2006), who argues that computer use is positively related to entrepreneurship not only for those who work in the IT industry but also for others in general.

---

<sup>24</sup>Rybczynski (2015), using Canadian data, arrives at a similar conclusion, namely, that the number of children negatively affects the continuation of women’s self-employment. See also Okamuro and Ikeuchi (2012) for a study of the relationship between women’s self-employment and work-life balance.

The effects of homestead exemption and median home value are *negative*, with 10% statistical significance. However, unemployment rate and tax rates have no significant effects.

Table 2.6 shows the estimated average/marginal effects in Eq. (??) from subsamples of married and unmarried individuals (Table 2.17 in Appendix 2 presents the parameter estimates). In each specification, the estimated negative effect of being a woman in entrepreneurship is *weaker* for married individuals than for unmarried individuals. Thus, marriage encourages more women to choose entrepreneurship. Interestingly, for unmarried women, working for a small or large firm has a *positive* effect on independent entrepreneurship, whereas the opposite is true for married women (see the results from Specification 3). Moreover, in all of the specifications, the effect of being an unmarried part-time employee is no longer statistical significant. Unmarried part-time employees are as likely to become an entrepreneur as full-time employees are. Now, Table 2.8 divides the sample into full-time and part-time workers (Table 2.19 in Appendix 2 presents the parameter estimates). Except for Specification 5, the estimated negative effect of being a woman on entrepreneurship is *weaker* for full-time employees than for part-time employees. Somewhat unexpectedly, for part-time workers, the interaction of being as a woman and the presence of children has a *negative* effect on entrepreneurship, while it is positive for full-time workers. This is presumably because part-time female workers with children are not so attracted to entrepreneurship because they already have time flexibility, while full-time female workers are inclined toward entrepreneurship if they have a child.

### Selection of intrapreneurship (Eq. (2))

Next, the estimates for average (for discrete variables) and marginal (for continuous variables) effects of Eq. (2) are presented in Table 2.5 (Table 2.16 in Appendix 2 shows the parameter estimates). Here, positive signs of coefficients mean positive effects on intrapreneurship, and vice versa.

In Specification 1, the negative effect of being a woman is 1% statistically significant, implying that women are, *ceteris paribus*, *less* likely to become intrapreneurs, and to remain as employees than men are. This finding supports Hypothesis 1b. It suggests that women may be not only risk averse but also in a disadvantageous position in the workplace. In contrast with the case of entrepreneurship above, however, statistical significance is not seen in Specifications 3 and 4. As expected, the interaction of children and gender (being a woman) has a *negative* effect (Specifications 2 and 4),

although no statistical significance is found. Thus, Hypothesis 2b is weakly supported. Marriage, as in the choice of entrepreneurship, also has a *negative* effect. However, the interaction of gender and marriage shows mixed results: in Specification 2, it has a negative effect, whereas Specification 4 indicates a positive sign. Neither of these is statistically significant, though. The interaction of gender and family size also produces mixed results.

Regarding employment-related variables, part-time work has a *negative* effect on intrapreneurship, and this effect is statistically significant in Specifications 1, 2 and 5, where it is not interacted with gender. Specifications 3 and 4 show that being a woman has a reverse effect, which supports Hypothesis 3b: the negative effect of part-time work on intrapreneurship is stronger for men, while for women, part-time work does not have as much of an adverse effect as it does for men. Again, this may suggest that the meaning of part-time work in organizations, and thus its effect on one's propensity to be an intrapreneur, differs across genders. The effects of firm size may also be different across genders: both in Specifications 3 and 4, among those who work for a small firm women are more likely to be an intrapreneur, whereas among those who work for a large firm men are more likely to be an intrapreneur.

Next, if we look at other control variables, black individuals are also *more* likely to be an intrapreneur. The average effects of education level have *negative* effects on intrapreneurship, although being a woman has reverse effects. However, they are relatively smaller than the effects on entrepreneurship, and none has statistical significance. This result is consistent with Parker's (2011) finding that the role of (general) human capital is more prominent in nascent entrepreneurship than in nascent intrapreneurship. Regarding age effects, young employees are *more* likely to become intrapreneurs than older employees, as opposed to the case of entrepreneurship. Individuals who use the internet are also *more* likely to become intrapreneurs. This may imply that computer skills would be useful for both entrepreneurship and intrapreneurship.

Table 2.7 shows the estimated average/marginal effects in Eq. (2) from subsamples of married and unmarried individuals (Table 2.18 in Appendix 2 presents the parameter estimates). In each specification, the estimated negative effect of being a woman on intrapreneurship is *stronger* for married individuals than for unmarried individuals. Thus, in contrast to entrepreneurship, more women are discouraged from trying intrapreneurship if they are married. In addition, for unmarried women, working for a small or large firm has a *negative* effect on intrapreneurship, whereas the opposite is true for married women (compare the results from Specification 3). This

is also in contrast to entrepreneurship. Interestingly, in all of the specifications, the effects of being a married or unmarried part-time employee lose statistical significance. This suggests that part-time employees are, regardless of marital status, are as likely to pursue intrapreneurship as full-time employees.

Table 2.9 shows the estimated effects from subsamples of full-time and part-time workers (Table 2.20 in Appendix 2 presents the parameter estimates). In each specification, the estimated negative effect of being a woman on intrapreneurship is *stronger* for full-time employees than for part-time employees. Again, this is opposite to the results from the estimates of Eq. (1). Note also that the signs for the interactions of gender with marriage, children, and family size have opposite signs between the full-time and part-time subsamples. For example, as in the case of entrepreneurship, for part-time workers, the interaction of being as a woman and the presence of children has a *negative* effect on intrapreneurship. That is, if a part-time worker is a woman with children, she is not inclined toward either entrepreneurship or intrapreneurship. Such a woman may be satisfied with time flexibility so that entrepreneurship is less attractive, and she may not want to lose the flexibility by becoming an intrapreneur, either.

Finally, notice that Table 2.16 in Appendix 2 shows that Specification 1 yields a smaller value of Akaike’s Information Criterion (AIC). Thus, Specification 1 is preferred.<sup>25</sup> Thus, the counterfactual probabilities computed in Table 2.10 in the next subsection are based on Specification 1. In this specification, the estimated correlation coefficients between the unobservables ( $\epsilon_{1i}$  in Eq. (1) and  $\epsilon_{2i}$  in Eq. (2)) are greater than 0.9 and statistically significant. Recall that in our bivariate probit model with sample selection, a *low* value of  $\epsilon_{1i}$  favors entrepreneurship, and a high value of  $\epsilon_{2i}$  favors intrapreneurship. That is, our positive estimates for  $\rho$  suggest that what Lucas (1978) calls (unobserved) “entrepreneurial skills/talents,” are *negatively* related to (unobserved) “intrapreneurial skills/talents.” If one ignores this correlation (i.e., estimating each of the equations independently, or treating the three alternatives equally as in a multinomial logit model), the parameter estimates would be biased, and the predicted rates of entrepreneurship

---

<sup>25</sup>To consider the possibility that intrapreneurship may mean different things across firm sizes, we estimate the two equations with a subsample of those who work for a firm with fewer than 100 workers, and with a subsample of the others. We also conduct the same exercise by dividing the sample into those who work for a firm with fewer than 25 workers (this is the minimum number for the firm-size categorization) and others. We find that overall, the parameter estimates (available upon request) are similar across the subsamples.

and intrapreneurship under counterfactual scenarios would be imprecise. As in Parker (2011), this justifies our empirical model of double selection.

In summary, we find that women are *less* likely to choose entrepreneurship presumably because of their aversion to risk, the existence of credit constraints or discrimination. Furthermore, marriage, children, and family size have additional effects that work *positively* for women. Thus, Hypotheses 1a and 2a are supported. We find, however, that part-time work has additional *negative* effects on entrepreneurship for women, rejecting Hypothesis 3a. As for intrapreneurship, we find that women are also *less* likely to become intrapreneurs (Hypothesis 1b). In addition, the presence of children has additional *negative* effects on intrapreneurship for women, supporting Hypothesis 2b. This may suggest that intrapreneurship does not provide women with more time flexibility. Interestingly, for women, the negative effect of being a part-time worker on intrapreneurship is *weaker*, suggesting that part-time work is not so disadvantageous for women to become an intrapreneur, and that part-time work would be a greater stigma for men.

#### 2.4.2 Decomposition of the gender gap

To explore further the relationships between gender and start-up activities, we compute women’s actual and predicted probabilities of becoming independent entrepreneurs and intrapreneurs when they become the average man (i.e., in each simulation, each woman’s covariates are drawn from the estimated distribution of the covariates for men). We also show the results from the non-linear version of the Blinder–Oaxaca decomposition (see, e.g., Blinder 1973; Oaxaca 1973; Oaxaca and Ramson 1994; Fairlie 1999, 2003, 2005; Yun 2004; Fortin et al. 2011). It decomposes the gender differences in the average rate of becoming an independent entrepreneur or intrapreneur into the characteristics’ effect and the coefficients’ effect as given below:

$$\begin{aligned} \overline{\text{Pr}}_m - \overline{\text{Pr}}_f &= \underbrace{\overline{\text{Pr}}(\hat{\beta}^*, X_m) - \overline{\text{Pr}}(\hat{\beta}^*, X_f)}_{\text{characteristics' effect ("explained")}} \\ &+ \underbrace{\overline{\text{Pr}}(\hat{\beta}_m, X^*) - \overline{\text{Pr}}(\hat{\beta}_f, X^*)}_{\text{coefficients' effect ("unexplained")}}, \end{aligned}$$

where  $\overline{\text{Pr}}_m$  and  $\overline{\text{Pr}}_f$  denote the average predicted probabilities of becoming an independent entrepreneur or intrapreneur for men and women, respectively (thus,  $\overline{\text{Pr}}_m - \overline{\text{Pr}}_f$  expresses the observed gender gap in independent entrepreneurship or intrapreneurship),  $\hat{\beta}^* = \Omega\hat{\beta}_m + (I - \Omega)\hat{\beta}_f$ ,

with  $\Omega$  being a weighting matrix,  $\hat{\beta}_m$  and  $\hat{\beta}_f$  being the parameter estimates in the male sample, and female sample, respectively, and finally,  $X^* = (I - \Omega)X_m + \Omega X_f$ , with  $X_m$  and  $X_f$  representing the observed characteristics of men and women, respectively.<sup>26</sup>

## Entrepreneurship

First, Panel A of Table 2.10 displays the actual probabilities of choosing entrepreneurship by gender in the diagonal cells and the counterfactual probabilities in the non-diagonal cells. As shown in the table, if the distribution of men’s characteristics is identical to that of women’s, then the predicted chance of becoming an entrepreneur is 3.8%, whereas the actual chance is 3.6%, although this difference is not statistically significant. On the other hand, if the distribution of women’s characteristics is identical to that of men’s, they are *less* likely to choose entrepreneurship by 0.2% points (this is also not statistically significant). These two counterfactual scenarios suggest that female characteristics *do* favor entrepreneurship.

However, column “Male” shows that even if the distribution of women’s characteristics  $\mathbf{x}_i$  is identical to that of men’s (except *female<sub>i</sub>*), women are *less* likely to become entrepreneurs than men, and this difference (1.6%) is 1% statistically significant. Column “Female” also shows a similar result if the distribution of men’s characteristics becomes identical to that of women’s. These two results show that women are *less* likely to choose entrepreneurship precisely because they are women, suggesting that women may be in a disadvantageous position when becoming entrepreneurs. In this sense, policies for promoting entrepreneurship with an emphasis on women would be justified, as the U.S. SBA currently emphasizes (recall the first paragraph of the Introduction). For example, if the mismatch of nascent entrepreneurs and start-up assistance programs is serious, as found by Yusuf (2010), policies would be better improved focusing on women’s entrepreneurship.

Now, Panel A of Table 2.11 shows the results from decomposition of the gender differences in entrepreneurship. Following Oaxaca and Ramson (1994), we show the decomposition result from the weighted coefficients ( $\hat{\beta}^*$  above) in column “Weighted coefficients.” It is well known that the decomposition result is sensitive to whether male or female coefficients are used.

---

<sup>26</sup>Our implementation is based on Sinning et al. (2008). Following Oaxaca and Ransom (1994), we do not include the gender dummy when we obtain the estimates. This issue has not been settled in the literature. For example, Elder et al. (2010) recommend the inclusion of the group variable, whereas Lee (2015) opposes it.

Although we prefer to argue the result based on the weighted coefficients, we also show the results from the use of the two coefficients respectively (in columns “Male coefficients” and “Female coefficients”). It is observed that the gender differences in the observed characteristics *reduces* the observed gender gap by 10.8%. Among these contributions, the effects of the gender differences in the employment-related variables on the gender gap are larger (in absolute terms) than those in the family-related variables (-3.5% vs. 1.0%). Thus, while we find that family size also matters to women’s entrepreneurship as in Hundley (2000), employment status would be more important in explaining the gender gap in entrepreneurship.<sup>27</sup>

### Intrapreneurship

Now, we look at intrapreneurship. Panel B of Table 2.10 depicts the gender differences in the actual and the counterfactual probabilities of becoming an intrapreneur. Importantly, if a woman has the same characteristics as a man, her likelihood of becoming an intrapreneur would be 1.7%, slightly higher than the actual rate of 1.6%, although this difference is not statistically significant. On the other hand, the opposite is true for men (see row “Male”). These two counterfactual scenarios suggest that, in contrast to entrepreneurship, female characteristics do *not* favor intrapreneurship. More importantly, columns “Male” and “Female” both suggest that women may also be in a disadvantageous position when becoming intrapreneurs. The male–female difference is 2.2% points if the distribution of female characteristics  $\mathbf{x}_i$  is identical to that of male characteristics (except  $female_i$ ), and this difference is 1% statistically significant. Comparison within column “Female” gives a similar result.<sup>28</sup>

Lastly, Panel B of Table 2.11 shows the results from decomposition of the gender differences in intrapreneurship. Now, in contrast to the case of entrepreneurship, the gender differences in the employment-related variables (*positively*) contribute to the gender gap in intrapreneurship, and these effects are larger than those in the family-related variables (4.5% vs. 0.1%). Although the gender differences in employment status is more significant

<sup>27</sup>For other aspects of gender differences in entrepreneurship, Leoni and Falk (2010) focus on areas of university graduates’ majors, and Bönte and Piegeler (2013) consider gender differences in preferences toward competitive situations.

<sup>28</sup>Notice that it is possible to compute the actual and counterfactual (when all women acquire the same characteristics as men) rates of the non-involved for men and for women as in Table 2.12. Unfortunately, however, it is not possible to predict how the three rates for men would change because we do not model interactions among individuals.

than those in family status in explaining the observed gender gap in both entrepreneurship and intrapreneurship, their signs vary across the two start-up modes.

### 2.4.3 Variables of the financial environment

Since the PSED II was conducted from September 2005 to February 2006, we set 2005 as the base year. To measure state-varying bankruptcy exemptions, we use homestead exemptions in 2005, and this information is based on Table 2.1 of Corradin et al. (2016). To capture the local housing market, we use the median value of owner-occupied housing units in 2005, and this variable comes directly from the 2005 American Community Survey (Variable B25077; owner-occupied housing units). The state-specific unemployment rate is the annual average in 2005 (available at the Webpage of the U.S. Bureau of Labor Statistics<sup>29</sup>). Finally, we consider three tax rates: individual income, corporate income, and sales taxes in 2005. The information is taken from the Tax Foundation’s Webpage (<http://taxfoundation.org/tax-topics/state-taxes>; accessed July 2016). Following Rohlin and Ross (2016), we use the highest marginal rate for individual income and corporate income taxes.

Table 2.13 presents the state-level data for the financial environment. All these variables have sufficient variations. Table 2.14 shows that the correlations among these variables are weak, except for the one between individual income tax and corporate income tax. There are seven states that do not set an exemption level. In Table 2.13, such a state is deemed “unlimited,” and in our empirical analysis we impute \$500,000, the maximum amount from the rest of the states, for these states’ exemption level. The federal level of exemption in 2005 was \$36,900, and for states that had a lower amount but allowed their residents to opt out for the federal level, the amount is set at \$36,900. However, 17 states continued to have a lower amount than \$36,900. In particular, there are two states (Delaware and Maryland) that did not permit any homestead exemption.<sup>30</sup>

### 2.4.4 Parameter estimates

In the main text, we present the estimates of the average (‘marginal’ for continuous variables) effects for each equation under each of the six specifi-

---

<sup>29</sup>The URL is [http://www.bls.gov/news.release/archives/srgune\\_03012006.pdf](http://www.bls.gov/news.release/archives/srgune_03012006.pdf) (accessed July 2016).

<sup>30</sup>However, in 2006, Delaware set \$50,000 for its homestead exemption.

cations. Below, we show the original parameter estimates.

## 2.5 Concluding remarks

By broadening the concept of start-up activity, this study examines how gender matters in entrepreneurship and intrapreneurship. We find that marriage, children, and family size have additional *positive* effects on women's entrepreneurship, whereas part-time work has additional *negative* effects. For women's intrapreneurship, children has additional *negative* effects, whereas part-time work is not disadvantageous for women in becoming intrapreneurs. Our counterfactual experiments suggest that the rate of entrepreneurial activities by women, who acquire the same characteristics as men (in the distributional sense), is lower than that of men's entrepreneurial activities. Similarly, the rate of intrapreneurial activities of women with the same characteristics as men will be lower than the rate of men's intrapreneurial activities. These two findings suggest that women may be disadvantaged for becoming entrepreneurs and intrapreneurs. In addition, our decomposition results suggest that both entrepreneurship and intrapreneurship, the gender differences in the employment-related variables are more significant than those in the family-related variables in affecting the observed gender gap negatively (for entrepreneurship) or positively (for intrapreneurship).

Our empirical results would imply that if the government aims to reduce the gender gap in start-up activities, it should recognize that workplace conditions, rather than family-related policies, would be important. However, caution must be taken when deriving policy implications from our results because we do not discuss the performances of these start-up activities.<sup>31</sup> In particular, it is difficult to measure the performance of intrapreneurial activities: the process and performance of an intrapreneurial activity has to be recorded, and a sufficient number of such observations has to be made available to researchers. Nonetheless, it would be interesting to study how gender matters to the duration of intrapreneurship when measuring the performance of start-up activities. However, our empirical model applied in this paper is inherently static, and has obvious limitations. Important issues, including this, await future research to deepen our understanding of start-up

---

<sup>31</sup>For example, Fairlie and Robb (2009) find that the lower performances of women-owned businesses are explained by both less human and financial capital that are specific to starting a business. See also Robb and Watson (2012) on gender differences in the performance of new ventures, Fairlie (1999) and Ahn (2011) on racial differences in the duration of entrepreneurship, and Oe and Mitsuhashi (2013) on the effects of founders' experiences on the profitability of start-ups.

activities in a broader sense.

# Bibliography

- Adelino, M., Schoar, A., & Severino, F. (2015). House Prices, Collateral, and Self-Employment. *Journal of Financial Economics*, 117(2), 288-306.
- Ahn, T. (2010). Attitudes toward Risk and Self-Employment of Young Workers. *Labour Economics*, 17(2), 434-442.
- Ahn, T. (2011). Racial Differences in Self-Employment exits. *Small Business Economics*, 36(2), 169-186.
- Antoncic, B. (2007). Intrapreneurship: A Comparative Structural Equation Modeling Study. *Industrial Management & Data Systems*, 107(3), 309-325.
- Antoncic, B., & Hisrich, R. D. (2001). Intrapreneurship: Construct Refinement and Cross-Cultural Validation. *Journal of Business Venturing*, 16(5), 495-527.
- Antoncic, B., & Hisrich, R. D. (2003). Clarifying the Intrapreneurship Concept. *Journal of Small Business and Enterprise Development*, 10(1), 7-24.
- Baruah, B., & Ward, A. (2015). Metamorphosis of Intrapreneurship as an Effective Organizational Strategy. *International Entrepreneurship and Management Journal*, 11(4), 811-822.
- Bates, T. (1995). Self-Employment Entry across Industry Groups. *Journal of Business Venturing*, 10(2), 143-156.
- Becker, G. S. (1957). *The Economics of Discrimination*, Chicago: University of Chicago Press.
- Becker, G. S. (1985). Human Capital, Effort, and the Sexual Division of Labor. *Journal of Labor Economics*, 3(1), 33-58.
- Berkowitz, J., & White, M. J. (2004). Bankruptcy and Small Firms' access to Credit. *RAND Journal of Economics*, 35(1), 69-84.

- Bethlehem, J., Cobben, F., & Schouten, B. (2011). *Handbook of Nonresponse in Household Surveys*, New York: John Wiley & Sons.
- Blau, F. D., & Kahn, L. M. (2006). The U.S. Gender Pay Gap in the 1990s: Slowing Convergence. *Industrial and Labor Relations Review*, 60(1), 45-66.
- Blinder, A. S. (1973). Wage Discrimination: Reduced form and Structural Estimates. *Journal of Human Resources*, 8(4), 436-455.
- Bönte, W., & Piegeler, M. (2013). Gender Gap in Latent and Nascent Entrepreneurship: Driven by Competitiveness. *Small Business Economics*, 41(4), 961-987.
- Buera, F. J. (2009). A Dynamic Model of Entrepreneurship with Borrowing Constraints: Theory and Evidence. *Annals of Finance*, 5(3-4), 443-464.
- Caliendo, M., Fossen, F. M., & Kritikos, A. S. (2009). Risk Attitudes of Nascent Entrepreneurs: New Evidence from an Experimentally validated survey. *Small Business Economics*, 32(2), 153-167.
- Caliendo, M., Fossen, F. M., Kritikos, A. S., & Wetter, M. (2015). The Gender Gap in Entrepreneurship: Not Just a Matter of Personality. *CEifo Economic Studies*, 61(1), 202-238.
- Carr, D. (1996). Two Paths to Self-Employment? Women's and Men's Self-Employment in the United States, 1980. *Work and Occupations*, 23(1), 26-53.
- Cerqueiro, G., & Penas, M. F. (2016). How Does Personal Bankruptcy Law Affect Start-Ups? Unpublished manuscript.
- Corradin, S., Gropp, R., Huizinga, H., & Laeven, L. (2016). The Effect of Personal Bankruptcy Exemptions on Investment in Home Equity. *Journal of Financial Intermediation*, 25(1), 77-98.
- Cotter, D. A., Hermsen, J. M., Ovadia, S., & Vanneman, R. (2001). The Glass Ceiling Effect. *Social Forces*, 80(2), 655-681.
- Covin, J. G., & Slevin, D. P. (1991). A Conceptual Model of Entrepreneurship as Firm Behavior. *Entrepreneurship Theory and Practice*, 16(1), 7-25.
- Croson, R., & Gneezy, U. (2009). Gender Differences in Preferences. *Journal of Economic Literature*, 47(2), 448-474.

- Davidsson, P., & Gordon, S. R. (2012). Panel Studies of New Venture Creation: A Methods-Focused Review and Suggestions for Future Research. *Small Business Economics*, 39(4), 853-876.
- De Clercq, D., Castañer, X., & Belausteguigoitia, I. (2011). Entrepreneurial Initiative Selling within Organizations: Towards a More Comprehensive Motivational Framework. *Journal of Management Studies*, 48(6), 1269-1290.
- Demsetz, H. (1988). Profit as a Functional Return: Reconsidering Knight's Views. In H. Demsetz, *Ownership, Control, and the Firm* (pp. 236-247). Oxford: Basil Blackwell.
- Devine, T. J. (1994). Characteristics of Self-Employed Women in the United States. *Monthly Labor Review*, 117(3), 20-34.
- Douglas, E. J., & Fitzsimmons, J. R. (2013). Intrapreneurial Intentions versus Entrepreneurial Intentions: Distinct Constructs with Different Antecedents. *Small Business Economics*, 41(1), 115-132.
- Edwards, L. N., & Field-Hendrey, E. (2002). Home-Based Work and Women's Labor Force Decisions. *Journal of Labor Economics*, 20(1), 170-200.
- Ekelund, J., Johansson, E., Järvelin, M.-R., & Lichtermann, D. (2005). Self-Employment and Risk Aversion—Evidence from Psychological Test Data. *Labour Economics*, 12(5), 649-659.
- Elder, T. E., Goddeeris, J. H., & Haider, S. J. (2010). Unexplained Gaps and Oaxaca-Blinder Decompositions. *Labour Economics*, 17(1), 284-290.
- Elliott, J. R., & Smith, R. A. (2004). Race, Gender, and Workplace Power. *American Sociological Review*, 69(3), 365-386.
- Evans, D. S., & Jovanovic, B. (1989). An Estimated Model of Entrepreneurial Choice under Liquidity Constraints. *Journal of Political Economy*, 97(4), 808-827.
- Evans, D. S., & Leighton, L. S. (1989a). The determinants of changes in U.S. self-employment, 1968-1987. *Small Business Economics*, 1(2), 111-119.
- Evans, D. S., & Leighton, L. S. (1989b). Some Empirical Aspects of Entrepreneurship. *American Economic Review*, 79(3), 519-535.

- Fairlie, R. W. (1999). The Absence of the African-American Owned Business: An Analysis of the Dynamics of Self-Employment. *Journal of Labor Economics*, 17(1), 80-108.
- Fairlie, R. W. (2003). An Extension of the Blinder-Oaxaca Decomposition Technique to Logit and Probit Models. Economic Growth Center, Yale University Discussion Paper No. 873.
- Fairlie, R. W. (2005). An Extension of the Blinder–Oaxaca Decomposition Technique to Logit and Probit Models. *Journal of Economic and Social Measurement*, 30(4), 305-316.
- Fairlie, R. W. (2006). The Personal Computer and Entrepreneurship. *Management Science*, 52(2), 187-203.
- Fairlie, R. W., & Krashinsky, H. A. (2012). Liquidity Constraints, Household Wealth, and Entrepreneurship Revisited. *Review of Income and Wealth*, 58(2), 279-306.
- Fairlie, R. W., & Robb, A. M. (2009). Gender Differences in Business Performance: Evidence from the Characteristics of Business Owners Survey. *Small Business Economics*, 33(4), 375-395.
- Fan, W., & White, M. J. (2003). Personal Bankruptcy and the Level of Entrepreneurial Activity. *Journal of Law and Economics*, 97(4), 808-827.
- Fortin, N. M. (2008). The Gender Wage Gap among Young Adults in the United States: The Importance of Money versus People. *Journal of Human Resources*, 43(4), 884-918.
- Fortin, N., Lemieux, T., & Firpo, S. (2011). Decomposition Methods in Economics. In O. Ashenfelter & D. Card (Eds.), *Handbook of labor economics*, Volume 4A (pp. 1-102). Amsterdam: North-Holland.
- Fossen, F. M. (2012). Gender Differences in Entrepreneurial Choice and Risk Aversion – A Decomposition Based on a Microeconomic model. *Applied Economics*, 44(14), 1795-1812.
- Gartner, W. B., & Shaver, K. G. (2012). Nascent Entrepreneurship Panel Studies: Progress and Challenges. *Small Business Economics*, 39(3), 659-665.
- Hamilton, B. H. (2000). Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment. *Journal of Political Economy*, 108(3), 604–631.

- Hellmann, T. (2007). When Do Employees Become Entrepreneurs? *Management Science*, 53(6), 919-933
- Hisrich, R. D. (1990). Entrepreneurship/Intrapreneurship. *American Psychologist*, 45(2), 209-222.
- Holtz-Eakin, D., Joulfaian, D., & Rosen, H. S. (1994a). Entrepreneurial Decisions and Liquidity Constraints. *RAND Journal of Economics*, 25(2), 334-347.
- Holtz-Eakin, D., Joulfaian, D., & Rosen, H. S. (1994b). Sticking it Out: Entrepreneurial Survival and Liquidity Constraints. *Journal of Political Economy*, 102(1), 53-75.
- Honig, B. (2001). Learning Strategies and Resources of Entrepreneurs and Intrapreneurs. *Entrepreneurship Theory and Practice*, 26(1), 21-35.
- Hundley, G. (2000). Male/Female Earnings Differences in Self-Employment: The Effects of Marriage, Children, and the Household Division of Labor. *Industrial and Labor Relations Review*, 54(1), 95-114.
- Hurst, E., & Lusardi, A. (2004). Liquidity Constraints, Household Wealth, and Entrepreneurship. *Journal of Political Economy*, 112(2), 319-347.
- Johnson, J. E. V., & Powell, P. L. (1994). Decision Making, Risk and Gender: Are Managers Different? *British Journal of Management*, 5(2), 123-138.
- Kacperczyk, A. (2015). Female Entrepreneurship and Alternative Opportunities Inside an Established Firm. Unpublished manuscript.
- Kan, K., & Tsai, W.-D. (2006). Entrepreneurship and Risk Aversion. *Small Business Economics*, 26(5), 465-474.
- Kautonen, T., Down, S., Minniti, M. (2014). Ageing and Entrepreneurial Activities. *Small Business Economics*, 42(3), 579-594.
- Kawaguchi, D. (2003). Human Capital Accumulation of Salaried and Self-Employed Workers. *Labour Economics*, 10(1), 55-71.
- Kim, P. H., Longest, K. C., & Lippmann, S. (2015). The Tortoise versus the Hare: Progress and Business Viability Differences between Conventional and Leisure-Based Founders. *Journal of Business Venturing*, 30(2), 185-204.
- Knight, F. H. (1921). *Risk, Uncertainty and Profit*. Houghton Mifflin Company.

- Lee, M.-J. (2015). Reference Parameters in Blinder-Oaxaca Decomposition: Pooled-Sample versus Intercept-Shift Approaches. *Journal of Economic Inequality*, 13(1), 69-82.
- Leoni, T., & Falk, M. (2010). Gender and field of study as determinants of self-employment. *Small Business Economics*, 34(2), 167-185.
- LeRoy, S. F., & Singell, L. D., Jr. (1987). Knight on Risk and Uncertainty. *Journal of Political Economy*, 95(2), 394-406.
- Lévesque, M., & Minniti, M. (2006). The effect of aging on entrepreneurial behavior. *Journal of Business Venturing*, 21(2), 177-194.
- Lombard, K. V. (2001). Female Self-Employment and Demand for Flexible, Nonstandard Work Schedules. *Economic Inquiry*, 39(2), 214-237.
- Lucas, R. E., Jr. (1978). On the Size Distribution of Business Firms. *Bell Journal of Economics*, 9(2), 508-523.
- Lumpkin, G. T., & Dess, G. G. (1996). "Clarifying the Entrepreneurial Orientation Construct and Linking It to Performance." *The Academy of Management Review*, 21(1), 135-172.
- Macpherson, D. A. (1988). Self-Employment and Married Women. *Economics Letters*, 28(3), 281-284.
- Malchow-Møller, N., Markusen, J. R., & Skaksen, J. R. (2010). Labor Market Institutions, Learning and Self-Employment. *Small Business Economics*, 35(1), 36-52.
- Martiarena, A. (2013). What's so Entrepreneurial about Intrapreneurs? *Small Business Economics*, 40(1), 27-39.
- McCann, B. T., & Folta, T. B. (2012). Entrepreneurial Entry Thresholds. *Journal of Economic Behavior & Organization*, 84(3), 782-800.
- Miller, D. (1983). The Correlates of Entrepreneurship in Three Types of Firms. *Management Science*, 29(7), 770-791.
- Mondragón-Vélez, Camilo. (2009). The Probability of Transition to Entrepreneurship Revisited: Wealth, Education and Age. *Annals of Finance*, 5(3-4), 421-441.

- Monsen, E., Patzelt, H., & Saxton, T. (2010). Beyond Simple Utility: Incentive Design and Trade-Offs for Corporate Employee-Entrepreneurs. *Entrepreneurship Theory and Practice*, 34(1), 105-130.
- Moriano, J. A., Molero, F., Topa, G., & Lévy Mangin, J.-P. (2014). The Influence of Transformational Leadership and Organizational Identification on Intrapreneurship. *International Entrepreneurship and Management Journal*, 10(1), 103-119.
- Morris, M. H., & Sexton, D. L. (1996). The Concept of Entrepreneurial Intensity: Implications for Company Performance. *Journal of Business Research*, 36(1), 5-13.
- Noseleit, F. (2014). Female Self-Employment and Children. *Small Business Economics*, 43(3), 549-569.
- Oaxaca, R. (1973). Male-Female Wage Differentials in Urban Labor Markets. *International Economic Review*, 14(3), 693-709.
- Oaxaca, R., & Ransom, M. (1994). On Discrimination and the Decomposition of Wage Differentials. *Journal of Econometrics*, 61(1), 5-21.
- Oe, A., & Mitsuhashi, H. (2013). Founders' Experiences for Startups' Fast Break-Even. *Journal of Business Research*, 66(11), 2193-2201.
- Okamuro, H., & Ikeuchi, K. (2012). Work-Life Balance and Gender Differences in Self-Employment Income during the Start-Up Stage in Japan. Unpublished manuscript.
- Paik, Y. (2013). The Bankruptcy Reform Act of 2005 and Entrepreneurial Activity. *Journal of Economics & Management Strategy*, 22(2), 259-280.
- Parker, S. C. (2000). Saving to Overcome Borrowing Constraints: Implications for Small Business Entry and Exit. *Small Business Economics*, 15(3), 223-232.
- Parker, S. C. (2009). *The Economics of Entrepreneurship*. Cambridge University Press.
- Parker, S. C. (2011). Intrapreneurship or Entrepreneurship? *Journal of Business Venturing*, 26(1), 19-34.
- Parker, S. C. (2014). Who Become Serial and Portfolio Entrepreneurs? *Small Business Economics*, 43(4), 887-898.

- Patrick, C., Stephens, H., & Weinstein, A. (2016). Where Are All the Self-Employed Women? Push and Pull Factors Influencing Female Labor Market Decisions. *Small Business Economics*, 46(3), 365-390.
- Phelps, E. S. (1972). The Statistical Theory of Racism and Sexism. *American Economic Review*, 62(4), 659-661.
- Pinchot, G., III. (1985). *Intrapreneuring: Why You Don't Have to Leave the Corporation to Become an Entrepreneur*. Harper & Row.
- Renko, M. (2013). Early Challenges of Nascent Social Entrepreneurs. *Entrepreneurship Theory and Practice*, 37(5), 1045-1069.
- Reynolds, P. D., & Curtin, R. T. (2009). *Business Creation in the United States: Initial explorations with the PSED II data set*, Springer.
- Robb, A. M., & Watson, J. (2012). Gender Differences in Firm Performance: Evidence from New Ventures in the United States. *Journal of Business Venturing*, 27(5), 544-558.
- Rohlin, S. M., & Ross, A. (2016). Does Bankruptcy Law Affect Business Turnover? Evidence from New and Existing Business. *Economic Inquiry*, 54(1), 361-374.
- Rule, E. G., & Irwin, D. W. (1988). Fostering Intrapreneurship: The New Competitive Edge. *Journal of Business Strategy*, 9(3), 44-47.
- Runde, J. (1998). Clarifying Frank Knight's Discussion of the Meaning of Risk and Uncertainty." *Cambridge Journal of Economics*, 22(5), 539-546.
- Rybczynski, K. (2009). Are Liquidity Constraints Holding Women Back? An Analysis of Gender in Self-Employment Earnings. *Journal of Economic Asymmetries*, 6(1), 141-165.
- Rybczynski, K. (2015). What Drives Self-Employment Survival for Women and Men? Evidence from Canada. *Journal of Labor Research*, 36(1), 27-43.
- Sardy, M., & Alon, I. (2007). Exploring the Differences between Franchisee Entrepreneurs and Nascent Entrepreneurs. *International Entrepreneurship and Management Journal*, 3(4), 403-418.
- Saridakis, G., Marlow, S., & Storey, D. J. (2014). Do Different Factors Explain Male and Female Self-Employment Rates? *Journal of Business Venturing*, 29(3), 345-362.

- Schmalz, M. C., Sraer, D. A., & Thesmar, D. (2016). Housing Collateral and Entrepreneurship. *Journal of Finance*, Forthcoming.
- Schultz, T. W. (1980). Investment in Entrepreneurial Ability. *Scandinavian Journal of Economics*, 82(4), 437-448.
- Sinning, M., Hahn, M., & Bauer, T. K. (2008). The Blinder-Oaxaca Decomposition for Nonlinear Regression Models. *Stata Journal*, 8(4), 480-492.
- Taniguchi, H. 2002. Determinants of Women's Entry into Self-Employment. *Social Science Quartely*, 83(3), 875-893.
- Taylor, M. P. (2001). Self-Employment and Windfall Gains in Britain: Evidence from Panel Data. *Economica*, 68(272), 539-565.
- Tietz, M. A., & Parker, S. C. (2012). How do Intrapreneurs and Entrepreneurs Differ in Their Motivation to Start a New Venture? *Frontiers of Entrepreneurship Research*, 32(4), Article 4. <http://digitalknowledge.babson.edu/fer/vol32/iss4/4>
- Wellington, A. J. (2006). Self-Employment: the New Solution for Balancing Family and Career? *Labour Economics*, 13(3), 357-386.
- Yun, M.-S. (2004). Decomposing Differences in the First Moment. *Economics Letters*, 82(2), 275-280.
- Yusuf, J.-E. (2010). Meeting Entrepreneurs' Support Needs: Are Assistance Programs Effective? *Journal of Small Business and Enterprise Development*, 17(2), 294-307.
- Zhang, X., & Bartol, K. M. (2010). Linking Empowering Leadership and Employee Creativity: The Influence of Psychological Empowerment, Intrinsic Motivation, and Creative Process Engagement. *The Academy of Management Journal*, 53(1), 107-128.

Table 2.1: Categorization of start-up participants

| Answer to |     | QFF1b                    |                          |
|-----------|-----|--------------------------|--------------------------|
| QFF1a     |     | Yes                      | No                       |
|           | Yes | Nascent<br>Intrapreneurs | Nascent<br>Entrepreneurs |
|           | No  | Nascent<br>Intrapreneurs | Uninvolved               |
|           |     |                          |                          |

Table 2.2: Summary statistics: across modes

|                                   | <i>Uninvolved</i> | <i>Entrepreneurship</i> | <i>Intrapreneurship</i> |
|-----------------------------------|-------------------|-------------------------|-------------------------|
|                                   | Mean              | Mean                    | Mean                    |
| Female                            | 0.512             | 0.356***                | 0.296***                |
| Family                            |                   |                         |                         |
| Married                           | 0.602             | 0.561                   | 0.531**                 |
| Children under age 11             | 0.344             | 0.435***                | 0.409**                 |
| Size                              | 2.993             | 3.311***                | 3.192**                 |
| Income                            | 65814.710         | 65329.133               | 67026.976               |
| Employment                        |                   |                         |                         |
| Work status                       |                   |                         |                         |
| Full-time                         | 0.829             | 0.828                   | 0.858                   |
| Part-time                         | 0.171             | 0.172                   | 0.142                   |
| Firm size                         |                   |                         |                         |
| Firm size 99 or less              | 0.435             | 0.485*                  | 0.431                   |
| Firm size 100 to 999              | 0.187             | 0.145**                 | 0.165                   |
| Firm size 1000 or more            | 0.378             | 0.370                   | 0.404                   |
| Race                              |                   |                         |                         |
| White                             | 0.743             | 0.638***                | 0.637***                |
| Black                             | 0.122             | 0.206***                | 0.175**                 |
| Hispanic                          | 0.135             | 0.156                   | 0.188**                 |
| Foreign born                      | 0.119             | 0.098                   | 0.153                   |
| Age                               |                   |                         |                         |
| 18 to 24                          | 0.121             | 0.148                   | 0.194***                |
| 25 to 34                          | 0.241             | 0.282                   | 0.295**                 |
| 35 to 44                          | 0.263             | 0.280                   | 0.249                   |
| 45 to 54                          | 0.238             | 0.223                   | 0.194*                  |
| 55 to 64                          | 0.107             | 0.057***                | 0.060***                |
| 65 and more                       | 0.030             | 0.010***                | 0.007***                |
| Education                         |                   |                         |                         |
| HS dropout                        | 0.055             | 0.076                   | 0.096**                 |
| HS graduate                       | 0.272             | 0.204***                | 0.264                   |
| Some college                      | 0.270             | 0.360***                | 0.253                   |
| Bachelor                          | 0.257             | 0.251                   | 0.229                   |
| Postgraduate                      | 0.146             | 0.109**                 | 0.158                   |
| Internet                          | 0.834             | 0.921***                | 0.873**                 |
| Non-metro area                    | 0.233             | 0.194*                  | 0.213                   |
| Unemployment rate                 | 5.084             | 5.013                   | 5.089                   |
| Homestead exemption               | 128.615           | 162.073***              | 146.465                 |
| Median home value                 | 201.995           | 203.190                 | 205.754                 |
| Maximum personal income tax rate  | 5.552             | 5.124**                 | 5.323                   |
| Maximum corporate income tax rate | 6.673             | 6.372*                  | 6.648                   |
| Sales tax rate                    | 5.324             | 5.289                   | 5.425                   |
| <i>N</i>                          | 10,480            | 322                     | 311                     |

Sample weights are used to calculate the means. The unit is \$1,000 for Homestead exemption and Median home value. The three tax rates are in percentage terms.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  when compared with Uninvolved.

Table 2.3: Summary statistics: across genders

|                                   | <i>Male</i> | <i>Female</i> |
|-----------------------------------|-------------|---------------|
|                                   | Mean        | Mean          |
| Uninvolved                        | 0.914       | 0.958***      |
| Entrepreneurship                  | 0.041       | 0.023***      |
| Intrapreneurship                  | 0.045       | 0.019***      |
| Family                            |             |               |
| Married                           | 0.614       | 0.584***      |
| Children under age 11             | 0.355       | 0.343         |
| Size                              | 3.057       | 2.961***      |
| Income                            | 67962.404   | 63714.442***  |
| Employment                        |             |               |
| Work status                       |             |               |
| Full-time                         | 0.881       | 0.779***      |
| Part-time                         | 0.119       | 0.221***      |
| Firm size                         |             |               |
| Firm size 99 or less              | 0.444       | 0.430         |
| Firm size 100 to 999              | 0.173       | 0.197***      |
| Firm size 1000 or more            | 0.383       | 0.373         |
| Race                              |             |               |
| White                             | 0.741       | 0.732         |
| Black                             | 0.103       | 0.149***      |
| Hispanic                          | 0.156       | 0.119***      |
| Foreign born                      | 0.118       | 0.121         |
| Age                               |             |               |
| 18 to 24                          | 0.135       | 0.113***      |
| 25 to 34                          | 0.231       | 0.256***      |
| 35 to 44                          | 0.279       | 0.247***      |
| 45 to 54                          | 0.225       | 0.247***      |
| 55 to 64                          | 0.104       | 0.104         |
| 65 and more                       | 0.024       | 0.033***      |
| Education                         |             |               |
| HS dropout                        | 0.068       | 0.046***      |
| HS graduate                       | 0.287       | 0.253***      |
| Some college                      | 0.272       | 0.272         |
| Bachelor                          | 0.239       | 0.273***      |
| Postgraduate                      | 0.134       | 0.156***      |
| Internet                          | 0.821       | 0.855***      |
| Non-metro area                    | 0.237       | 0.226         |
| Unemployment rate                 | 5.083       | 5.081         |
| Homestead exemption               | 129.334     | 131.164       |
| Median home value                 | 200.296     | 204.007*      |
| Maximum personal income tax rate  | 5.486       | 5.575         |
| Maximum corporate income tax rate | 6.662       | 6.663         |
| Sales tax rate                    | 5.363       | 5.288***      |
| <i>N</i>                          | 5,874       | 5,239         |

Sample weights are used to calculate the means. The unit is \$1,000 for Homestead exemption and Median home value. The three tax rates are in percentage terms.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  when compared with Male.

Table 2.4: Entrepreneurship (Eq. (1))

|                                                                                   | Specification 1 | Specification 2 | Specification 3 | Specification 4 | Specification 5 |         |           |         |           |         |
|-----------------------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------|-----------|---------|-----------|---------|
| Dependent variable:<br>1 = Staying in<br>0 = Going out (Entrepreneurship)         |                 |                 |                 |                 |                 |         |           |         |           |         |
| Female                                                                            | 0.016***        | (0.003)         | 0.024***        | (0.008)         | 0.023**         | (0.011) | 0.048***  | (0.016) |           |         |
| Family                                                                            |                 |                 |                 |                 |                 |         |           |         |           |         |
| Married                                                                           | 0.006           | (0.004)         | 0.011**         | (0.005)         | 0.005           | (0.004) | 0.010**   | (0.005) | 0.006     | (0.004) |
| Children under age 11                                                             | -0.004          | (0.004)         | -0.004          | (0.005)         | -0.004          | (0.004) | -0.004    | (0.005) | -0.004    | (0.004) |
| Size                                                                              | -0.002          | (0.001)         | -0.002          | (0.002)         | -0.002          | (0.001) | -0.002    | (0.002) | -0.002    | (0.001) |
| Married $\times$ Female                                                           |                 |                 | -0.012*         | (0.007)         |                 |         | -0.011    | (0.007) |           |         |
| Children under age 11 $\times$ Female ( $\times 10^{-1}$ )                        |                 |                 | -0.010          | (0.083)         |                 |         | -0.005    | (0.083) |           |         |
| Size $\times$ Female ( $\times 10^{-1}$ )                                         |                 |                 | -0.001          | (0.028)         |                 |         | -0.004    | (0.028) |           |         |
| Employment                                                                        |                 |                 |                 |                 |                 |         |           |         |           |         |
| Work status: Ref = full-time                                                      |                 |                 |                 |                 |                 |         |           |         |           |         |
| Part-time                                                                         | -0.008*         | (0.005)         | -0.007          | (0.005)         | -0.015**        | (0.007) | -0.013**  | (0.007) | -0.008*   | (0.005) |
| Part-time $\times$ Female                                                         |                 |                 |                 |                 | 0.012           | (0.009) | 0.011     | (0.009) |           |         |
| Firm size: Ref = Firm size 100 to 999                                             |                 |                 |                 |                 |                 |         |           |         |           |         |
| Firm size 99 or less                                                              | -0.003          | (0.005)         | -0.003          | (0.004)         | -0.004          | (0.006) | -0.004    | (0.006) | -0.004    | (0.005) |
| Firm size 1000 or more ( $\times 10^{-1}$ )                                       | -0.009          | (0.046)         | -0.012          | (0.046)         | 0.007           | (0.060) | 0.003     | (0.060) | -0.007    | (0.046) |
| Firm size 99 or less $\times$ Female                                              |                 |                 |                 |                 | 0.001           | (0.009) | 0.001     | (0.009) |           |         |
| Firm size 1000 or more $\times$ Female                                            |                 |                 |                 |                 | -0.004          | (0.009) | -0.004    | (0.009) |           |         |
| Race: Ref = white                                                                 |                 |                 |                 |                 |                 |         |           |         |           |         |
| Black                                                                             | -0.025***       | (0.005)         | -0.026***       | (0.005)         | -0.025***       | (0.005) | -0.025*** | (0.005) | -0.025*** | (0.005) |
| Hispanic                                                                          | -0.004          | (0.006)         | -0.004          | (0.006)         | -0.004          | (0.006) | -0.004    | (0.006) | -0.004    | (0.006) |
| Foreign born                                                                      | 0.014**         | (0.006)         | 0.015**         | (0.006)         | 0.014**         | (0.006) | 0.014**   | (0.006) | 0.014**   | (0.006) |
| Age: Ref = 55 and more                                                            |                 |                 |                 |                 |                 |         |           |         |           |         |
| 18 to 24                                                                          | -0.002          | (0.007)         | -0.001          | (0.008)         | -0.001          | (0.007) | -0.000    | (0.008) | -0.002    | (0.007) |
| 25 to 34                                                                          | -0.013**        | (0.006)         | -0.013**        | (0.006)         | -0.014**        | (0.006) | -0.013**  | (0.006) | -0.013**  | (0.006) |
| 35 to 44                                                                          | -0.014**        | (0.006)         | -0.014**        | (0.006)         | -0.015**        | (0.006) | -0.014**  | (0.006) | -0.014**  | (0.006) |
| 45 to 54                                                                          | -0.012**        | (0.005)         | -0.011**        | (0.005)         | -0.012**        | (0.005) | -0.011**  | (0.005) | -0.012**  | (0.005) |
| Education: Ref = HS dropout                                                       |                 |                 |                 |                 |                 |         |           |         |           |         |
| HS graduate                                                                       | 0.023***        | (0.007)         | 0.024***        | (0.007)         | 0.023***        | (0.007) | 0.023***  | (0.007) | 0.034***  | (0.008) |
| Some college                                                                      | 0.009           | (0.007)         | 0.009           | (0.007)         | 0.008           | (0.007) | 0.008     | (0.007) | 0.014**   | (0.008) |
| Bachelor                                                                          | 0.018**         | (0.007)         | 0.018**         | (0.007)         | 0.018**         | (0.007) | 0.018**   | (0.007) | 0.026***  | (0.009) |
| Postgraduate                                                                      | 0.018**         | (0.008)         | 0.018**         | (0.008)         | 0.018**         | (0.008) | 0.018**   | (0.008) | 0.026***  | (0.009) |
| HS graduate $\times$ Female                                                       |                 |                 |                 |                 |                 |         |           |         | -0.040**  | (0.017) |
| Some college $\times$ Female                                                      |                 |                 |                 |                 |                 |         |           |         | -0.029*   | (0.017) |
| Bachelor $\times$ Female                                                          |                 |                 |                 |                 |                 |         |           |         | -0.034**  | (0.017) |
| Postgraduate $\times$ Female                                                      |                 |                 |                 |                 |                 |         |           |         | -0.034*   | (0.018) |
| Internet                                                                          | -0.023***       | (0.005)         | -0.023***       | (0.005)         | -0.023***       | (0.005) | -0.023*** | (0.005) | -0.023*** | (0.005) |
| Non-metro area                                                                    | -0.001          | (0.004)         | -0.001          | (0.004)         | -0.001          | (0.004) | -0.001    | (0.004) | -0.001    | (0.004) |
| Unemployment rate ( $\times 10^{-2}$ )                                            | -0.006          | (0.210)         | -0.002          | (0.209)         | -0.005          | (0.210) | -0.002    | (0.209) | -0.012    | (0.211) |
| Homestead exemption ( $\times 10^{-2}$ )                                          | -0.002*         | (0.001)         | -0.002*         | (0.001)         | -0.002*         | (0.001) | -0.002*   | (0.001) | -0.002*   | (0.001) |
| Median home value ( $\times 10^{-2}$ )                                            | -0.003*         | (0.002)         | -0.003*         | (0.002)         | -0.003*         | (0.002) | -0.003*   | (0.002) | -0.003*   | (0.002) |
| Maximum personal income tax rate                                                  | 0.001           | (0.001)         | 0.001           | (0.001)         | 0.001           | (0.001) | 0.001     | (0.001) | 0.001     | (0.001) |
| Maximum corporate income tax rate ( $\times 10^{-1}$ )                            | 0.003           | (0.007)         | 0.004           | (0.007)         | 0.003           | (0.007) | 0.004     | (0.007) | 0.003     | (0.007) |
| Sales tax rate                                                                    | 0.002           | (0.001)         | 0.002           | (0.001)         | 0.002           | (0.001) | 0.002     | (0.001) | 0.002     | (0.001) |
| $N$                                                                               | 11,113          | 11,113          | 11,113          | 11,113          | 11,113          | 11,113  | 11,113    | 11,113  | 11,113    | 11,113  |
| Average (for discrete variables) and marginal (for continuous variables) effects; |                 |                 |                 |                 |                 |         |           |         |           |         |

Average (for discrete variables) and marginal (for continuous variables) effects;

Robust standard errors are in parentheses.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.5: Intrapreneurship (Eq. (2))

|                                                                                    | Specification 1      | Specification 2                       | Specification 3                       | Specification 4                        | Specification 5     |
|------------------------------------------------------------------------------------|----------------------|---------------------------------------|---------------------------------------|----------------------------------------|---------------------|
| Dependent variable:<br>1 = Intrapreneurship<br>0 = Else                            |                      |                                       |                                       |                                        |                     |
| Female                                                                             | -0.023***<br>(0.003) | -0.021***<br>(0.008)                  | -0.034<br>(0.024)                     | -0.033<br>(0.028)                      | -0.030**<br>(0.014) |
| Family                                                                             | -0.006<br>(0.004)    | -0.006<br>(0.005)                     | -0.009<br>(0.008)                     | -0.010<br>(0.011)                      | -0.006<br>(0.004)   |
| Married                                                                            | 0.004<br>(0.004)     | 0.005<br>(0.005)                      | 0.005<br>(0.007)                      | 0.007<br>(0.008)                       | 0.004<br>(0.004)    |
| Children under age 11<br>Size ( $\times 10^{-1}$ )                                 | 0.005<br>(0.013)     | 0.004<br>(0.016)                      | 0.012<br>(0.024)                      | 0.012<br>(0.012)                       | 0.006<br>(0.013)    |
| Married $\times$ Female                                                            |                      | -0.001<br>(0.007)                     |                                       | 0.003<br>(0.012)                       |                     |
| Children under age 11 $\times$ Female<br>Size $\times$ Female ( $\times 10^{-2}$ ) |                      | -0.005<br>(0.008)<br>0.040<br>(0.273) |                                       | -0.005<br>(0.010)<br>-0.002<br>(0.335) |                     |
| Employment                                                                         |                      |                                       |                                       |                                        |                     |
| Work status: Ref = full-time                                                       |                      |                                       |                                       |                                        |                     |
| Part-time                                                                          | -0.009*<br>(0.005)   | -0.009*<br>(0.005)                    | -0.012<br>(0.014)<br>0.009<br>(0.015) | -0.013<br>(0.012)<br>0.009<br>(0.013)  | -0.009*<br>(0.005)  |
| Part-time $\times$ Female                                                          |                      |                                       |                                       |                                        |                     |
| Firm size: Ref = Firm size 100 to 999                                              |                      |                                       |                                       |                                        |                     |
| Firm size 99 or less                                                               | 0.003<br>(0.004)     | 0.003<br>(0.004)                      | 0.004<br>(0.008)                      | 0.004<br>(0.008)                       | 0.003<br>(0.004)    |
| Firm size 1000 or more ( $\times 10^{-2}$ )                                        | 0.017<br>(0.449)     | 0.010<br>(0.449)                      | -0.013<br>(0.689)                     | -0.001<br>(0.681)                      | 0.028<br>(0.448)    |
| Firm size 99 or less $\times$ Female                                               |                      |                                       | 0.001<br>(0.011)                      | 0.001<br>(0.011)                       |                     |
| Firm size 1000 or more $\times$ Female                                             |                      |                                       | 0.001<br>(0.012)                      | 0.001<br>(0.012)                       |                     |
| Race: Ref = white                                                                  |                      |                                       |                                       |                                        |                     |
| Black                                                                              | 0.014***<br>(0.005)  | 0.014***<br>(0.005)                   | 0.025<br>(0.029)                      | 0.025<br>(0.025)                       | 0.014***<br>(0.005) |
| Hispanic                                                                           | 0.009*<br>(0.005)    | 0.009*<br>(0.005)                     | 0.013<br>(0.011)                      | 0.013<br>(0.010)                       | 0.009*<br>(0.005)   |
| Foreign born                                                                       | 0.005<br>(0.005)     | 0.005<br>(0.005)                      | 0.002<br>(0.012)                      | 0.003<br>(0.011)                       | 0.005<br>(0.005)    |
| Age: Ref = 55 and more                                                             |                      |                                       |                                       |                                        |                     |
| 18 to 24                                                                           | 0.024***<br>(0.007)  | 0.024***<br>(0.007)                   | 0.030**<br>(0.012)                    | 0.029***<br>(0.011)                    | 0.024***<br>(0.007) |
| 25 to 34                                                                           | 0.016***<br>(0.006)  | 0.016***<br>(0.006)                   | 0.023<br>(0.019)                      | 0.022<br>(0.016)                       | 0.016***<br>(0.006) |
| 35 to 44                                                                           | 0.009<br>(0.006)     | 0.009<br>(0.006)                      | 0.014<br>(0.017)                      | 0.014<br>(0.015)                       | 0.008<br>(0.006)    |
| 45 to 54                                                                           | 0.009*<br>(0.005)    | 0.009*<br>(0.005)                     | 0.014<br>(0.015)                      | 0.013<br>(0.013)                       | 0.009*<br>(0.005)   |
| Education: Ref = HS dropout                                                        |                      |                                       |                                       |                                        |                     |
| HS graduate                                                                        | -0.008<br>(0.007)    | -0.008<br>(0.007)                     | -0.017<br>(0.025)                     | -0.016<br>(0.022)                      | -0.009<br>(0.008)   |
| Some college                                                                       | -0.007<br>(0.007)    | -0.007<br>(0.007)                     | -0.011<br>(0.013)                     | -0.010<br>(0.012)                      | -0.008<br>(0.008)   |
| Bachelor                                                                           | -0.008<br>(0.007)    | -0.008<br>(0.007)                     | -0.014<br>(0.021)                     | -0.014<br>(0.018)                      | -0.011<br>(0.008)   |
| Postgraduate                                                                       | 0.001<br>(0.008)     | 0.001<br>(0.007)                      | -0.004<br>(0.019)                     | -0.004<br>(0.016)                      | -0.002<br>(0.009)   |
| HS graduate $\times$ Female                                                        |                      |                                       |                                       |                                        | 0.003<br>(0.016)    |
| Some college $\times$ Female                                                       |                      |                                       |                                       |                                        | 0.005<br>(0.016)    |
| Bachelor $\times$ Female                                                           |                      |                                       |                                       |                                        | 0.013<br>(0.016)    |
| Postgraduate $\times$ Female                                                       |                      |                                       |                                       |                                        | 0.010<br>(0.016)    |
| Internet                                                                           | 0.010**<br>(0.005)   | 0.010**<br>(0.005)                    | 0.018<br>(0.024)                      | 0.018<br>(0.021)                       | 0.010**<br>(0.005)  |
| N                                                                                  | 11,113               | 11,113                                | 11,113                                | 11,113                                 | 11,113              |

Average (for discrete variables) and marginal (for continuous variables) effects;

Robust standard errors are in parentheses.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.6: Entrepreneurship (Eq. (1)) — subsamples: married and unmarried

|                                                      | Married              |                      |                      | Unmarried            |                      |                      |
|------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                                      | Specification 1      | Specification 3      | Specification 5      | Specification 1      | Specification 3      | Specification 5      |
| Dependent variable:                                  |                      |                      |                      |                      |                      |                      |
| 1 = Staying in                                       |                      |                      |                      |                      |                      |                      |
| 0 = Going out (Entrepreneurship)                     |                      |                      |                      |                      |                      |                      |
| Female                                               | 0.012***<br>(0.004)  | 0.008<br>(0.010)     | 0.049**<br>(0.025)   | 0.023***<br>(0.006)  | 0.025**<br>(0.013)   | 0.048**<br>(0.021)   |
| Family                                               |                      |                      |                      |                      |                      |                      |
| Children under age 11                                | -0.007<br>(0.005)    | -0.007<br>(0.005)    | -0.006<br>(0.005)    | -0.002<br>(0.008)    | -0.003<br>(0.008)    | -0.003<br>(0.008)    |
| Size                                                 | -0.002<br>(0.002)    | -0.002<br>(0.002)    | -0.002<br>(0.002)    | -0.002<br>(0.002)    | -0.002<br>(0.002)    | -0.002<br>(0.002)    |
| Employment                                           |                      |                      |                      |                      |                      |                      |
| Work status: Ref = full-time                         |                      |                      |                      |                      |                      |                      |
| Part-time                                            | -0.009<br>(0.006)    | -0.021**<br>(0.010)  | -0.009<br>(0.006)    | -0.007<br>(0.007)    | -0.011<br>(0.009)    | -0.008<br>(0.007)    |
| Part-time × Female                                   |                      | 0.018<br>(0.012)     |                      |                      | 0.010<br>(0.013)     |                      |
| Firm size: Ref = Firm size 100 to 999                |                      |                      |                      |                      |                      |                      |
| Firm size 99 or less                                 | -0.004<br>(0.006)    | -0.005<br>(0.008)    | -0.004<br>(0.006)    | -0.002<br>(0.007)    | -0.002<br>(0.009)    | -0.002<br>(0.007)    |
| Firm size 1000 or more                               | -0.004<br>(0.006)    | -0.004<br>(0.008)    | -0.003<br>(0.006)    | 0.002<br>(0.007)     | 0.006<br>(0.009)     | 0.003<br>(0.007)     |
| Firm size 99 or less × Female ( $\times 10^{-1}$ )   |                      | 0.032<br>(0.116)     |                      |                      | -0.004<br>(0.143)    |                      |
| Firm size 1000 or more × Female ( $\times 10^{-1}$ ) |                      | 0.001<br>(0.118)     |                      |                      | -0.094<br>(0.150)    |                      |
| Race: Ref = white                                    |                      |                      |                      |                      |                      |                      |
| Black                                                | -0.035***<br>(0.007) | -0.035***<br>(0.007) | -0.035***<br>(0.007) | -0.015*<br>(0.008)   | -0.015*<br>(0.008)   | -0.015*<br>(0.008)   |
| Hispanic                                             | -0.004<br>(0.008)    | -0.004<br>(0.008)    | -0.004<br>(0.008)    | -0.004<br>(0.009)    | -0.003<br>(0.009)    | -0.003<br>(0.009)    |
| Foreign born                                         | 0.015*<br>(0.008)    | 0.015*<br>(0.008)    | 0.015*<br>(0.008)    | 0.013<br>(0.009)     | 0.013<br>(0.009)     | 0.013<br>(0.009)     |
| Age: Ref = 55 and more                               |                      |                      |                      |                      |                      |                      |
| 18 to 24 ( $\times 10^{-1}$ )                        | 0.050<br>(0.124)     | 0.046<br>(0.125)     | 0.045<br>(0.124)     | -0.008<br>(0.104)    | -0.006<br>(0.104)    | -0.002<br>(0.104)    |
| 25 to 34                                             | -0.015*<br>(0.008)   | -0.015*<br>(0.008)   | -0.015*<br>(0.008)   | -0.009<br>(0.009)    | -0.009<br>(0.009)    | -0.009<br>(0.009)    |
| 35 to 44                                             | -0.014*<br>(0.007)   | -0.014*<br>(0.007)   | -0.014*<br>(0.007)   | -0.014<br>(0.009)    | -0.014<br>(0.009)    | -0.014<br>(0.009)    |
| 45 to 54                                             | -0.014**<br>(0.007)  | -0.015**<br>(0.007)  | -0.014**<br>(0.007)  | -0.005<br>(0.009)    | -0.006<br>(0.009)    | -0.005<br>(0.009)    |
| Education: Ref = HS dropout                          |                      |                      |                      |                      |                      |                      |
| HS graduate                                          | 0.019*<br>(0.010)    | 0.018*<br>(0.010)    | 0.031***<br>(0.012)  | 0.028***<br>(0.010)  | 0.029***<br>(0.010)  | 0.035***<br>(0.012)  |
| Some college                                         | 0.005<br>(0.010)     | 0.004<br>(0.010)     | 0.011<br>(0.011)     | 0.013<br>(0.010)     | 0.013<br>(0.010)     | 0.017<br>(0.012)     |
| Bachelor                                             | 0.023**<br>(0.010)   | 0.022**<br>(0.010)   | 0.031***<br>(0.012)  | 0.007<br>(0.011)     | 0.007<br>(0.011)     | 0.012<br>(0.013)     |
| Postgraduate                                         | 0.014<br>(0.010)     | 0.014<br>(0.010)     | 0.018<br>(0.012)     | 0.022*<br>(0.013)    | 0.022*<br>(0.013)    | 0.044**<br>(0.018)   |
| HS graduate × Female                                 |                      |                      | -0.049*<br>(0.026)   |                      |                      | -0.028<br>(0.024)    |
| Some college × Female                                |                      |                      | -0.035<br>(0.025)    |                      |                      | -0.021<br>(0.023)    |
| Bachelor × Female                                    |                      |                      | -0.041<br>(0.026)    |                      |                      | -0.022<br>(0.023)    |
| Postgraduate × Female                                |                      |                      | -0.028<br>(0.027)    |                      |                      | -0.055**<br>(0.027)  |
| Internet                                             | -0.021***<br>(0.007) | -0.021***<br>(0.007) | -0.021***<br>(0.007) | -0.022***<br>(0.008) | -0.022***<br>(0.008) | -0.022***<br>(0.008) |
| Non-metro area                                       | -0.003<br>(0.005)    | -0.003<br>(0.005)    | -0.003<br>(0.005)    | 0.003<br>(0.006)     | 0.003<br>(0.006)     | 0.003<br>(0.006)     |
| Unemployment rate                                    | 0.001<br>(0.002)     | 0.001<br>(0.002)     | 0.001<br>(0.003)     | -0.001<br>(0.004)    | -0.001<br>(0.004)    | -0.001<br>(0.004)    |
| Homestead exemption ( $\times 10^{-3}$ )             | -0.024**<br>(0.012)  | -0.024**<br>(0.012)  | -0.024**<br>(0.012)  | -0.002<br>(0.016)    | -0.003<br>(0.016)    | -0.001<br>(0.016)    |
| Median home value ( $\times 10^{-2}$ )               | -0.004*<br>(0.002)   | -0.004*<br>(0.002)   | -0.004*<br>(0.002)   | -0.001<br>(0.003)    | -0.001<br>(0.003)    | -0.001<br>(0.003)    |
| Maximum personal income tax rate                     | 0.001<br>(0.001)     | 0.001<br>(0.001)     | 0.001<br>(0.001)     | 0.001<br>(0.001)     | 0.001<br>(0.001)     | 0.001<br>(0.001)     |
| Maximum corporate income tax rate                    | 0.001<br>(0.001)     | 0.001<br>(0.001)     | 0.001<br>(0.001)     | -0.001<br>(0.001)    | -0.001<br>(0.001)    | -0.001<br>(0.001)    |
| Sales tax rate                                       | 0.002<br>(0.002)     | 0.003<br>(0.002)     | 0.003<br>(0.002)     | 0.001<br>(0.002)     | 0.001<br>(0.002)     | 0.001<br>(0.002)     |
| N                                                    | 6,835                | 6,835                | 6,835                | 4,278                | 4,278                | 4,278                |

Average (for discrete variables) and marginal (for continuous variables) effects;

Robust standard errors are in parentheses.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.7: Intrapreneurship (Eq. (2)) — subsamples: married and unmarried

|                                       | Married              |                      |                     | Unmarried            |                     |                     |
|---------------------------------------|----------------------|----------------------|---------------------|----------------------|---------------------|---------------------|
|                                       | Specification 1      | Specification 3      | Specification 5     | Specification 1      | Specification 3     | Specification 5     |
| Dependent variable:                   |                      |                      |                     |                      |                     |                     |
| 1 = Intrapreneurship                  |                      |                      |                     |                      |                     |                     |
| 0 = Else                              |                      |                      |                     |                      |                     |                     |
| Female                                | -0.032***<br>(0.008) | -0.039***<br>(0.013) | -0.072**<br>(0.036) | -0.025***<br>(0.006) | -0.016<br>(0.014)   | -0.025<br>(0.020)   |
| Family                                | 0.002<br>(0.007)     | 0.002<br>(0.007)     | 0.001<br>(0.007)    | 0.011<br>(0.008)     | 0.011<br>(0.008)    | 0.012<br>(0.008)    |
| Children under age 11                 | 0.001<br>(0.003)     | 0.001<br>(0.003)     | 0.001<br>(0.003)    | 0.001<br>(0.002)     | 0.001<br>(0.002)    | 0.002<br>(0.002)    |
| Size                                  |                      |                      |                     |                      |                     |                     |
| Employment                            |                      |                      |                     |                      |                     |                     |
| Work status: Ref = full-time          |                      |                      |                     |                      |                     |                     |
| Part-time                             | -0.011<br>(0.010)    | -0.015<br>(0.019)    | -0.011<br>(0.010)   | -0.007<br>(0.008)    | -0.014<br>(0.010)   | -0.007<br>(0.008)   |
| Part-time × Female                    |                      | 0.005<br>(0.021)     |                     |                      | 0.017<br>(0.014)    |                     |
| Firm size: Ref = Firm size 100 to 999 |                      |                      |                     |                      |                     |                     |
| Firm size 99 or less                  | -0.002<br>(0.007)    | -0.005<br>(0.008)    | -0.003<br>(0.007)   | 0.015*<br>(0.008)    | 0.020*<br>(0.010)   | 0.015*<br>(0.008)   |
| Firm size 1000 or more                | -0.006<br>(0.007)    | -0.010<br>(0.008)    | -0.007<br>(0.007)   | 0.012<br>(0.008)     | 0.019*<br>(0.011)   | 0.012<br>(0.008)    |
| Firm size 99 or less × Female         |                      | 0.008<br>(0.014)     |                     |                      | -0.013<br>(0.016)   |                     |
| Firm size 1000 or more × Female       |                      | 0.011<br>(0.015)     |                     |                      | -0.017<br>(0.017)   |                     |
| Race: Ref = white                     |                      |                      |                     |                      |                     |                     |
| Black                                 | 0.024<br>(0.019)     | 0.024<br>(0.019)     | 0.022<br>(0.019)    | 0.020***<br>(0.008)  | 0.021***<br>(0.008) | 0.020***<br>(0.008) |
| Hispanic                              | 0.007<br>(0.010)     | 0.006<br>(0.010)     | 0.006<br>(0.010)    | 0.015*<br>(0.008)    | 0.016*<br>(0.008)   | 0.015*<br>(0.008)   |
| Foreign born                          | 0.004<br>(0.010)     | 0.004<br>(0.010)     | 0.004<br>(0.009)    | 0.002<br>(0.008)     | 0.002<br>(0.008)    | 0.002<br>(0.008)    |
| Age: Ref = 55 and more                |                      |                      |                     |                      |                     |                     |
| 18 to 24                              | 0.031**<br>(0.014)   | 0.031**<br>(0.014)   | 0.030**<br>(0.014)  | 0.018*<br>(0.010)    | 0.018*<br>(0.010)   | 0.016<br>(0.010)    |
| 25 to 34                              | 0.035***<br>(0.012)  | 0.035***<br>(0.012)  | 0.034***<br>(0.012) | 0.002<br>(0.010)     | 0.002<br>(0.010)    | 0.001<br>(0.010)    |
| 35 to 44                              | 0.015<br>(0.011)     | 0.015<br>(0.011)     | 0.015<br>(0.011)    | 0.012<br>(0.010)     | 0.012<br>(0.010)    | 0.012<br>(0.010)    |
| 45 to 54                              | 0.020**<br>(0.010)   | 0.020*<br>(0.010)    | 0.019*<br>(0.010)   | 0.003<br>(0.009)     | 0.003<br>(0.009)    | 0.002<br>(0.009)    |
| Education: Ref = HS dropout           |                      |                      |                     |                      |                     |                     |
| HS graduate                           | -0.021<br>(0.014)    | -0.021<br>(0.014)    | -0.030<br>(0.019)   | -0.006<br>(0.010)    | -0.006<br>(0.010)   | -0.003<br>(0.012)   |
| Some college                          | -0.013<br>(0.012)    | -0.013<br>(0.012)    | -0.017<br>(0.014)   | -0.002<br>(0.011)    | -0.002<br>(0.011)   | -0.005<br>(0.013)   |
| Bachelor                              | -0.019<br>(0.015)    | -0.019<br>(0.015)    | -0.033*<br>(0.020)  | -0.008<br>(0.012)    | -0.008<br>(0.012)   | -0.003<br>(0.014)   |
| Postgraduate                          | -0.005<br>(0.013)    | -0.005<br>(0.013)    | -0.009<br>(0.015)   | -0.002<br>(0.013)    | -0.001<br>(0.013)   | -0.022<br>(0.018)   |
| HS graduate × Female                  |                      |                      | 0.046<br>(0.037)    |                      |                     | -0.011<br>(0.023)   |
| Some college × Female                 |                      |                      | 0.027<br>(0.034)    |                      |                     | 0.006<br>(0.022)    |
| Bachelor × Female                     |                      |                      | 0.060*<br>(0.035)   |                      |                     | -0.014<br>(0.024)   |
| Postgraduate × Female                 |                      |                      | 0.029<br>(0.033)    |                      |                     | 0.035<br>(0.026)    |
| Internet                              | 0.022*<br>(0.013)    | 0.023*<br>(0.013)    | 0.022*<br>(0.013)   | 0.011<br>(0.007)     | 0.012<br>(0.007)    | 0.012<br>(0.007)    |
| N                                     | 6,835                | 6,835                | 6,835               | 4,278                | 4,278               | 4,278               |

Average (for discrete variables) and marginal (for continuous variables) effects;

Robust standard errors are in parentheses.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.8: Entrepreneurship (Eq. (1)) — subsamples: full-time and part-time

|                                                                           | Full-time       |                 |                 | Part-time       |                 |                 |
|---------------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                                                           | Specification 1 | Specification 2 | Specification 5 | Specification 1 | Specification 2 | Specification 5 |
| Dependent variable:<br>1 = Staying in<br>0 = Going out (Entrepreneurship) |                 |                 |                 |                 |                 |                 |
| Female                                                                    | 0.014***        | 0.021**         | (0.009)         | 0.046**         | (0.019)         | 0.032***        |
| Family                                                                    |                 |                 |                 |                 |                 |                 |
| Married                                                                   | 0.005           | 0.010*          | (0.005)         | 0.006           | (0.004)         | 0.008           |
| Children under age 11                                                     | -0.003          | -0.001          | (0.006)         | -0.002          | (0.004)         | -0.007          |
| Size                                                                      | -0.003*         | -0.003          | (0.002)         | -0.003*         | (0.002)         | -0.000          |
| Married × Female                                                          |                 | -0.011          | (0.008)         |                 | (0.017)         |                 |
| Children under age 11 × Female                                            |                 | -0.007          | (0.009)         |                 | (0.023)         |                 |
| Size × Female                                                             |                 | 0.001           | (0.003)         |                 | (0.007)         |                 |
| Employment                                                                |                 |                 |                 |                 |                 |                 |
| Firm size: Ref = Firm size 100 to 999                                     |                 |                 |                 |                 |                 |                 |
| Firm size 99 or less                                                      | -0.002          | -0.003          | (0.005)         | -0.002          | (0.005)         | -0.011          |
| Firm size 1000 or more                                                    | 0.002           | 0.002           | (0.005)         | 0.003           | (0.005)         | -0.022*         |
| Race: Ref = white                                                         |                 |                 |                 |                 |                 |                 |
| Black                                                                     | -0.029***       | -0.030***       | (0.005)         | -0.029***       | (0.005)         | 0.021           |
| Hispanic                                                                  | -0.006          | -0.006          | (0.006)         | -0.006          | (0.006)         | 0.003           |
| Foreign born                                                              | 0.015**         | 0.015**         | (0.006)         | 0.015**         | (0.006)         | 0.009           |
| Age: Ref = 55 and more                                                    |                 |                 |                 |                 |                 |                 |
| 18 to 24                                                                  | -0.013          | -0.012          | (0.008)         | -0.013          | (0.008)         | 0.017           |
| 25 to 34                                                                  | -0.014**        | -0.013*         | (0.007)         | -0.014**        | (0.007)         | -0.019          |
| 35 to 44                                                                  | -0.017***       | -0.017***       | (0.006)         | -0.018***       | (0.006)         | -0.015          |
| 45 to 54                                                                  | -0.013*         | -0.013**        | (0.006)         | -0.013**        | (0.006)         | -0.015          |
| Education: Ref = HS dropout                                               |                 |                 |                 |                 |                 |                 |
| HS graduate                                                               | 0.025***        | 0.025***        | (0.008)         | 0.034***        | (0.009)         | 0.021           |
| Some college                                                              | 0.010           | 0.010           | (0.008)         | 0.016*          | (0.009)         | 0.004           |
| Bachelor                                                                  | 0.020**         | 0.020**         | (0.008)         | 0.028***        | (0.009)         | 0.012           |
| Postgraduate                                                              | 0.022**         | 0.022**         | (0.009)         | 0.028***        | (0.010)         | -0.001          |
| HS graduate × Female                                                      |                 |                 |                 | -0.041**        | (0.020)         |                 |
| Some college × Female                                                     |                 |                 |                 | -0.029          | (0.020)         |                 |
| Bachelor × Female ( $\times 10^{-1}$ )                                    |                 |                 |                 | -0.036*         | (0.020)         |                 |
| Postgraduate × Female                                                     |                 |                 |                 | -0.362          | (0.198)         |                 |
| Internet                                                                  | -0.027***       | -0.027***       | (0.006)         | -0.027***       | (0.006)         | -0.007          |
| Non-metro area                                                            | 0.001           | 0.001           | (0.004)         | 0.001           | (0.004)         | -0.011          |
| Unemployment rate ( $\times 10^{-1}$ )                                    | -0.005          | -0.005          | (0.022)         | -0.006          | (0.022)         | 0.031           |
| Homestead exemption ( $\times 10^{-2}$ )                                  | -0.002          | -0.002          | (0.001)         | -0.002          | (0.001)         | -0.001          |
| Median home value ( $\times 10^{-2}$ )                                    | -0.002          | -0.002          | (0.002)         | -0.002          | (0.002)         | -0.007          |
| Maximum personal income tax rate ( $\times 10^{-1}$ )                     | 0.009           | 0.009           | (0.009)         | 0.009           | (0.009)         | 0.001           |
| Maximum corporate income tax rate ( $\times 10^{-1}$ )                    | 0.003           | 0.003           | (0.008)         | 0.003           | (0.008)         | 0.004           |
| Sales tax rate                                                            | 0.002           | 0.002           | (0.001)         | 0.002           | (0.001)         | 0.002           |
| <i>N</i>                                                                  | 9,331           | 9,331           |                 | 9,331           |                 | 1,782           |
|                                                                           |                 |                 |                 |                 |                 | 1,782           |

Average (for discrete variables) and marginal (for continuous variables) effects;

Robust standard errors are in parentheses;

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.9: Intrapreneurship (Eq. (2)) — subsamples: full-time and part-time

|                                       | Full-time       |                 |                 | Part-time       |                 |                 |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                       | Specification 1 | Specification 2 | Specification 5 | Specification 1 | Specification 2 | Specification 5 |
| Dependent variable:                   |                 |                 |                 |                 |                 |                 |
| 1 = Intrapreneurship                  |                 |                 |                 |                 |                 |                 |
| 0 = Else                              |                 |                 |                 |                 |                 |                 |
| Female                                | -0.038***       | (0.005)         | -0.042***       | (0.012)         | -0.078*         | (0.041)         |
| Family                                | -0.010*         | (0.006)         | -0.016**        | (0.007)         | -0.009          | (0.007)         |
| Married                               | 0.006           | (0.006)         | 0.007           | (0.008)         | 0.006           | (0.007)         |
| Children under age 11                 | 0.003           | (0.002)         | 0.004           | (0.003)         | 0.002           | (0.003)         |
| Size                                  |                 |                 | 0.016           | (0.011)         |                 |                 |
| Married × Female                      |                 |                 | 0.001           | (0.013)         |                 |                 |
| Children under age 11 × Female        |                 |                 | -0.002          | (0.004)         |                 |                 |
| Size × Female                         |                 |                 |                 |                 |                 |                 |
| Employment                            |                 |                 |                 |                 |                 |                 |
| Firm size: Ref = Firm size 100 to 999 |                 |                 |                 |                 |                 |                 |
| Firm size 99 or less                  | 0.004           | (0.007)         | 0.004           | (0.007)         | 0.003           | (0.007)         |
| Firm size 1000 or more                | -0.002          | (0.007)         | -0.002          | (0.007)         | -0.001          | (0.007)         |
| Race: Ref = white                     |                 |                 |                 |                 |                 |                 |
| Black                                 | 0.044***        | (0.008)         | 0.045***        | (0.008)         | 0.035           | (0.023)         |
| Hispanic                              | 0.016*          | (0.009)         | 0.016*          | (0.009)         | 0.014           | (0.010)         |
| Foreign born                          | -0.002          | (0.008)         | -0.002          | (0.008)         | 0.005           | (0.014)         |
| Age: Ref = 55 and more                |                 |                 |                 |                 |                 |                 |
| 18 to 24                              | 0.040***        | (0.011)         | 0.039***        | (0.011)         | 0.038***        | (0.013)         |
| 25 to 34                              | 0.027***        | (0.009)         | 0.026***        | (0.009)         | 0.024*          | (0.012)         |
| 35 to 44                              | 0.021**         | (0.009)         | 0.021**         | (0.009)         | 0.014           | (0.016)         |
| 45 to 54                              | 0.018**         | (0.008)         | 0.017**         | (0.008)         | 0.014           | (0.012)         |
| Education: Ref = HS dropout           |                 |                 |                 |                 |                 |                 |
| HS graduate                           | -0.033***       | (0.011)         | -0.033***       | (0.011)         | -0.033          | (0.028)         |
| Some college                          | -0.014          | (0.011)         | -0.014          | (0.011)         | -0.017          | (0.016)         |
| Bachelor                              | -0.025**        | (0.011)         | -0.025**        | (0.011)         | -0.034          | (0.024)         |
| Postgraduate                          | -0.019          | (0.012)         | -0.019          | (0.012)         | -0.022          | (0.025)         |
| HS graduate × Female                  |                 |                 |                 |                 | 0.033           | (0.044)         |
| Some college × Female                 |                 |                 |                 |                 | 0.031           | (0.036)         |
| Bachelor × Female                     |                 |                 |                 |                 | 0.056           | (0.038)         |
| Postgraduate × Female                 |                 |                 |                 |                 | 0.045           | (0.035)         |
| Internet                              | 0.038***        | (0.008)         | 0.038***        | (0.008)         | 0.031           | (0.022)         |
| N                                     | 9,331           | 9,331           | 9,331           | 1,782           | 1,782           | 1,782           |

Average (for discrete variables) and marginal (for continuous variables) effects;

Robust standard errors are in parentheses.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.10: Actual and counterfactual rates of start-up activities

| Gender \ Char                    | Male              | Female            | Difference |
|----------------------------------|-------------------|-------------------|------------|
| <i>Panel A: Pr(Entrepreneur)</i> |                   |                   |            |
| Male                             | 3.56%<br>(0.0024) | 3.83%<br>(0.0003) | 0.27%      |
| Female                           | 1.99%<br>(0.0002) | 2.16%<br>(0.0020) | -0.17%     |
| Difference                       | -1.57%***         | 1.67%***          |            |
| <i>Panel B: Pr(Intrapreneur)</i> |                   |                   |            |
| Male                             | 3.85%<br>(0.0025) | 3.74%<br>(0.0002) | -0.11%     |
| Female                           | 1.68%<br>(0.0001) | 1.62%<br>(0.0017) | -0.06%     |
| Difference                       | -2.17%***         | 2.11%***          |            |

Standard errors in parentheses. Diagonal cells are actual rates, and nondiagonal cells are counterfactual rates.

For example, the (male, female) cell in Panel A means that if all men's characteristics are drawn from the distribution of covariates for women, 3.83% of men would be engaged in entrepreneurial activities, a higher number than the actual rate, 3.56%.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.11: Decompositon of gender differences

|                                           |  | Specification 1       |          |                   |           |                     |          |
|-------------------------------------------|--|-----------------------|----------|-------------------|-----------|---------------------|----------|
|                                           |  | Weighted coefficients |          | Male coefficients |           | Female coefficients |          |
| <i>Panel A: Entrepreneurship</i>          |  |                       |          |                   |           |                     |          |
| Male mean (%)                             |  | 3.56                  |          | 3.56              |           | 3.56                |          |
| Female mean (%)                           |  | 2.16                  |          | 2.16              |           | 2.16                |          |
| Male – Female difference (%)              |  | 1.40                  |          | 1.40              |           | 1.40                |          |
| Explained difference (%)                  |  | -0.15                 |          | -0.41             |           | -0.09               |          |
| Unexplained difference (%)                |  | 1.55                  |          | 1.81              |           | 1.49                |          |
| Contributions from gender differences in: |  |                       |          |                   |           |                     |          |
| <b>Family</b>                             |  | 0.0001403             | 1.00%    | -0.0001800        | -1.29%    | 0.0005394           | 3.85%    |
| Married                                   |  | (-0.0002549)          | (-1.82%) | (-0.0005433)      | (-3.88%)  | (0.0000244)         | (0.17%)  |
| Children under age 11                     |  | (0.0001163)           | (0.83%)  | (0.0001082)       | (0.77%)   | (0.0002083)         | (1.49%)  |
| Size                                      |  | (0.0002789)           | (1.99%)  | (0.0002551)       | (1.82%)   | (0.0003067)         | (2.19%)  |
| <b>Employment</b>                         |  | -0.0004895            | -3.49%   | -0.0020922        | -14.94%   | -0.0000299          | -0.21%   |
| Part-time                                 |  | (-0.0005644)          | (-4.03%) | (-0.0021928)      | (-15.66%) | (-0.0000678)        | (-0.48%) |
| Firm size 99 or less                      |  | (0.0000713)           | (0.51%)  | (0.0001003)       | (0.72%)   | (0.0000332)         | (0.24%)  |
| Firm size 1000 or more                    |  | (0.0000036)           | (0.03%)  | (0.0000003)       | (0.00%)   | (0.0000047)         | (0.03%)  |
| <b>Age</b>                                |  | 0.0003143             | 2.25%    | 0.0003384         | 2.41%     | 0.0000272           | 0.20%    |
| <b>Education</b>                          |  | 0.0001248             | 0.89%    | 0.0001224         | 0.88%     | -0.0002649          | -1.89%   |
| <b>Other variables</b>                    |  | -0.0016054            | -11.48%  | -0.0022889        | -16.35%   | -0.0011610          | -8.28%   |
| <b>All included variables</b>             |  | -0.0015155            | -10.83%  | -0.0041003        | -29.29%   | -0.0008891          | -6.33%   |
| <i>N</i>                                  |  | 11,113                |          | 11,113            |           | 11,113              |          |
| <i>Panel B: Intrapreneurship</i>          |  |                       |          |                   |           |                     |          |
| Male mean (%)                             |  | 3.41                  |          | 3.41              |           | 3.41                |          |
| Female mean (%)                           |  | 0.94                  |          | 0.94              |           | 0.94                |          |
| Male – Female difference (%)              |  | 2.46                  |          | 2.46              |           | 2.46                |          |
| Explained difference (%)                  |  | 0.14                  |          | 0.18              |           | 0.01                |          |
| Unexplained difference (%)                |  | 2.33                  |          | 2.28              |           | 2.45                |          |
| Contributions from gender differences in: |  |                       |          |                   |           |                     |          |
| <b>Family</b>                             |  | -0.0000274            | -0.11%   | -0.0000466        | -0.18%    | -0.0003161          | -1.28%   |
| Married                                   |  | (-0.0000991)          | (-0.40%) | (-0.0002128)      | (-0.86%)  | (-0.0002382)        | (-0.97%) |
| Children under age 11                     |  | (0.0000643)           | (0.26%)  | (0.0001222)       | (0.50%)   | (-0.0000402)        | (-0.16%) |
| Size                                      |  | (0.0000074)           | (0.03%)  | (0.0000440)       | (0.18%)   | (-0.0000377)        | (-0.15%) |
| <b>Employment</b>                         |  | 0.0011145             | 4.52%    | 0.0017755         | 7.21%     | 0.0002038           | 0.83%    |
| Part-time                                 |  | (0.0010971)           | (4.45%)  | (0.0017600)       | (7.14%)   | (0.0001800)         | (0.73%)  |
| Firm size 99 or less                      |  | (0.0000170)           | (0.07%)  | (0.0000160)       | (0.07%)   | (0.0000245)         | (0.10%)  |
| Firm size 1000 or more                    |  | (0.0000004)           | (0.00%)  | (-0.0000005)      | (0.00%)   | (-0.0000007)        | (0.00%)  |
| <b>Age</b>                                |  | 0.0003798             | 1.55%    | 0.0005048         | 2.05%     | 0.0003291           | 1.34%    |
| <b>Education</b>                          |  | 0.0000038             | 0.02%    | 0.0001252         | 0.51%     | -0.0000587          | -0.24%   |
| <b>Other variables</b>                    |  | -0.0000840            | -0.33%   | -0.0005557        | -2.26%    | -0.0000125          | -0.05%   |
| <b>All included variables</b>             |  | 0.0013867             | 5.65%    | 0.0018031         | 7.33%     | 0.0001456           | 0.60%    |
| <i>N</i>                                  |  | 10,791                |          | 10,791            |           | 10,791              |          |

The decomposition is considered for non-linear.

The decomposition is considered for non-linear.

Table 2.12: Actual and counterfactual rates of the three modes

|               |        | Actual (%) | Counterfactual (%) |
|---------------|--------|------------|--------------------|
| Entrepreneurs | Male   | 3.56       |                    |
|               | Female | 2.16       | 1.99               |
| Intrapreneurs | Male   | 3.85       |                    |
|               | Female | 1.62       | 1.67               |
| Uninvolved    | Male   | 42.59      |                    |
|               | Female | 46.21      | 46.34              |

Table 2.13: State-level data

| State          | Homestead<br>Exemption (\$) | Median<br>Home Value (\$) | Unemployment<br>Rate (%) | Individual Income<br>Tax Rate (%) | Corporate Income<br>Tax Rate (%) | Sales Tax<br>Rate (%) |
|----------------|-----------------------------|---------------------------|--------------------------|-----------------------------------|----------------------------------|-----------------------|
| Alabama        | 10,000                      | 97,500                    | 4                        | 5                                 | 6.5                              | 4                     |
| Arizona        | 150,000                     | 185,400                   | 4.7                      | 5.04                              | 6.97                             | 5.6                   |
| Arkansas       | Unlimited                   | 87,400                    | 4.9                      | 7                                 | 6.5                              | 6                     |
| California     | 75,000                      | 477,700                   | 5.4                      | 9.3                               | 8.84                             | 6.25                  |
| Colorado       | 90,000                      | 223,300                   | 5                        | 4.63                              | 4.63                             | 2.9                   |
| Connecticut    | 150,000                     | 271,500                   | 4.9                      | 5                                 | 7.5                              | 6                     |
| Delaware       | 0                           | 203,800                   | 4.2                      | 5.95                              | 8.7                              | 0                     |
| D.C.           | 36,900                      | 384,400                   | 6.5                      | 9                                 | 9.98                             | 5.75                  |
| Florida        | Unlimited                   | 189,500                   | 3.8                      | 0                                 | 5.5                              | 6                     |
| Georgia        | 20,000                      | 147,500                   | 5.3                      | 6                                 | 6                                | 4                     |
| Idaho          | 50,000                      | 134,900                   | 3.8                      | 7.8                               | 7.6                              | 6                     |
| Illinois       | 15,000                      | 183,900                   | 5.7                      | 3                                 | 7.3                              | 6.25                  |
| Indiana        | 15,000                      | 114,400                   | 5.4                      | 3.4                               | 8.5                              | 6                     |
| Iowa           | Unlimited                   | 106,600                   | 4.6                      | 8.98                              | 12                               | 5                     |
| Kansas         | Unlimited                   | 107,800                   | 5.1                      | 6.45                              | 4                                | 5.3                   |
| Kentucky       | 10,000                      | 103,900                   | 6.1                      | 6                                 | 8.25                             | 6                     |
| Louisiana      | 25,000                      | 101,700                   | 7.1                      | 6                                 | 8                                | 4                     |
| Maine          | 70,000                      | 155,300                   | 4.8                      | 8.5                               | 8.93                             | 5                     |
| Maryland       | 0                           | 280,200                   | 4.1                      | 4.75                              | 7                                | 5                     |
| Massachusetts  | 500,000                     | 361,500                   | 4.8                      | 5.3                               | 9.5                              | 5                     |
| Michigan       | 36,900                      | 149,300                   | 6.7                      | 3.9                               | 1.9                              | 6                     |
| Minnesota      | 200,000                     | 198,800                   | 4                        | 7.85                              | 9.8                              | 6.5                   |
| Mississippi    | 150,000                     | 82,700                    | 7.9                      | 5                                 | 5                                | 7                     |
| Missouri       | 15,000                      | 123,100                   | 5.4                      | 6                                 | 6.25                             | 4.225                 |
| Montana        | 200,000                     | 131,600                   | 4                        | 11                                | 6.75                             | 0                     |
| Nebraska       | 12,500                      | 113,200                   | 3.8                      | 6.84                              | 7.81                             | 5.5                   |
| Nevada         | 200,000                     | 283,400                   | 4.1                      | 0                                 | 0                                | 6.5                   |
| New Hampshire  | 200,000                     | 240,100                   | 3.6                      | 5                                 | 9.25                             | 0                     |
| New Jersey     | 36,900                      | 333,900                   | 4.4                      | 8.97                              | 9                                | 6                     |
| New Mexico     | 60,000                      | 125,500                   | 5.3                      | 6.8                               | 7.6                              | 5                     |
| New York       | 20,000                      | 258,900                   | 5                        | 7.7                               | 7.5                              | 4                     |
| North Carolina | 10,000                      | 127,600                   | 5.2                      | 8.25                              | 6.9                              | 4.5                   |
| North Dakota   | 80,000                      | 88,600                    | 3.4                      | 5.54                              | 7                                | 5                     |
| Ohio           | 10,000                      | 129,600                   | 5.9                      | 7.5                               | 8.5                              | 6                     |
| Oklahoma       | Unlimited                   | 89,100                    | 4.4                      | 6.65                              | 6                                | 4.5                   |
| Oregon         | 33,000                      | 201,200                   | 6.1                      | 9                                 | 6.6                              | 0                     |
| Pennsylvania   | 36,900                      | 131,900                   | 5                        | 3.07                              | 9.99                             | 6                     |
| Rhode Island   | 200,000                     | 281,300                   | 5                        | 9.9                               | 9                                | 7                     |
| South Carolina | 36,900                      | 113,100                   | 6.8                      | 7                                 | 5                                | 5                     |
| South Dakota   | Unlimited                   | 101,700                   | 3.9                      | 0                                 | 0                                | 4                     |
| Tennessee      | 7,500                       | 114,000                   | 5.6                      | 6                                 | 6.5                              | 7                     |
| Texas          | Unlimited                   | 106,000                   | 5.3                      | 0                                 | 0                                | 6.25                  |
| Utah           | 40,000                      | 167,200                   | 4.3                      | 7                                 | 5                                | 4.75                  |
| Vermont        | 150,000                     | 173,400                   | 3.5                      | 9.5                               | 9.75                             | 6                     |
| Virginia       | 10,000                      | 212,300                   | 3.5                      | 5.75                              | 6                                | 4                     |
| Washington     | 40,000                      | 227,700                   | 5.5                      | 0                                 | 0                                | 6.5                   |
| West Virginia  | 50,000                      | 84,400                    | 5                        | 6.5                               | 9                                | 6                     |
| Wisconsin      | 40,000                      | 152,600                   | 4.7                      | 6.75                              | 7.9                              | 5                     |
| Wyoming        | 20,000                      | 135,000                   | 3.6                      | 0                                 | 0                                | 4                     |
| Mean           | 74,107 <sup>a</sup>         | 175,416                   | 4.9                      | 5.8                               | 6.7                              | 4.9                   |
| Median         | 40,000                      | 147,500                   | 4.9                      | 6                                 | 7                                | 5.3                   |
| Std. Dev.      | 93,558                      | 87,561                    | 1.01                     | 2.81                              | 2.89                             | 1.76                  |

Source: Corradin, Gropp, Huizinga and Laeven (2016) (Homestead exemptions); 2005 American Community Survey (Median home values); Bureau of Labor Statistics (Unemployment rates); Tax Foundation (Taxes)

Araska and Hawaii are not included because the PSED II does not include individuals living in these states.

<sup>a</sup>: States with "Unlimited" are excluded.

Table 2.14: Correlations between institutional variables

|          | Exemp | Home  | Unemp | Ind In | Corp Inc | Sales |
|----------|-------|-------|-------|--------|----------|-------|
| Exemp    | -     | -0.08 | -0.20 | -0.19  | -0.17    | 0.07  |
| Home     | -     | -     | -0.06 | 0.14   | 0.19     | 0.03  |
| Unemp    | -     | -     | -     | 0.08   | -0.02    | 0.23  |
| Ind Inc  | -     | -     | -     | -      | 0.71     | -0.17 |
| Corp Inc | -     | -     | -     | -      | -        | -0.04 |
| Sales    | -     | -     | -     | -      | -        | -     |

Table 2.15: Parameter estimates in Eq. (1)

|                                                                           | Specification 1      | Specification 2      | Specification 3      | Specification 4      | Specification 5      |
|---------------------------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Dependent variable:<br>1 = Staying in<br>0 = Going out (Entrepreneurship) |                      |                      |                      |                      |                      |
| Female                                                                    | 0.257***<br>(0.053)  | 0.377***<br>(0.125)  | 0.241*<br>(0.125)    | 0.370**<br>(0.173)   | 0.753***<br>(0.245)  |
| Family                                                                    | 0.088<br>(0.058)     | 0.167**<br>(0.073)   | 0.074<br>(0.060)     | 0.148**<br>(0.075)   | 0.092<br>(0.058)     |
| Married                                                                   | -0.061<br>(0.067)    | -0.065<br>(0.085)    | -0.060<br>(0.068)    | -0.067<br>(0.087)    | -0.059<br>(0.067)    |
| Children under age 11                                                     | -0.029<br>(0.022)    | -0.030<br>(0.027)    | -0.032<br>(0.024)    | -0.030<br>(0.028)    | -0.031<br>(0.022)    |
| Size                                                                      |                      |                      |                      |                      |                      |
| Married $\times$ Female                                                   |                      | -0.189*<br>(0.112)   |                      | -0.176<br>(0.113)    |                      |
| Children under age 11 $\times$ Female                                     |                      | -0.014<br>(0.130)    |                      | -0.008<br>(0.131)    |                      |
| Size $\times$ Female                                                      |                      | -0.001<br>(0.044)    |                      | -0.006<br>(0.045)    |                      |
| Employment                                                                |                      |                      |                      |                      |                      |
| Work status: Ref = full-time                                              |                      |                      |                      |                      |                      |
| Part-time                                                                 | -0.128*<br>(0.073)   | -0.111<br>(0.073)    | -0.229**<br>(0.103)  | -0.203*<br>(0.105)   | -0.129*<br>(0.072)   |
| Part-time $\times$ Female                                                 |                      |                      | 0.203<br>(0.140)     | 0.185<br>(0.142)     |                      |
| Firm size: Ref = Firm size 100 to 999                                     |                      |                      |                      |                      |                      |
| Firm size 99 or less                                                      | -0.053<br>(0.071)    | -0.054<br>(0.071)    | -0.065<br>(0.093)    | -0.066<br>(0.092)    | -0.056<br>(0.071)    |
| Firm size 1000 or more                                                    | -0.015<br>(0.073)    | -0.020<br>(0.073)    | 0.007<br>(0.096)     | 0.003<br>(0.094)     | -0.012<br>(0.073)    |
| Firm size 99 or less $\times$ Female                                      |                      |                      | 0.017<br>(0.144)     | 0.021<br>(0.143)     |                      |
| Firm size 1000 or more $\times$ Female                                    |                      |                      | -0.069<br>(0.146)    | -0.068<br>(0.146)    |                      |
| Race: Ref = white                                                         |                      |                      |                      |                      |                      |
| Black                                                                     | -0.401***<br>(0.080) | -0.410***<br>(0.080) | -0.383***<br>(0.081) | -0.391***<br>(0.081) | -0.402***<br>(0.080) |
| Hispanic                                                                  | -0.063<br>(0.092)    | -0.065<br>(0.092)    | -0.056<br>(0.092)    | -0.059<br>(0.092)    | -0.063<br>(0.092)    |
| Foreign born                                                              | 0.225**<br>(0.090)   | 0.229**<br>(0.090)   | 0.223**<br>(0.090)   | 0.226**<br>(0.090)   | 0.228**<br>(0.091)   |
| Age: Ref = 55 and more                                                    |                      |                      |                      |                      |                      |
| 18 to 24                                                                  | -0.027<br>(0.116)    | -0.008<br>(0.118)    | -0.017<br>(0.117)    | -0.001<br>(0.119)    | -0.025<br>(0.117)    |
| 25 to 34                                                                  | -0.212**<br>(0.095)  | -0.198**<br>(0.096)  | -0.215**<br>(0.095)  | -0.202**<br>(0.095)  | -0.211**<br>(0.095)  |
| 35 to 44                                                                  | -0.225**<br>(0.090)  | -0.213**<br>(0.090)  | -0.228**<br>(0.090)  | -0.216**<br>(0.090)  | -0.228**<br>(0.090)  |
| 45 to 54                                                                  | -0.182**<br>(0.083)  | -0.172**<br>(0.084)  | -0.187**<br>(0.084)  | -0.178**<br>(0.084)  | -0.182**<br>(0.083)  |
| Education: Ref = HS dropout                                               |                      |                      |                      |                      |                      |
| HS graduate                                                               | 0.370***<br>(0.110)  | 0.374***<br>(0.110)  | 0.358***<br>(0.112)  | 0.362***<br>(0.112)  | 0.532***<br>(0.129)  |
| Some college                                                              | 0.139<br>(0.109)     | 0.141<br>(0.109)     | 0.124<br>(0.111)     | 0.126<br>(0.110)     | 0.229*<br>(0.125)    |
| Bachelor                                                                  | 0.286***<br>(0.114)  | 0.287***<br>(0.115)  | 0.270**<br>(0.117)   | 0.273***<br>(0.116)  | 0.407***<br>(0.133)  |
| Postgraduate                                                              | 0.289**<br>(0.123)   | 0.287**<br>(0.123)   | 0.278**<br>(0.123)   | 0.275**<br>(0.123)   | 0.411***<br>(0.144)  |
| HS graduate $\times$ Female                                               |                      |                      |                      |                      |                      |
| Some colleague $\times$ Female                                            |                      |                      |                      |                      |                      |
| Bachelor $\times$ Female                                                  |                      |                      |                      |                      |                      |
| Postgraduate $\times$ Female                                              |                      |                      |                      |                      |                      |
| Internet                                                                  | -0.359***<br>(0.085) | -0.360***<br>(0.086) | -0.350***<br>(0.086) | -0.352***<br>(0.086) | -0.357***<br>(0.086) |
| Non-metro area                                                            | -0.018<br>(0.059)    | -0.015<br>(0.060)    | -0.007<br>(0.070)    | -0.005<br>(0.068)    | -0.018<br>(0.060)    |
| Unemployment rate                                                         | -0.002<br>(0.033)    | -0.002<br>(0.033)    | 0.006<br>(0.041)     | 0.006<br>(0.038)     | -0.003<br>(0.033)    |
| Homestead exemption ( $\times 10^{-1}$ )                                  | -0.003*<br>(0.002)   | -0.003*<br>(0.002)   | -0.002<br>(0.002)    | -0.002<br>(0.002)    | -0.003*<br>(0.002)   |
| Median home value ( $\times 10^{-1}$ )                                    | -0.005*<br>(0.003)   | -0.005*<br>(0.003)   | -0.005*<br>(0.003)   | -0.005*<br>(0.003)   | -0.005*<br>(0.003)   |
| Maximum personal income tax rate                                          | 0.013<br>(0.013)     | 0.012<br>(0.012)     | 0.009<br>(0.021)     | 0.009<br>(0.019)     | 0.013<br>(0.013)     |
| Maximum corporate income tax rate                                         | 0.004<br>(0.012)     | 0.005<br>(0.012)     | 0.009<br>(0.019)     | 0.009<br>(0.017)     | 0.004<br>(0.012)     |
| Sales tax rate                                                            | 0.029<br>(0.019)     | 0.029<br>(0.019)     | 0.033*<br>(0.018)    | 0.033*<br>(0.018)    | 0.030<br>(0.019)     |
| Constant                                                                  | 2.036***<br>(0.248)  | 1.976***<br>(0.251)  | 1.986***<br>(0.298)  | 1.927***<br>(0.290)  | 1.924***<br>(0.253)  |
| N                                                                         | 11,113               | 11,113               | 11,113               | 11,113               | 11,113               |

Note: Robust standard errors are in parentheses.  
\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.16: Parameter estimates in Eq. (2)

|                                                         | Specification 1      | Specification 2      | Specification 3      | Specification 4      | Specification 5      |
|---------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Dependent variable:<br>1 = Intrapreneurship<br>0 = Else |                      |                      |                      |                      |                      |
| Female                                                  | -0.363***<br>(0.054) | -0.343***<br>(0.125) | -0.420***<br>(0.120) | -0.417**<br>(0.173)  | -0.479**<br>(0.229)  |
| Family                                                  | -0.095<br>(0.058)    | -0.089<br>(0.073)    | -0.114**<br>(0.056)  | -0.131<br>(0.082)    | -0.096<br>(0.058)    |
| Married                                                 | 0.060<br>(0.070)     | 0.084<br>(0.084)     | 0.067<br>(0.068)     | 0.089<br>(0.081)     | 0.061<br>(0.070)     |
| Children under age 11                                   | 0.008<br>(0.021)     | 0.006<br>(0.026)     | 0.015<br>(0.023)     | 0.015<br>(0.026)     | 0.009<br>(0.021)     |
| Size                                                    |                      |                      |                      |                      |                      |
| Married $\times$ Female                                 |                      | -0.022<br>(0.115)    |                      | 0.035<br>(0.137)     |                      |
| Children under age 11 $\times$ Female                   |                      | -0.079<br>(0.136)    |                      | -0.066<br>(0.130)    |                      |
| Size $\times$ Female ( $\times 10^{-1}$ )               |                      | 0.065<br>(0.440)     |                      | -0.002<br>(0.420)    |                      |
| Employment                                              |                      |                      |                      |                      |                      |
| Work status: Ref = full-time                            |                      |                      |                      |                      |                      |
| Part-time                                               | -0.148*<br>(0.081)   | -0.143*<br>(0.082)   | -0.153<br>(0.261)    | -0.158<br>(0.220)    | -0.144*<br>(0.081)   |
| Part-time $\times$ Female                               |                      |                      | 0.106<br>(0.233)     | 0.112<br>(0.209)     |                      |
| Firm size: Ref = Firm size 100 to 999                   |                      |                      |                      |                      |                      |
| Firm size 99 or less                                    | 0.044<br>(0.070)     | 0.043<br>(0.070)     | 0.045<br>(0.084)     | 0.045<br>(0.084)     | 0.044<br>(0.070)     |
| Firm size 1000 or more ( $\times 10^{-1}$ )             | 0.027<br>(0.722)     | 0.016<br>(0.723)     | -0.016<br>(0.853)    | -0.001<br>(0.832)    | 0.045<br>(0.721)     |
| Firm size 99 or less $\times$ Female                    |                      |                      | 0.017<br>(0.139)     | 0.015<br>(0.139)     |                      |
| Firm size 1000 or more $\times$ Female                  |                      |                      | 0.015<br>(0.151)     | 0.011<br>(0.149)     |                      |
| Race: Ref = white                                       |                      |                      |                      |                      |                      |
| Black                                                   | 0.223***<br>(0.084)  | 0.224***<br>(0.084)  | 0.307**<br>(0.153)   | 0.309**<br>(0.143)   | 0.224***<br>(0.083)  |
| Hispanic                                                | 0.146*<br>(0.087)    | 0.145*<br>(0.087)    | 0.158*<br>(0.083)    | 0.158*<br>(0.083)    | 0.144*<br>(0.087)    |
| Foreign born                                            | 0.084<br>(0.079)     | 0.084<br>(0.079)     | 0.030<br>(0.172)     | 0.032<br>(0.154)     | 0.084<br>(0.079)     |
| Age: Ref = 55 and more                                  |                      |                      |                      |                      |                      |
| 18 to 24                                                | 0.389***<br>(0.108)  | 0.391***<br>(0.108)  | 0.367**<br>(0.176)   | 0.365**<br>(0.166)   | 0.380***<br>(0.108)  |
| 25 to 34                                                | 0.259***<br>(0.095)  | 0.261***<br>(0.095)  | 0.283***<br>(0.091)  | 0.281***<br>(0.090)  | 0.252***<br>(0.094)  |
| 35 to 44                                                | 0.141<br>(0.091)     | 0.141<br>(0.091)     | 0.177<br>(0.114)     | 0.174*<br>(0.105)    | 0.136<br>(0.090)     |
| 45 to 54                                                | 0.145*<br>(0.083)    | 0.145*<br>(0.083)    | 0.171*<br>(0.093)    | 0.168*<br>(0.088)    | 0.142*<br>(0.083)    |
| Education: Ref = HS dropout                             |                      |                      |                      |                      |                      |
| HS graduate                                             | -0.132<br>(0.109)    | -0.130<br>(0.109)    | -0.207<br>(0.186)    | -0.204<br>(0.171)    | -0.138<br>(0.126)    |
| Some college                                            | -0.107<br>(0.110)    | -0.105<br>(0.110)    | -0.131<br>(0.107)    | -0.129<br>(0.107)    | -0.122<br>(0.127)    |
| Bachelor                                                | -0.123<br>(0.114)    | -0.121<br>(0.114)    | -0.179<br>(0.152)    | -0.176<br>(0.142)    | -0.182<br>(0.134)    |
| Postgraduate                                            | 0.014<br>(0.121)     | 0.016<br>(0.121)     | -0.052<br>(0.199)    | -0.048<br>(0.180)    | -0.029<br>(0.141)    |
| HS graduate $\times$ Female                             |                      |                      |                      |                      |                      |
| Some college $\times$ Female                            |                      |                      |                      |                      |                      |
| Bachelor $\times$ Female                                |                      |                      |                      |                      |                      |
| Postgraduate $\times$ Female                            |                      |                      |                      |                      |                      |
| Internet                                                | 0.164**<br>(0.078)   | 0.162**<br>(0.077)   | 0.229<br>(0.152)     | 0.226*<br>(0.137)    | 0.166**<br>(0.078)   |
| $\rho$                                                  | 0.934***<br>(0.018)  | 0.849***<br>(0.026)  | -0.655<br>(1.053)    | -0.643<br>(0.926)    | 0.862***<br>(0.031)  |
| Constant                                                | -2.017***<br>(0.141) | -2.025***<br>(0.146) | -1.900***<br>(0.338) | -1.900***<br>(0.327) | -1.994***<br>(0.151) |
| LL                                                      | -2745.709            | -2743.859            | -2743.989            | -2742.279            | -2741.719            |
| AIC                                                     | 5587.417             | 5595.718             | 5595.979             | 5604.557             | 5595.439             |
| N                                                       | 11,113               | 11,113               | 11,113               | 11,113               | 11,113               |

Notes: Robust standard errors are in parentheses. LL stands for Log Likelihood, and AIC for Akaike's Information Criterion.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.17: Parameter estimates in Eq. (1) — subsamples: married and unmarried

|                                                                           | Married         |                 |                 | Unmarried       |                 |                 |           |         |           |         |           |         |
|---------------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------|---------|-----------|---------|-----------|---------|
|                                                                           | Specification 1 | Specification 2 | Specification 5 | Specification 1 | Specification 2 | Specification 5 |           |         |           |         |           |         |
| Dependent variable:<br>1 = Staying in<br>0 = Going out (Entrepreneurship) |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Female                                                                    | 0.194***        | (0.073)         | 0.138           | (0.170)         | 0.814**         | (0.403)         | 0.352***  | (0.083) | 0.378**   | (0.189) | 0.726**   | (0.310) |
| Family                                                                    | -0.090          | (0.090)         | -0.097          | (0.091)         | -0.086          | (0.090)         | -0.035    | (0.117) | -0.039    | (0.116) | -0.044    | (0.118) |
| Children under age 11                                                     | -0.030          | (0.031)         | -0.030          | (0.031)         | -0.030          | (0.031)         | -0.035    | (0.031) | -0.035    | (0.031) | -0.036    | (0.031) |
| Size                                                                      |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Employment                                                                |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Work status: Ref = full-time                                              |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Part-time                                                                 | -0.139          | (0.100)         | -0.334**        | (0.160)         | -0.131          | (0.100)         | -0.104    | (0.109) | -0.163    | (0.137) | -0.115    | (0.109) |
| Part-time × Female                                                        |                 |                 | 0.292           | (0.201)         |                 |                 |           |         | 0.146     | (0.204) |           |         |
| Firm size: Ref = Firm size 100 to 999                                     |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Firm size 99 or less                                                      | -0.066          | (0.095)         | -0.089          | (0.124)         | -0.062          | (0.095)         | -0.036    | (0.106) | -0.033    | (0.135) | -0.036    | (0.107) |
| Firm size 1000 or more                                                    | -0.074          | (0.096)         | -0.077          | (0.125)         | -0.063          | (0.096)         | 0.035     | (0.111) | 0.095     | (0.144) | 0.041     | (0.111) |
| Firm size 99 or less × Female                                             |                 |                 | 0.046           | (0.180)         |                 |                 |           |         | -0.007    | (0.218) |           |         |
| Firm size 1000 or more × Female                                           |                 |                 | -0.010          | (0.193)         |                 |                 |           |         | -0.144    | (0.228) |           |         |
| Race: Ref = white                                                         |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Black                                                                     | -0.573***       | (0.107)         | -0.565***       | (0.108)         | -0.578***       | (0.108)         | -0.240**  | (0.118) | -0.235**  | (0.118) | -0.231*   | (0.119) |
| Hispanic                                                                  | -0.062          | (0.126)         | -0.061          | (0.125)         | -0.062          | (0.126)         | -0.051    | (0.137) | -0.048    | (0.137) | -0.045    | (0.137) |
| Foreign born                                                              | 0.239*          | (0.122)         | 0.236*          | (0.122)         | 0.235*          | (0.123)         | 0.195     | (0.133) | 0.196     | (0.132) | 0.201     | (0.133) |
| Age: Ref = 55 and more                                                    |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| 18 to 24                                                                  | 0.068           | (0.201)         | 0.063           | (0.201)         | 0.067           | (0.202)         | -0.011    | (0.157) | -0.008    | (0.158) | -0.003    | (0.158) |
| 25 to 34                                                                  | -0.242*         | (0.127)         | -0.251**        | (0.127)         | -0.252**        | (0.128)         | -0.138    | (0.143) | -0.142    | (0.143) | -0.139    | (0.143) |
| 35 to 44                                                                  | -0.227*         | (0.119)         | -0.238**        | (0.120)         | -0.236**        | (0.120)         | -0.209    | (0.138) | -0.212    | (0.138) | -0.216    | (0.138) |
| 45 to 54                                                                  | -0.227**        | (0.108)         | -0.238**        | (0.109)         | -0.230**        | (0.108)         | -0.080    | (0.136) | -0.083    | (0.136) | -0.079    | (0.136) |
| Education: Ref = HS dropout                                               |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| HS graduate                                                               | 0.299*          | (0.161)         | 0.292*          | (0.160)         | 0.500***        | (0.187)         | 0.432***  | (0.155) | 0.438***  | (0.156) | 0.538***  | (0.182) |
| Some college                                                              | 0.072           | (0.157)         | 0.064           | (0.156)         | 0.179           | (0.178)         | 0.197     | (0.153) | 0.198     | (0.153) | 0.262     | (0.179) |
| Bachelor                                                                  | 0.351**         | (0.165)         | 0.349**         | (0.164)         | 0.495***        | (0.191)         | 0.115     | (0.162) | 0.115     | (0.162) | 0.183     | (0.192) |
| Postgraduate                                                              | 0.228           | (0.170)         | 0.226           | (0.170)         | 0.293           | (0.193)         | 0.339*    | (0.193) | 0.345*    | (0.194) | 0.679***  | (0.263) |
| HS graduate × Female                                                      |                 |                 |                 |                 | -0.809*         | (0.427)         |           |         |           |         | -0.429    | (0.358) |
| Some college × Female                                                     |                 |                 |                 |                 | -0.589          | (0.416)         |           |         |           |         | -0.312    | (0.342) |
| Bachelor × Female                                                         |                 |                 |                 |                 | -0.679          | (0.425)         |           |         |           |         | -0.327    | (0.347) |
| Postgraduate × Female                                                     |                 |                 |                 |                 | -0.470          | (0.437)         |           |         |           |         | -0.834**  | (0.403) |
| Internet                                                                  | -0.337***       | (0.117)         | -0.336***       | (0.117)         | -0.338***       | (0.118)         | -0.340*** | (0.124) | -0.339*** | (0.124) | -0.335*** | (0.124) |
| Non-metro area                                                            | -0.040          | (0.076)         | -0.036          | (0.076)         | -0.041          | (0.076)         | 0.045     | (0.097) | 0.041     | (0.096) | 0.048     | (0.097) |
| Unemployment rate                                                         | 0.013           | (0.039)         | 0.013           | (0.039)         | 0.010           | (0.039)         | -0.019    | (0.054) | -0.019    | (0.054) | -0.019    | (0.054) |
| Homestead exemption ( $\times 10^{-2}$ )                                  | -0.037*         | (0.020)         | -0.037*         | (0.020)         | -0.038*         | (0.020)         | -0.006    | (0.025) | -0.006    | (0.025) | -0.004    | (0.025) |
| Median home value ( $\times 10^{-1}$ )                                    | -0.006          | (0.004)         | -0.006          | (0.004)         | -0.006*         | (0.004)         | -0.001    | (0.004) | -0.001    | (0.004) | -0.002    | (0.004) |
| Maximum personal income tax rate                                          | 0.007           | (0.017)         | 0.006           | (0.017)         | 0.008           | (0.017)         | 0.015     | (0.021) | 0.015     | (0.021) | 0.017     | (0.021) |
| Maximum corporate income tax rate                                         | 0.022           | (0.015)         | 0.022           | (0.015)         | 0.021           | (0.015)         | -0.014    | (0.018) | -0.014    | (0.018) | -0.014    | (0.018) |
| Sales tax rate                                                            | 0.052**         | (0.024)         | 0.053**         | (0.023)         | 0.053**         | (0.023)         | 0.012     | (0.029) | 0.013     | (0.029) | 0.012     | (0.029) |
| Constant                                                                  | 2.008***        | (0.337)         | 2.042***        | (0.348)         | 1.898***        | (0.345)         | 2.067***  | (0.381) | 2.049***  | (0.386) | 1.973***  | (0.392) |
| N                                                                         | 6,835           | 6,835           | 6,835           | 6,835           | 6,835           | 6,835           | 4,278     | 4,278   | 4,278     | 4,278   | 4,278     | 4,278   |

Note: Robust standard errors are in parentheses.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.18: Parameter estimates in Eq. (2) — subsamples: married and unmarried

|                                                         | Married         |                 |                 | Unmarried       |                 |                 |           |         |           |         |           |         |
|---------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------|---------|-----------|---------|-----------|---------|
|                                                         | Specification 1 | Specification 2 | Specification 5 | Specification 1 | Specification 2 | Specification 5 |           |         |           |         |           |         |
| Dependent variable:<br>1 = Intrapreneurship<br>0 = Else |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Female                                                  | -0.382***       | (0.073)         | -0.473***       | (0.159)         | -0.890**        | (0.356)         | -0.365*** | (0.083) | -0.230    | (0.211) | -0.364    | (0.294) |
| Family                                                  |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Children under age 11                                   | 0.022           | (0.085)         | 0.024           | (0.085)         | 0.014           | (0.087)         | 0.167     | (0.111) | 0.161     | (0.110) | 0.175     | (0.111) |
| Size                                                    | 0.008           | (0.031)         | 0.008           | (0.031)         | 0.010           | (0.031)         | 0.021     | (0.029) | 0.021     | (0.029) | 0.022     | (0.029) |
| Employment                                              |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Work status: Ref = full-time                            |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Part-time                                               | -0.136          | (0.143)         | -0.177          | (0.260)         | -0.134          | (0.143)         | -0.107    | (0.110) | -0.202    | (0.144) | -0.101    | (0.110) |
| Part-time × Female                                      |                 |                 | 0.063           | (0.264)         |                 |                 |           |         | 0.242     | (0.202) |           |         |
| Firm size: Ref = Firm size 100 to 999                   |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Firm size 99 or less                                    | -0.029          | (0.085)         | -0.059          | (0.105)         | -0.034          | (0.086)         | 0.222*    | (0.116) | 0.294*    | (0.152) | 0.220*    | (0.116) |
| Firm size 1000 or more                                  | -0.078          | (0.090)         | -0.121          | (0.108)         | -0.089          | (0.090)         | 0.181     | (0.120) | 0.282*    | (0.157) | 0.177     | (0.120) |
| Firm size 99 or less × Female                           |                 |                 | 0.094           | (0.174)         |                 |                 |           |         | -0.184    | (0.236) |           |         |
| Firm size 1000 or more × Female                         |                 |                 | 0.135           | (0.180)         |                 |                 |           |         | -0.250    | (0.243) |           |         |
| Race: Ref = white                                       |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| Black                                                   | 0.286*          | (0.166)         | 0.292*          | (0.164)         | 0.275           | (0.171)         | 0.299***  | (0.110) | 0.303***  | (0.110) | 0.289***  | (0.109) |
| Hispanic                                                | 0.082           | (0.115)         | 0.078           | (0.114)         | 0.076           | (0.118)         | 0.222*    | (0.122) | 0.227*    | (0.122) | 0.214*    | (0.122) |
| Foreign born                                            | 0.046           | (0.123)         | 0.047           | (0.123)         | 0.055           | (0.125)         | 0.031     | (0.121) | 0.036     | (0.121) | 0.026     | (0.121) |
| Age: Ref = 55 and more                                  |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| 18 to 24                                                | 0.370*          | (0.192)         | 0.369*          | (0.190)         | 0.371*          | (0.190)         | 0.257*    | (0.149) | 0.261*    | (0.148) | 0.235     | (0.149) |
| 25 to 34                                                | 0.423***        | (0.113)         | 0.419***        | (0.112)         | 0.428***        | (0.114)         | 0.032     | (0.152) | 0.028     | (0.152) | 0.016     | (0.152) |
| 35 to 44                                                | 0.183*          | (0.109)         | 0.181*          | (0.110)         | 0.185*          | (0.111)         | 0.181     | (0.139) | 0.176     | (0.139) | 0.172     | (0.140) |
| 45 to 54                                                | 0.243**         | (0.097)         | 0.243**         | (0.097)         | 0.242**         | (0.098)         | 0.039     | (0.137) | 0.041     | (0.137) | 0.027     | (0.137) |
| Education: Ref = HS dropout                             |                 |                 |                 |                 |                 |                 |           |         |           |         |           |         |
| HS graduate                                             | -0.254*         | (0.144)         | -0.256*         | (0.143)         | -0.375**        | (0.174)         | -0.086    | (0.153) | -0.085    | (0.153) | -0.039    | (0.183) |
| Some college                                            | -0.162          | (0.141)         | -0.162          | (0.141)         | -0.215          | (0.158)         | -0.034    | (0.155) | -0.033    | (0.155) | -0.067    | (0.187) |
| Bachelor                                                | -0.229          | (0.154)         | -0.231          | (0.152)         | -0.415**        | (0.177)         | -0.122    | (0.169) | -0.121    | (0.169) | -0.044    | (0.205) |
| Postgraduate                                            | -0.064          | (0.155)         | -0.062          | (0.154)         | -0.113          | (0.177)         | -0.023    | (0.191) | -0.013    | (0.191) | -0.317    | (0.268) |
| HS graduate × Female                                    |                 |                 |                 |                 | 0.575           | (0.390)         |           |         |           |         | -0.158    | (0.331) |
| Some college × Female                                   |                 |                 |                 |                 | 0.334           | (0.391)         |           |         |           |         | 0.085     | (0.327) |
| Bachelor × Female                                       |                 |                 |                 |                 | 0.744**         | (0.376)         |           |         |           |         | -0.211    | (0.351) |
| Postgraduate × Female                                   |                 |                 |                 |                 | 0.356           | (0.388)         |           |         |           |         | 0.511     | (0.388) |
| Internet                                                | 0.269**         | (0.115)         | 0.271**         | (0.114)         | 0.270**         | (0.117)         | 0.167     | (0.105) | 0.172     | (0.106) | 0.172     | (0.105) |
| $\rho$                                                  | -0.787          | (0.295)         | -0.797          | (0.286)         | -0.765          | (0.323)         | 0.898***  | (0.045) | 0.897***  | (0.072) | 0.903***  | (0.036) |
| Constant                                                | -1.910***       | (0.194)         | -1.877***       | (0.194)         | -1.824***       | (0.209)         | -2.193*** | (0.200) | -2.255*** | (0.212) | -2.187*** | (0.219) |
| LL                                                      | -1590.619       |                 | -1597.96        |                 | -1593.325       |                 | -1121.722 |         | -1120.002 |         | -1115.762 |         |
| AIC                                                     | 3291.238        |                 | 3299.919        |                 | 3294.651        |                 | 2335.444  |         | 2344.004  |         | 2339.524  |         |
| N                                                       | 6,835           |                 | 6,835           |                 | 6,835           |                 | 4,278     |         | 4,278     |         | 4,278     |         |

Notes: Robust standard errors are in parentheses. LL stands for Log Likelihood, and AIC for Akaike's Information Criterion.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.19: Parameter estimates in Eq. (1) — subsamples: full-time and part-time

|                                                                           | Full-time            |                      |                      | Part-time           |                     |                    |
|---------------------------------------------------------------------------|----------------------|----------------------|----------------------|---------------------|---------------------|--------------------|
|                                                                           | Specification 1      | Specification 2      | Specification 5      | Specification 1     | Specification 2     | Specification 5    |
| Dependent variable:<br>1 = Staying in<br>0 = Going out (Entrepreneurship) |                      |                      |                      |                     |                     |                    |
| Female                                                                    | 0.231***<br>(0.061)  | 0.352**<br>(0.145)   | 0.733**<br>(0.295)   | 0.481***<br>(0.129) | 0.780***<br>(0.293) | 0.694<br>(0.432)   |
| Family                                                                    |                      |                      |                      |                     |                     |                    |
| Married                                                                   | 0.089<br>(0.065)     | 0.126<br>(0.078)     | 0.086<br>(0.064)     | 0.126<br>(0.140)    | 0.204<br>(0.196)    | 0.138<br>(0.139)   |
| Children under age 11                                                     | -0.024<br>(0.069)    | 0.029<br>(0.090)     | -0.029<br>(0.072)    | -0.110<br>(0.189)   | -0.483*<br>(0.263)  | -0.100<br>(0.192)  |
| Size                                                                      | -0.058**<br>(0.025)  | -0.057*<br>(0.033)   | -0.050*<br>(0.027)   | -0.007<br>(0.047)   | 0.065<br>(0.065)    | -0.013<br>(0.045)  |
| Married × Female                                                          |                      | -0.129<br>(0.128)    |                      |                     | -0.148<br>(0.261)   |                    |
| Children under age 11 × Female                                            |                      | -0.150<br>(0.139)    |                      |                     | 0.634*<br>(0.354)   |                    |
| Size × Female                                                             |                      | 0.005<br>(0.052)     |                      |                     | -0.135<br>(0.104)   |                    |
| Employment                                                                |                      |                      |                      |                     |                     |                    |
| Firm size: Ref = Firm size 100 to 999                                     |                      |                      |                      |                     |                     |                    |
| Firm size 99 or less                                                      | -0.040<br>(0.076)    | -0.051<br>(0.074)    | -0.043<br>(0.077)    | -0.163<br>(0.204)   | -0.173<br>(0.204)   | -0.162<br>(0.211)  |
| Firm size 1000 or more                                                    | 0.036<br>(0.080)     | 0.016<br>(0.075)     | 0.039<br>(0.080)     | -0.331<br>(0.206)   | -0.330<br>(0.208)   | -0.323<br>(0.218)  |
| Race: Ref = white                                                         |                      |                      |                      |                     |                     |                    |
| Black                                                                     | -0.458***<br>(0.087) | -0.461***<br>(0.083) | -0.462***<br>(0.086) | 0.314<br>(0.306)    | 0.334<br>(0.306)    | 0.307<br>(0.305)   |
| Hispanic                                                                  | -0.073<br>(0.107)    | -0.083<br>(0.108)    | -0.080<br>(0.104)    | 0.038<br>(0.215)    | 0.061<br>(0.209)    | 0.039<br>(0.211)   |
| Foreign born                                                              | 0.246**<br>(0.099)   | 0.250**<br>(0.099)   | 0.240**<br>(0.099)   | 0.135<br>(0.222)    | 0.158<br>(0.225)    | 0.130<br>(0.217)   |
| Age: Ref = 55 and more                                                    |                      |                      |                      |                     |                     |                    |
| 18 to 24                                                                  | -0.180<br>(0.139)    | -0.169<br>(0.139)    | -0.199<br>(0.137)    | 0.257<br>(0.230)    | 0.230<br>(0.230)    | 0.260<br>(0.232)   |
| 25 to 34                                                                  | -0.208*<br>(0.110)   | -0.205*<br>(0.108)   | -0.220**<br>(0.108)  | -0.266<br>(0.222)   | -0.283<br>(0.225)   | -0.267<br>(0.224)  |
| 35 to 44                                                                  | -0.265**<br>(0.106)  | -0.268**<br>(0.107)  | -0.285***<br>(0.102) | -0.013<br>(0.232)   | -0.020<br>(0.237)   | -0.020<br>(0.236)  |
| 45 to 54                                                                  | -0.177*<br>(0.101)   | -0.181*<br>(0.102)   | -0.203***<br>(0.100) | -0.225<br>(0.185)   | -0.202<br>(0.189)   | -0.230<br>(0.186)  |
| Education: Ref = HS dropout                                               |                      |                      |                      |                     |                     |                    |
| HS graduate                                                               | 0.391***<br>(0.130)  | 0.393***<br>(0.131)  | 0.535***<br>(0.150)  | 0.322<br>(0.240)    | 0.322<br>(0.238)    | 0.446<br>(0.307)   |
| Some college                                                              | 0.170<br>(0.126)     | 0.179<br>(0.127)     | 0.252*<br>(0.142)    | 0.059<br>(0.225)    | 0.038<br>(0.224)    | 0.112<br>(0.267)   |
| Bachelor                                                                  | 0.323**<br>(0.132)   | 0.338**<br>(0.132)   | 0.447***<br>(0.151)  | 0.186<br>(0.257)    | 0.174<br>(0.259)    | 0.121<br>(0.319)   |
| Postgraduate                                                              | 0.372***<br>(0.139)  | 0.393***<br>(0.139)  | 0.435***<br>(0.160)  | -0.007<br>(0.275)   | -0.045<br>(0.274)   | 0.163<br>(0.355)   |
| HS graduate × Female                                                      |                      |                      | -0.622*<br>(0.332)   |                     |                     | -0.345<br>(0.502)  |
| Some college × Female                                                     |                      |                      | -0.464<br>(0.309)    |                     |                     | -0.207<br>(0.464)  |
| Bachelor × Female                                                         |                      |                      | -0.571*<br>(0.316)   |                     |                     | 0.002<br>(0.510)   |
| Postgraduate × Female                                                     |                      |                      | -0.435<br>(0.341)    |                     |                     | -0.420<br>(0.529)  |
| Internet                                                                  | -0.422***<br>(0.099) | -0.444***<br>(0.101) | -0.425***<br>(0.103) | -0.103<br>(0.172)   | -0.090<br>(0.176)   | -0.101<br>(0.172)  |
| Non-metro area                                                            | 0.008<br>(0.050)     | 0.023<br>(0.050)     | 0.020<br>(0.062)     | -0.169<br>(0.137)   | -0.168<br>(0.137)   | -0.172<br>(0.140)  |
| Unemployment rate                                                         | -0.009<br>(0.027)    | -0.009<br>(0.026)    | -0.005<br>(0.033)    | 0.051<br>(0.102)    | 0.059<br>(0.105)    | 0.048<br>(0.117)   |
| Homestead exemption( $\times 10^{-1}$ )                                   | -0.002<br>(0.001)    | -0.002<br>(0.001)    | -0.002<br>(0.002)    | -0.001<br>(0.003)   | -0.001<br>(0.003)   | -0.001<br>(0.004)  |
| Median home value( $\times 10^{-1}$ )                                     | -0.004*<br>(0.002)   | -0.004*<br>(0.002)   | -0.004<br>(0.003)    | -0.010<br>(0.007)   | -0.009<br>(0.007)   | -0.010<br>(0.007)  |
| Maximum personal income tax rate( $\times 10^{-1}$ )                      | 0.000<br>(0.107)     | -0.002<br>(0.081)    | 0.073<br>(0.208)     | 0.049<br>(0.328)    | 0.003<br>(0.322)    | 0.053<br>(0.328)   |
| Maximum corporate income tax rate                                         | 0.011<br>(0.009)     | 0.013<br>(0.009)     | 0.012<br>(0.015)     | 0.006<br>(0.028)    | 0.010<br>(0.027)    | 0.006<br>(0.028)   |
| Sales tax rate                                                            | 0.021<br>(0.014)     | 0.022<br>(0.014)     | 0.033<br>(0.022)     | 0.027<br>(0.047)    | 0.027<br>(0.047)    | 0.026<br>(0.046)   |
| Constant                                                                  | 2.211***<br>(0.263)  | 2.166***<br>(0.264)  | 1.996***<br>(0.287)  | 1.556***<br>(0.592) | 1.369**<br>(0.645)  | 1.520**<br>(0.656) |
| <i>N</i>                                                                  | 9,331                | 9,331                | 9,331                | 1,782               | 1,782               | 1,782              |

Note: Robust standard errors are in parentheses.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 2.20: Parameter estimates in Eq. (2) — subsamples: full-time and part-time

|                                                         | Full-time              |                        |                      | Part-time            |                      |                      |
|---------------------------------------------------------|------------------------|------------------------|----------------------|----------------------|----------------------|----------------------|
|                                                         | Specification 1        | Specification 2        | Specification 5      | Specification 1      | Specification 2      | Specification 5      |
| Dependent variable:<br>1 = Intrapreneurship<br>0 = Else |                        |                        |                      |                      |                      |                      |
| Female                                                  | -0.345***<br>(0.046)   | -0.380***<br>(0.108)   | -0.791***<br>(0.258) | -0.243<br>(0.194)    | -0.415<br>(0.406)    | -0.207<br>(0.490)    |
| Family                                                  |                        |                        |                      |                      |                      |                      |
| Married                                                 | -0.088*<br>(0.050)     | -0.141**<br>(0.063)    | -0.094*<br>(0.055)   | -0.371***<br>(0.168) | -0.290<br>(0.276)    | -0.379**<br>(0.171)  |
| Children under age 11                                   | 0.053<br>(0.058)       | 0.060<br>(0.071)       | 0.064<br>(0.065)     | 0.071<br>(0.194)     | 0.143<br>(0.313)     | 0.061<br>(0.198)     |
| Size                                                    | 0.027<br>(0.019)       | 0.033<br>(0.023)       | 0.021<br>(0.025)     | 0.021<br>(0.052)     | -0.016<br>(0.077)    | 0.027<br>(0.048)     |
| Married × Female                                        |                        | 0.140<br>(0.100)       |                      |                      | -0.137<br>(0.349)    |                      |
| Children under age 11 × Female                          |                        | 0.010<br>(0.115)       |                      |                      | -0.113<br>(0.397)    |                      |
| Size × Female                                           |                        | -0.018<br>(0.040)      |                      |                      | 0.072<br>(0.103)     |                      |
| Employment                                              |                        |                        |                      |                      |                      |                      |
| Firm size: Ref = Firm size 100 to 999                   |                        |                        |                      |                      |                      |                      |
| Firm size 99 or less                                    | 0.033<br>(0.060)       | 0.033<br>(0.059)       | 0.027<br>(0.065)     | 0.308<br>(0.234)     | 0.309<br>(0.231)     | 0.331<br>(0.236)     |
| Firm size 1000 or more                                  | -0.016<br>(0.061)      | -0.015<br>(0.061)      | -0.011<br>(0.068)    | 0.028<br>(0.252)     | 0.036<br>(0.252)     | 0.026<br>(0.262)     |
| Race: Ref = white                                       |                        |                        |                      |                      |                      |                      |
| Black                                                   | 0.394***<br>(0.070)    | 0.400***<br>(0.070)    | 0.351***<br>(0.124)  | 0.347<br>(0.243)     | 0.328<br>(0.255)     | 0.333<br>(0.261)     |
| Hispanic                                                | 0.141*<br>(0.077)      | 0.143*<br>(0.077)      | 0.140*<br>(0.083)    | 0.323<br>(0.226)     | 0.318<br>(0.226)     | 0.341<br>(0.231)     |
| Foreign born                                            | -0.014<br>(0.070)      | -0.015<br>(0.070)      | 0.051<br>(0.159)     | -7.733***<br>(0.359) | -7.455***<br>(0.935) | -7.018***<br>(0.758) |
| Age: Ref = 55 and more                                  |                        |                        |                      |                      |                      |                      |
| 18 to 24                                                | 0.362***<br>(0.099)    | 0.347***<br>(0.100)    | 0.380***<br>(0.124)  | 0.546<br>(0.349)     | 0.552<br>(0.364)     | 0.644*<br>(0.365)    |
| 25 to 34                                                | 0.245***<br>(0.080)    | 0.237***<br>(0.081)    | 0.239***<br>(0.086)  | 0.617*<br>(0.353)    | 0.629*<br>(0.356)    | 0.720**<br>(0.356)   |
| 35 to 44                                                | 0.192**<br>(0.076)     | 0.185**<br>(0.077)     | 0.146<br>(0.120)     | 0.778**<br>(0.316)   | 0.768**<br>(0.334)   | 0.857***<br>(0.321)  |
| 45 to 54                                                | 0.162**<br>(0.071)     | 0.156**<br>(0.071)     | 0.140<br>(0.090)     | 0.598**<br>(0.289)   | 0.611**<br>(0.291)   | 0.685**<br>(0.291)   |
| Education: Ref = HS dropout                             |                        |                        |                      |                      |                      |                      |
| HS graduate                                             | -0.295***<br>(0.098)   | -0.295***<br>(0.098)   | -0.333*<br>(0.180)   | -0.122<br>(0.252)    | -0.129<br>(0.253)    | -0.166<br>(0.363)    |
| Some college                                            | -0.124<br>(0.098)      | -0.121<br>(0.098)      | -0.176<br>(0.129)    | -0.330<br>(0.260)    | -0.316<br>(0.254)    | -0.528<br>(0.363)    |
| Bachelor                                                | -0.225**<br>(0.100)    | -0.221**<br>(0.101)    | -0.345**<br>(0.149)  | -0.430<br>(0.336)    | -0.428<br>(0.333)    | 0.090<br>(0.410)     |
| Postgraduate                                            | -0.174<br>(0.107)      | -0.166<br>(0.107)      | -0.220<br>(0.186)    | 0.000<br>(0.326)     | 0.016<br>(0.321)     | 0.164<br>(0.461)     |
| HS graduate × Female                                    |                        |                        | 0.336<br>(0.353)     |                      | 0.076<br>(0.513)     | 0.164<br>(0.461)     |
| Some college × Female                                   |                        |                        | 0.314<br>(0.302)     |                      | 0.307<br>(0.522)     | 0.307<br>(0.522)     |
| Bachelor × Female                                       |                        |                        | 0.568**<br>(0.279)   |                      | -0.854***<br>(0.880) | -0.854***<br>(0.880) |
| Postgraduate × Female                                   |                        |                        | 0.452<br>(0.286)     |                      | -0.246<br>(0.633)    | -0.246<br>(0.633)    |
| Internet                                                | 0.344***<br>(0.072)    | 0.343***<br>(0.072)    | 0.317***<br>(0.117)  | 0.062<br>(0.210)     | 0.073<br>(0.211)     | 0.053<br>(0.213)     |
| $\rho$                                                  | -1.000<br>(1.21E - 06) | -1.000<br>(4.42E - 07) | -0.876<br>(0.374)    | -0.152<br>(0.900)    | -0.300<br>(0.834)    | -0.230<br>(1.284)    |
| Constant                                                | -1.822***<br>(0.127)   | -1.804***<br>(0.132)   | -1.765***<br>(0.212) | -2.382***<br>(0.427) | -2.286***<br>(0.528) | -2.492***<br>(0.555) |
| LL                                                      | -2327.373              | -2324.381              | -2322.413            | -384.79              | -382.6081            | -379.9356            |
| AIC                                                     | 4746.747               | 4752.761               | 4752.826             | 861.580              | 869.216              | 867.871              |
| N                                                       | 9,331                  | 9,331                  | 9,331                | 1,782                | 1,782                | 1,782                |

Notes: Robust standard errors are in parentheses. LL stands for Log Likelihood, and AIC for Akaike's Information Criterion.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Chapter 3

# Differences in Risk Tolerance and Asset Allocation among White, Black, and Hispanic Households in the United States

Takanori Hisada, *International Journal of Economics and Finance*

### 3.1 Introduction

This study examines differences in risk tolerance and asset allocation among race and ethnicity in the United States. The United States is a multiracial nation composed of various races and ethnicities, such as white, black, and Hispanic. However, the nation is predominantly comprised of whites, who represented 72 percent of the population of 308.7 million people in the 2010 census (Hixson *et al.*, 2011). In practice, wealth inequality arises between white and nonwhite. According to the 2010 Survey of Consumer Finances, whites have a rough mean net worth of \$680,000 relative to \$100,000 for blacks. As determinants of wealth inequality, Cagetti and Nardi (2008) explain that income, taxation, inheritance, human capital, and portfolio choice affect wealth inequality. As people are more anxious about social security, it is expected to increase opportunities for asset allocation. Moreover, shifting from a defined benefit plan to a defined contribution plan is important

for individuals to make asset allocation at their own discretion. Eventually, asset allocation affects future wealth. Thus, it is important to investigate whether differences among race and ethnicity affect risk tolerance and asset allocation and cause wealth inequality.

Several prior studies have analyzed differences in risk tolerance and asset allocation among race and ethnicity. With regard to risk tolerance, whites are more likely to take risk than are blacks and Hispanics (Sung and Hanna, 1996). Regarding asset allocation, whites are more likely to hold risky assets than are blacks and Hispanics (Hanna *et al.*, 2010). Furthermore, Keister (2000) suggests that wealth inequality is caused because whites are more likely to have risky assets than are blacks. Hispanics are less likely to take risks and to hold risky assets, such as stock, since wealth inequality arises between them (Coleman, 2003).

Compared with prior studies, the contribution of this study is two-fold. First, this study uses a novel analysis method. Prior studies use mainly simple regression methods, such as logit models, to investigate whether differences of race and ethnicity influence risk tolerance and asset allocation. Variables that influence risk tolerance and asset allocation, such as income and education, are added as covariates and as a result, the prior literature suggests that differences of race and ethnicity influence risk tolerance and asset allocation. However, characteristics differ substantially by race and ethnicity, especially between whites and nonwhites. For example, whites have high average income and education relative to nonwhites. In particular, households who have more than \$100 million tend to be white. Cochran (1965) and Rubin (2001) suggest that regression analysis cannot reliably control differences in covariates when there are substantial differences in the distribution of covariates in the groups. Prior studies have analyzed the influence of the differences among race and ethnicity with the whole sample composed of a high average income and education group and a low average income and education group, and have found that the coefficients of race and ethnicity are statistically significant and that racial differences influence risk tolerance and asset allocation. However, those results may have low reliability. On the contrary, this study conducts analysis using a method that regresses after the sample of similar characteristics among race and ethnicity is chosen by propensity score matching (PSM). If the coefficients of race and ethnicity show statistically significant differences even with a sample of similar characteristics, there is reliability of results that show differences of race and ethnicity influence risk tolerance and asset allocation. In fact, combining regression and matching substantially reduces bias (Rubin, 1973, 1979; Rubin and Thomas, 2000; Glazerman *et al.*, 2003; Abadie and Imbens,

2011).

The second contribution of this study is that it investigates not only risky assets but also assets with various levels of risk and whether a particular race or ethnicity is more likely to hold a particular asset. Prior studies mainly have focused on risky assets only, such as stock. In traditional portfolio decisions based on the expected utility model, risk-averse investors invest in risky assets as long as the expected return is higher than the risk-free rate (Arrow, 1971). Haliassos and Bertaut (1995) indicate that stocks show historically higher returns than the risk-free rate and that households in the United States should have held more stocks, but that around 75 percent of households have not held stocks. However, investigating only risky assets does not reveal whether a particular race or ethnicity is more likely to hold a particular asset.

The analysis results are as follows. Differing from the prior studies, the PSM analysis results imply that white, black, and Hispanic households are more likely to have risk tolerance at a similar level, and that differences among race and ethnicity do not affect risk tolerance. Regarding whether to own assets, although the results with PSM indicate that black and Hispanic households are less likely to own almost all assets than are white households, they also indicate that black households are more likely to own some assets, such as US government savings bonds and real estate, at similar levels to white households. At the same time, black and Hispanic households are more likely to own almost all assets at similar levels. In addition, this study finds that a particular race and ethnicity is less likely to own a particular asset. In particular, black households are substantially less likely to own transaction accounts. Hispanic households are less likely to own US government savings bonds. These results suggest that differences in race and ethnicity affect whether to own assets. However, regarding asset allocation, PSM shows that white and black households have similar asset allocation while white and Hispanic households have similar asset allocation except for transaction accounts. Hispanic households have higher asset allocation share in transaction accounts than white households. At the same time, the results indicate that Hispanic and black households have similar asset allocation. These results suggest that white, black, and Hispanic households have similar asset allocation and that differences by race and ethnicity do not necessarily influence asset allocation.

As described above, in practice, there is wealth inequality between whites and nonwhites. Prior studies suggest that the reason that wealth inequality arises between whites and nonwhites is that nonwhite households are less likely to take risk and to hold risky assets than are white households. How-

ever, white, black, and Hispanic households take risk at a similar level and have similar asset allocation. Differences among race and ethnicity do not necessarily influence risk tolerance and asset allocation. Therefore, these results imply that wealth inequality between whites and nonwhites is not attributed to asset allocation.

The organization of the rest of this paper is as follows. The next section conducts a literature review of culture and behavior, risk tolerance, and asset allocation. In Section 3, hypotheses are provided. Section 4 describes the data, characteristics among race and ethnicity, and provides the analysis methods of this study. Section 5 reports and interprets the empirical results. Section 6 concludes.

## **3.2 Literature Review**

### **3.2.1 Culture and Behavior**

Ogden *et al.* (2004) explain that culture influences consumer perceptions and behavior. Moreover, differences in culture between not only a home country and a foreign country but also subcultures of domestic races and ethnicity influence behavior. Valencia (1989) focuses on whites and Hispanics and finds statistically significant differences in consumer behavior between them. This arises from differences not in income and education variables but in cultural values. By contrast, Rokeach and Parker (1970) investigate differences in values between whites and blacks. They indicate that differences in values between whites and blacks disappear or shrink when income and education are controlled. They conclude that behavioral differences are caused by differences in social position rather than race.

### **3.2.2 Risk Tolerance**

Sung and Hanna (1996) analyze various factors to risk tolerance. As individuals acquire higher education, they are more likely to take risk. White respondents are more likely to take risk than are nonwhite respondents. Income increases expected for investment gain positively affect risk tolerance. Individuals who are 30 years or more away from retirement are more likely to take risk than are other people. Single women are less likely to take risk than are single men or couples. Households comprising five people or more are not less likely to take risk than are other households. Yao *et al.* (2005) focus on differences in race and ethnicity among white, black, and Hispanic households and investigate differences in risk tolerance. They review prior

studies and report that white households are more likely to take risk than are nonwhite households regardless of risk measure. Furthermore, they themselves analyze risk tolerance, and find that white households are more likely to take risk than are black households, and that black households are more likely to take risk than are Hispanic households. However, white households are not more likely to take substantial risk than are nonwhite households. Yao *et al.* (2011) obtain the same results. Coleman (2003) shows that white households are more likely to take risks than are black and Hispanic households but the coefficient of black households is no longer statistically significant compared to white households when net worth is controlled. By contrast, the coefficient of Hispanic households is still negatively statistically significant compared to white households even when net worth is controlled. She emphasizes the necessity of net worth in an analysis.

### 3.2.3 Risky Assets Choice

Gutter *et al.* (1999) define stock and business asset as risky assets. They indicate that black households are less likely to choose risky assets than are white households. They conclude that racial differences in decision making for risky assets may be caused by the number of children and household size. As for black households, on the one hand, the presence of a child increases the likelihood of owning risky assets. On the other hand, the number of households decreases the likelihood of owning risky assets. Wang and Hanna (1997) report that older people are more likely to choose risky assets, white households are more likely to choose risky assets than are black households, and Hispanic households are more likely to choose risky assets than are black households. Zhong and Xiao (1995) show that people with higher education are more likely to hold stocks and bonds, and white households are more likely to hold stocks and bonds than are nonwhite households when income and other variables are controlled. In addition, older people and those with higher income are more likely to hold stocks. Haliassos and Bertaut (1995) indicate that nonwhite households are less likely to choose stocks than are white households, although gender and marital status do not influence the likelihood of owning stock when controlling all other variables. Campbell (2006) indicates that white households are more likely to own private businesses than are nonwhite households and that white households have higher portfolio shares of stocks than do nonwhite households. Gutter and Fontes (2006) use the Heckman two-step estimator and find that black households are less likely to choose risky assets than are white households, but there is little evidence of racial differences in the ratio of net worth invested in

risky assets when selection bias is controlled. Hanna *et al.* (2010) show that black and Hispanic households are less likely to choose risky assets than are white households even when education and other variables are controlled. However, Blinder–Oaxaca decomposition analysis shows that if black households have the average characteristics of white households, then black and white households have the same risky assets level. At the same time, if Hispanic households have the average characteristics of white households, then the difference between Hispanic and white households is much smaller. However, Barsky *et al.* (2002) indicate that the use of Blinder–Oaxaca decomposition analysis is misleading for the estimation results in regarding the gap between races. Straight (2002) analyzes differences in asset allocation between white and black households. He divides white and black households into low (high) income and education groups and calculates the median of assets. He finds that differences in asset allocation between white and black households are much smaller than the median of assets calculated before white and black households are divided.

### 3.2.4 Wealth Inequality and Asset Allocation

Wealth inequality between white and black has been reported for a long time (Terrell, 1971). Badu *et al.* (1999) investigate assets and debts between white and black households. They suggest black households have less net worth than white households in the long run because black households are less likely to take risk and to hold risky assets. Keister (2000) analyzes the relationship between wealth inequality and asset ownership among white and black households. She reports that white households are more likely to hold risky assets than are black households, and therefore, the net wealth of white households is likely to increase faster than that of black households. This causes wealth inequality between them. In the relationship between risk tolerance and investment behavior, Coleman (2003) reports that Hispanic households are less likely to take risks and choose risky assets than are white households, and so, there exists wealth inequality between them. Choudhury (2001) indicates that the net worth of white households is larger than that of black and Hispanic households and a wealth gap arises from differences in asset ownership by race and ethnicity. In particular, nonwhite households are less likely to own risky and high-yield assets than are white households. Altonji and Doraszelski (2005) report that the wealth of whites is accumulated more rapidly than that of blacks and this is caused by differences in savings behavior and rates of return on assets rather than donations and inheritance.

### 3.3 Hypotheses

Although the United State is a multiracial nation, it is difficult to amalgamate its racial and ethnic original cultures and identities, which appear as racial and ethnic original behavior and characteristics (Yinger, 1985). Kara and Kara (1996) indicate that cultural differences are processed in consumption motivation and choice criterion, which influence consumption behavior. With respect to investment behavior, Yao *et al.* (2005) report that differences in culture among race and ethnicity affect investment because there are different perceptions that arise from differences in culture among race and ethnicity. Therefore, it can be said that culture is important for preference and influences risk tolerance and asset allocation. In addition, Ogden *et al.* (2004) indicate that cultural values influence preference according to acculturation level and change in cultural values. Kara and Kara (1996) report that choice behavior differs according to acculturation level. Thus, it can be said that not only differences in culture but also the acculturation level to culture and cultural values influence risk tolerance and asset allocation. As for black people, although most black Americans are of African origin, their degree of acculturation to American culture is high and most have lost African culture. Therefore, black and white people have similar cultural values (Valencia, 1989). From the above, this study proposes the following hypothesis.

**Hypothesis 1:** Black respondents are more likely to have risk tolerance at a similar level to that of white respondents.

As described earlier in this section, black people have similar cultural values and behavior to white people. Thus, the following hypothesis is proposed.

**Hypothesis 2:** Black respondents are more likely to hold a similar share of asset allocation in each asset to white respondents.

Turning to Hispanic people, most Hispanic Americans are immigrants who have preserved much of their culture, language, and traditions in the United States. Moreover, Hispanic culture is constantly reinforced by new immigrants from Latin America (Valencia, 1989). In practice, the population of Hispanic Americans in 2010 increased about 43 percent compared with that of 2000 (Ennis *et al.*, 2011). Because their degree of acculturation to American culture is low, cultural values differ between Hispanics and whites (Valencia, 1989). Therefore, Hispanic people do not have similar

levels of risk tolerance to white people. In addition, Hispanic Americans, especially men, have strongly masculine orientation and behavior (Casas *et al.*, 1994). In other words, risk-averse behavior, that is, low risk tolerance behavior, signals weakness to individuals (Yao *et al.*, 2005). Thus, this study proposes the following hypothesis.

**Hypothesis 3:** Hispanic respondents are more likely to have higher risk tolerance than are white respondents.

As described earlier in this section, Hispanic culture values and behavior differ to white cultural values and behavior. At the same time, Hispanic people are oriented towards the present, which they regard as more important than the future (Okun *et al.*, 1998). In other words, Hispanic people have high time preference. For these reasons, this study proposes the following hypothesis.

**Hypothesis 4:** Hispanic respondents are more likely to hold lower shares of asset allocation in each asset than are white respondents.

## 3.4 Data and Methods

### 3.4.1 Data

This study uses datasets of the 2010 Survey of Consumer Finances (SCF). The SCF has been conducted every 3 years by the Federal Reserve Board in cooperation with the Internal Revenue Service since 1983. The SCF is intended to provide various information of financial characteristics of households in the United States. Detailed data collected include assets, such as transaction account, stock, and liabilities, such as credit cards and loans. Other information has been collected on employment, inheritance and so on. As another feature, the SCF is composed of both an area-probability sample and a special sample derived from tax data. Thus, the SCF oversamples households with unusual characteristics, such as high-income households (Kennickell *et al.*, 1996). The SCF asks respondent to choose seven race or ethnic categories that they feel best describes them. In the public datasets, seven categories are integrated into four categories of white, black, Hispanic, and other. This study chooses whites blacks, and Hispanics as the analysis targets.

The SCF has publicly provided five complete datasets with replicated datasets and processed missing data since 1992 instead of a survey dataset.

The multiple imputation method suggested by Rubin (1987) is used in processing technology of incomplete data. The multiple imputation method uses stochastic multivariate methods to replace each missing value with two or more values obtained to simulate the sampling distribution of the missing values (Montalto and Sung, 1996). Regression analysis needs to be considered using multiple imputation. In addition to multiple imputations, the descriptive statistics need to take account of nonresponse-adjusted sampling weights and replication weights.

### 3.4.2 Characteristics among Race and Ethnicity

As described in Section 1, characteristics differ among race and ethnicity. Prior studies mainly use regression analysis and control characteristics, such as income and education, in order to investigate whether racial and ethnic differences influence risk tolerance and asset allocation. Prior studies indicate that differences among race and ethnicity influence risk tolerance and asset allocation.

Figure 1 shows a scatter plot of current income and years of schooling by white, black, and Hispanic respondents. Some Hispanic respondents have lower education and income than some whites. At the same time, some white respondents have much higher income than do some Hispanic respondents. Income and education level are an example of characteristics among race and ethnicity. There are racial and ethnic differences in various characteristics, such as age and employment status. Table 3.1 shows the unweighted descriptive statistics.<sup>1</sup> For example, there are 14.22 mean years of schooling of white respondents in a 95 percent confidence interval range from 14.15 to 14.29. Meanwhile, there are 11.48 mean years of schooling of Hispanic respondents in a 95 percent confidence interval range from 11.18 to 11.78. This indicates that the lower bound of the confidence interval of white respondents does not cover the upper bound of confidence interval of Hispanic respondents. The white group has relatively higher average education and the Hispanic group has relatively lower average education. As for whites and blacks, the mean age of the white group is 52.69 years in a 95 percent confidence interval range from 52.24 to 53.15. At the same time, the mean age of the black group is 46.65 years in 95 percent confidence

---

<sup>1</sup>Note that here, descriptive statistics are unweighted. Like prior studies, regression analyses are not considered on weights because Montalto and Sung (1996) indicate that weighted regression will not correct the standard errors for the complex sampling design in the SCF. The weighted descriptive statistics in Table A.1 of Appendix A may not be consistent with the descriptive statistics in Table 3.1.

interval range from 45.60 to 47.69. This shows that the lower bound of the confidence interval of the white group does not overlap the upper bound of the confidence interval of the black group. The white group is relatively older than the black group. In addition, the lower bound of the confidence interval of the white group does not overlap the upper bound of the confidence interval of the black or Hispanic group in income, net worth, employment status, and health status.

Cochran (1965) and Rubin (2001) report that regression analysis cannot reliably control differences in covariates when there are substantial differences in the distribution of these covariates in the groups. However, prior studies performed simple regression by using the entire sample without considering substantial differences in the distribution of covariates among race and ethnicity. This study improves prior study methods.

### 3.4.3 Sample Construction

This study uses two methods. Method A is the same method as prior studies and Method B is an improvement on the previous method. The results of Method A are compared with those of Method B.

Method A performs regression by using the whole sample. The sample size of Method A is 6,188 people and is composed of 4,759 white people, 790 black people, and 639 Hispanic people. Meanwhile, Method B analyzes by the method of regressing after the sample of similar characteristics is chosen by matching instead of merely regressing using the whole sample. In practice, combining regression and matching substantially reduce bias (Rubin, 1973, 1979; Rubin and Thomas, 2000; Glazer *et al.*, 2003; Abadie and Imbens, 2011). The results of Method B have higher reliability than those of Method A. This study uses PSM proposed by Rosenbaum and Rubin (1983). The propensity score,  $e(\mathbf{x}_i)$ , is defined as the conditional probability that the  $i$ -th unit is assigned to a particular treatment given the covariates,  $\mathbf{x}_i$ .

$$e(\mathbf{x}_i) = pr(z_i = 1 | \mathbf{x}_i) \quad (3.1)$$

where  $z_i$  is the indicator that denotes whether  $z_i = 1$  or  $z_i = 0$  according to whether unit  $i$  is assigned to the treatment or the control, respectively.

The treatment group comprises, for example, individuals who participate in training programs (Dehejia and Wahba, 1999), black individuals (Barsky *et al.*, 2002), or African American mothers (Hill and Reiter, 2006). This study chooses the Hispanic group, which has the smallest sample size in the dataset, as the treatment group; thus, white and black groups have larger sample sizes than the Hispanic group as the control group. At the

same time, the matching method is one-to-one nearest neighbor matching with calipers and replacement. The caliper allows the choice of only pairs of specified distance (value) or less and guarantees common support.<sup>2</sup> Rosenbaum and Rubin (1985) suggest that a quarter of standard deviation of propensity score is chosen as the caliper size. The caliper size of Method B is calculated as 0.032. Matching with replacement allows the controls to be used once or more. Compared to matching without replacement, matching with replacement reduces bias (Dehejia and Wahba, 2002; Smith and Todd, 2005). A sample that is not chosen as a pair is excluded and the sample size decreases. Eventually, the sample size in Method B is 1,391 people and is composed of 450 white people, 334 black people, and 607 Hispanic people.

Figure 2 shows a histogram of estimated propensity score before and after matching.<sup>3</sup> The propensity score of the white group before matching is concentrated from 0 to 0.1 and hardly appears at 0.4 or more. At the same time, the propensity score of the black group before matching is concentrated from 0 to 0.1 but not as much as the white group and scarcely appears at 0.5 or more. This suggests that the distributions of the propensity score substantially differ among the white, black, and Hispanic groups. After matching, the distributions of the propensity score become similar among white, black, and Hispanic groups.

#### 3.4.4 Risk Tolerance

The SCF includes a multiple-choice question about risk tolerance as follows.

“Which of the following statements on this page comes closest to describing the amount of financial risk that you (and your {husband/wife/partner}) are willing to take when you save or make investments?”

1. “Take substantial financial risks expecting to earn substantial returns”
2. “Take above average financial risks expecting to earn above average returns”

---

<sup>2</sup>The common support is to overlap the distribution of propensity score in the groups.

<sup>3</sup>The propensity score is estimated by a logit model with variables of gender, age, years of schooling, marital status, family size, number of children, employment status, risk tolerance, expectations of US economy over the next 5 years, health status, log usual income, and log net worth. A constant value is added to income and net worth before taking logs to avoid the issue with non-positive values.

3. “Take average financial risks expecting to earn average returns”
4. “Not willing to take any financial risks”

This study uses an ordered logit model to analyze differences in risk tolerance by race and ethnicity because risk tolerance is the ordinal variable.<sup>4</sup>

$$y_i = \alpha_0 + \alpha_1 \text{race/ethnicity}_i + \mathbf{x}_i' \boldsymbol{\alpha} + u_i \quad (3.2)$$

where  $y_i$  denotes risk tolerance from 1 to 4 and  $\text{race/ethnicity}_i$  is a dummy variable that denotes individual  $i$ 's race or ethnicity.  $\mathbf{x}_i$  and  $u_i$  denote covariates and error terms.

### 3.4.5 Asset Allocation

Prior studies mainly analyze risky assets. Investigating only risky assets does not reveal whether a particular asset tended to be held among a particular race or ethnicity. The various risk-class assets allow us to establish whether a particular race or ethnicity is more (or less) likely to hold a particular asset. This study defines total assets as the following three risk classes: stock, business equity, and real estate chosen as high-risk and high-return assets, mutual funds are chosen as medium-risk and medium-return assets, and US government savings bonds and transaction accounts are chosen as low-risk and low-return assets.

This study uses the two-step estimator suggested by Heckman (1979) since asset allocation analysis consists of two steps.<sup>5</sup> The first step is that individuals decide whether to own an asset (e.g., stock).

$$y_{1i} = \beta_0 + \beta_1 \text{race/ethnicity}_i + \mathbf{x}_{1i}' \boldsymbol{\beta} + u_{1i} \quad (3.3)$$

where  $y_{1i}$  denotes choice of an asset and  $\text{race/ethnicity}_i$  is a dummy variable that denotes individual  $i$ 's race or ethnicity.  $\mathbf{x}_{1i}$  and  $u_{1i}$  denote covariates

---

<sup>4</sup>This study changes the order of risk tolerance in the SCF to facilitate the interpretation, that is, there is a change from 1 to 4 in “take substantial financial risks expecting to earn substantial returns,” a change from 2 to 3 in “take above average financial risks expecting to earn above average returns,” a change from 3 to 2 in “take average financial risks expecting to earn average returns,” and a change from 4 to 1 in “not willing to take any financial risks.” In addition, a constant value is added to income and net worth before taking logs to avoid the issue with non-positive values.

<sup>5</sup>Like Campbell (2006), this study controls log income, squared log income, log net worth, and squared log net worth. A constant value is added to income and net worth before taking logs to avoid the issue with non-positive values.

and error terms. In the second step, if individuals decide to own an asset,  $y_{i1} = 1$ , and they decide a proportion of an asset to the total assets.

$$y_{2i} = \gamma_0 + \gamma_1 race/ethnicity_i + \mathbf{x}_{2i}'\boldsymbol{\gamma} + u_{2i} \quad (3.4)$$

where  $y_{2i}$  donates the proportion of an asset to total assets.  $\mathbf{x}_{2i}$  and  $u_{2i}$  indicates the covariates and error terms. Note that  $\mathbf{x}_{2i}$  are included in  $\mathbf{x}_{1i}$  due to the exclusion restriction. This study assumes that  $(u_{1i}, u_{2i})$  are normal distribution with mean  $(0, 0)$ , variance  $(\sigma_1^2, 1)$ , and covariance  $(\rho\sigma_1, \rho\sigma_1)$ .

### 3.5 Estimation Results

#### 3.5.1 Risk tolerance

Table 3.2 reports the proportions of risk tolerance among white, black, and Hispanic groups. For “not willing to take any financial risks,” 43.3% of white, 56.8% of black, and 65.0% of Hispanic respondents chose this response. These results show a statistically significant difference among them, which suggests that black and Hispanic respondents are more likely to have low risk tolerance than are white respondents, and Hispanic respondents are more likely to have low risk tolerance than are black respondents. However, the results do not control covariates, such as income.

Table 3.3 shows the estimation results of an ordered logit model. Method A shows that the coefficients of the black and Hispanic groups are significantly negative. This implies that black and Hispanic respondents are more likely to have low risk tolerance than are white respondents. In addition, this study investigates the relationship between black and Hispanic groups by changing the reference from the white group to the black group (not reported in the tables to save space). The coefficient of the Hispanic group is significantly negative. This suggests that Hispanic respondents are more likely to have low risk tolerance than are black respondents. These results are consistent with Yao *et al.* (2005). By contrast, Method B shows that the coefficients of the black and Hispanic groups are no longer significant. When the reference is changed from the white group to the black group, the coefficient of the Hispanic group is no longer significant (not reported in the tables). This implies that white, black, and Hispanic respondents are more likely to have risk tolerance at the same level and that differences among white, black, and Hispanic respondents do not influence risk tolerance. Although these results are not consistent with prior studies, recall that the estimate results of Method B have higher reliability. Therefore, the results

of Method B support Hypothesis 1, that black respondents are more likely to have risk tolerance at a similar level to white respondents. Meanwhile, the results of Method B reject Hypothesis 3, that Hispanic respondents are more likely to have higher risk tolerance than are white respondents.

### 3.5.2 Asset Allocation

Tables 3.4–3.6 show the estimation results of the first step. This study focuses on assets that have different results in Methods A and B. The result of stock in Method A shows that the coefficients of the black and Hispanic groups are negatively statistically significant. When the reference is changed from the white group to the black group, the coefficient of the Hispanic group shows no statistically significant difference (not reported in the tables). This implies that black and Hispanic households are less likely to own stocks than are white households and that Hispanic and black households more likely to own stocks at the same level. These results are consistent with prior studies. By contrast, Method B shows that the coefficient of the black group is no longer a statistically significant difference. This result is not consistent with Method A. The coefficient of the Hispanic group is still negatively statistically significant. When the reference is changed to the black group, the coefficient of the Hispanic group is not statistically significantly different (not reported in the tables). This suggests that black and white households are more likely to own stocks at the same level and that Hispanic households are less likely to own stocks than are white households.

Turning to real estate in Method A, the coefficient of the black group is not a statistically significant difference. The coefficient of the Hispanic group is negatively statistically significant. When the reference is changed to the black group, the coefficient of the Hispanic group is negatively statistically significant (not reported in the tables). This suggests that white and black households are more likely to own real estate at the same level and that Hispanic households are less likely to own real estate than are white and black households. Meanwhile, in Method B, the coefficients of the black and Hispanic groups are not statistically significant differences. Moreover, when the reference is changed to the black group, the coefficient of the Hispanic group is not a statistically significant difference (not reported in the tables). This implies that white, black, and Hispanic households are more likely to own real estate at the same level.

Choudhury (2001) reports that nonwhites are less likely to own particularly risky and high-yield assets. Moreover, Keister (2000) suggests that inequality between white and black households is caused so that black house-

holds are less likely to own risky assets, such as stocks. At least, this study shows that white and black households are more likely to own stocks at the same level and that white, black, and Hispanic households are more likely to own real estate at the same level. Prior studies may not be able to control differences in covariates reliably in order to regress using the whole sample.

Turning to US government saving bonds (US bonds), in Method A, the coefficients of the black and Hispanic groups are negatively statistically significant. When the reference is changed to the black group, the coefficient of the Hispanic group is negatively statistically significant (not reported in the tables). These results suggest that black and Hispanic households are less likely to own US bonds than are white households and that Hispanic households are less likely to own US bonds than are black households. In Method B, the coefficient of the black group is no longer a statistically significant difference. This result is not consistent with Method A. The coefficient of the Hispanic group is still negatively statistically significant. When the reference is changed to the black group, the coefficient of the Hispanic group is negatively statistically significant (not reported in the tables). These results imply that white and black households are more likely to own US bonds at the same level and that Hispanic households are less likely to own US bonds than are black households.

Overall, Method B shows that black households are more likely to own high-risk high-return assets and low-risk low-return assets at the same level as white households. More precisely, black households are more likely to own three out of the six assets at the same level as white households. On the other hand, overall, Method B indicates that Hispanic households are less likely to own three risk classes. Hispanic households are less likely than white households to own five out of the six assets. At the same time, Hispanic households are more likely to own assets at the same level as black households except for US bonds and transaction accounts. This implies that differences in race and ethnicity affect whether to own assets.

In addition, this study investigates whether a particular asset is more likely to be owned by a particular race or ethnicity. Figure 3 reports race and ethnicity effects by average marginal effects of each asset in Method B. Transaction accounts are notably less chosen by black households: there are much less likelihood of owning transaction accounts by black households than the other assets. For Hispanic households, US bonds are a notably less chosen asset: Hispanic households are less likelihood of owning US bonds than the other assets. Transaction accounts and US bonds are low-risk low-return assets but there are different results for black and Hispanic households. These tendencies cannot be revealed by only stocks. Only when assets with

various risks are investigated will a particular race and ethnicity be revealed as more likely to own a particular asset.

Tables 3.7–3.9 indicate the estimation results of the second step. Following the first step, this study considers stocks, real estate, and US bonds. The stock results in Method A show that the coefficients of black and Hispanic groups are not statistically significant differences. When the reference is changed from the white group to the black group, the coefficient of the Hispanic group is not a statistically significant difference (not reported in the tables). This suggests that white, black, and Hispanic households have the same asset allocation shares in stocks. The results of Method B show the same results as Method A. In other words, white, black, and Hispanic households have the same asset allocation shares in stocks. This result is consistent with white and black households having similar asset allocation shares in risky assets, such as stocks and business equity (Gutter and Fontes, 2006).

Turning to real estate, in Method A, the coefficient of the black group is positively statistically significant. The coefficient of the Hispanic group is not a statistically significant difference. When the reference is changed to the black group, the coefficient of the Hispanic group is not a statistically significant difference (not reported in the tables). This implies that black households have a higher asset allocation share in real estate than white households and that Hispanic households have the same asset allocation share as do black and white households, that is, Hispanic households have a share between those of black and white households. In Method B, the coefficients of the black and Hispanic groups are not statistically significant differences. This result is inconsistent with Method A. When the reference is changed to the black group, the coefficient of the Hispanic group is not a statistically significant difference (not reported in the tables). This suggests that white, black, and Hispanic households have the same asset allocation shares in real estate.

Now, turning to US bonds, in Method A, the coefficient of the black group is positively statistically significant. The coefficient of the Hispanic group is not a statistically significant difference. When the reference is changed to the black group, the coefficient of the Hispanic group is not a statistically significant difference (not reported in the tables). This suggests that black households have a higher asset allocation share in US bonds than do white households, and Hispanic households have the same allocation share as black and white households, that is, Hispanic households have a share between black and white households. In Method B, the coefficients of the black and Hispanic households are not statistically significant differences.

This result is inconsistent with Method A. When the reference is changed to the black group, the coefficient of the Hispanic group is not statistically significantly different (not reported in the tables). This suggests that white, black, and Hispanic households have the same asset allocation shares in US bonds.

In summary, Method A shows that black households have higher asset allocation shares in transaction accounts and US bonds, which are low-risk low-return assets, and real estate, which is a high-risk high return asset. In addition, black households have lower asset allocation shares in mutual funds, which are medium-risk medium-return assets. However, Method B indicates that black and white households have similar asset allocation shares in high-risk high-return assets, medium-risk medium-return assets and low-risk low-return assets. In other words, black households do not have higher or lower asset allocation shares in a particular asset class and have the same asset allocation share in all asset classes as white households. Recall that Method B has higher reliability than Method A. Method A may not be able to control differences in covariates reliably in order to regress using the whole sample. Therefore, Hypothesis 2, that black households are more likely to hold similar asset allocation shares in each asset compared to white households, is supported. By contrast, both Methods A and B show that Hispanic and white households have the same asset allocation shares in high-risk high- return assets, medium-risk medium-return assets, and low-risk low-return assets. In detail, Hispanic and white households have the same allocation shares in all assets except for transaction accounts. There is a higher portfolio share in transaction accounts of Hispanic households compared to white households. Hence, Hypothesis 4, that Hispanic households are more likely to hold lower asset allocation shares in each asset than white households, is rejected. In addition, black and Hispanic households have the same portfolio shares in all assets. These results imply that white, black, and Hispanic households have similar asset allocation and that differences by race and ethnicity do not necessarily influence asset allocation.

### 3.5.3 Robustness Check

As a robustness check, Method C conducts two-to-one nearest neighbor matching with calipers and replacement. This matching method is to choose the nearest two controls to one treatment, which analyzes with a larger sample size than Method B. Method C has 1,928 people and is composed of 805 white people, 516 black people, and 607 Hispanic people. Overall, the estimate results are similar to those using the one-to-one matching method.

Table 3.10 shows the estimation results of risk tolerance. These results are similar to Table 3.3 and suggest that white, black, and Hispanic respondents are more likely to take risk at the same level and that racial and ethnic differences do not affect risk tolerance. Tables 3.11 and 3.12 report the estimate of asset allocation of the first step. Although the coefficient of the black group in stock has negatively statistical significance, the other results are similar to Tables 3.4–3.6. These results again imply that differences in race and ethnicity influence whether to own assets. Tables 3.13 and 3.14 show the estimation results of asset allocation of the second step. These results again suggest that white, black, and Hispanic households hold similar asset allocation and that differences by race and ethnicity do not necessarily influence asset allocation.

### 3.6 Conclusion

This study investigates differences in risk tolerance and asset allocation among white, black, and Hispanic households in the United States. This study uses a novel method that combines regression with matching because there are substantial differences in the distributions of covariates among the white, black, and Hispanic groups.

Overall, the estimation results with PSM are different from those of prior studies. First, PSM shows that white, black, and Hispanic respondents are more likely to a similar level of risk whereas prior studies show that nonwhite respondents are less likely to take risks than are white respondents. Second, although PSM indicates that black and Hispanic households are less likely to own almost all assets than white households, it also indicates that black households are more likely to own some assets, such as US bonds and real estate, at a similar level to white households. Prior studies may not be able to control differences in covariates reliably in order to regress using the whole sample.

This study analyze six assets with various risk in order to investigate whether a particular asset is more (or less) likely to be held by a particular race or ethnicity. This study finds that a particular race or ethnicity is less likely to own a particular asset. Black households are much less likely to own transaction accounts and Hispanic households are much less likely to own US bonds. These findings suggest that differences in race and ethnicity affect whether to own assets.

However, as for asset allocation, the results with PSM show that white and black households have similar levels of asset allocation, while, white

and Hispanic households have similar levels of asset allocation except for transaction accounts. Hispanic households have higher asset allocation share in transaction accounts than white households. At the same time, the results indicate that Hispanic and black households have the same level of asset allocation. These results suggest that white, black, and Hispanic households have similar asset allocation and that differences by race and ethnicity do not necessarily influence asset allocation.

In practice, there is wealth inequality between white and nonwhite households. Prior studies suggest that the reason wealth inequality arises between white and nonwhite households is that nonwhite households are less likely than white households to take risks and hold risky assets. However, white, black, and Hispanic households are more likely to take risks at a similar level and hold similar asset allocation. Differences by race and ethnicity do not necessarily influence risk tolerance and asset allocation. Therefore, this suggests that wealth inequality between white and nonwhite households is not attributed to asset allocation. It is not necessary to formulate policies that emphasize differences in asset allocation in order to solve wealth inequality between white and nonwhite groups.

With regard to the limitations of this study, unfortunately, the SCF does not provide information on how long respondents have lived in the United States. This information may be useful though Hispanic people have been resilient to acculturation into US culture and preserved their culture (Valencia, 1989). Moreover, the SCF does not provide information about regions. Regional characteristics, such as industrial structure and metropolitan features, may be useful information. Data fusion may help these limitations.

As well as addressing these limitations, future research will investigate whether differences by race or ethnicity affect asset prices under an assumption of downward-sloping demand for assets, provided data are available. White investment activities may affect asset prices substantially as the white population comprised 72 percent of the total population in the 2010 census (Hixson *et al.*, 2011). However, the white population will fall to 47 percent by 2050 since it is increasing more slowly than the nonwhite population (Passel and Cohn, 2008). Therefore, white investment activities will have a declining effect on asset prices in the future. By contrast, the Hispanic population will increase 43 percent from 2000 to 2010 (Ennis *et al.*, 2011), and so, Hispanic investment activities will affect asset prices in the future.

# Bibliography

Abadie A, Imbens GW. 2011. Bias-Corrected Matching Estimators for Average Treatment Effects. *Journal of Business & Economic Statistics* **29** (1): 1–11.

Altonji JG, Doraszelski U. 2005. The Role of Permanent Income and Demographics in Black/White Differences in Wealth. *Journal of Human Resources* **40** (1): 1–30.

Arrow KJ. 1971. *Essays in the Theory of Risk-Bearing*. Markham: Chicago.

Badu YA, Daniels KN, Salandro DP. 1999. An Empirical Analysis of Differences in Black and White Asset and Liability Combinations. *Financial Services Review* **8** (3): 129–147.

Barsky R, Bound J, Charles KK, Lupton JP. 2002. Accounting for the Black-White Wealth Gap: A Nonparametric Approach. *Journal of the American Statistical Association* **97** (459): 663–673.

Cagetti M, De Nardi M. 2008. Wealth Inequality: Data and Models. *Macroeconomic Dynamics* **12**: 285–313.

Campbell JY. 2006. Household Finance. *The Journal of Finance* **61** (4): 1553–1604.

Casas JM, Wagenheim BR, Banchemo R, Mendoza-Romero J. 1994. Hispanic Masculinity: Myth or Psychological Schema Meriting Clinical Consideration. *Hispanic Journal of Behavioral Sciences* **16** (3): 315–331.

Choudhury S. 2001. Racial and Ethnic Differences in Wealth and Asset Choices. *Social Security Bulletin* **64** (4): 1–15.

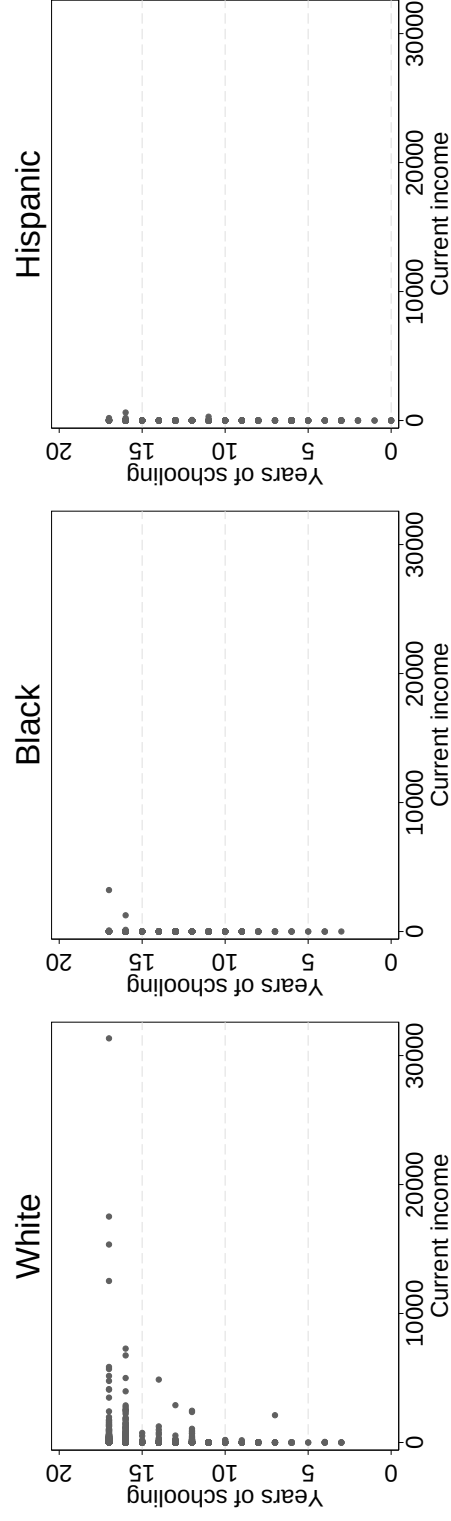
Cochran WG. 1965. The Planning of Observational Studies of Human Populations. *Journal of the Royal Statistical Society. Series A* **128** (2): 234–266.

- Coleman S. 2003. Risk Tolerance and the Investment Behavior of Black and Hispanic Heads of Household. *Journal of Financial Counseling and Planning* **14** (2): 43–52.
- Dehejia RH, Wahba S. 1999. Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs. *Journal of the American Statistical Association* **94** (448): 1053–1062.
- Dehejia RH, Wahba S. 2002. Propensity Score-Matching Methods for Non-experimental Causal Studies. *The Review of Economics and Statistics* **84** (1): 151–161.
- Ennis SR, Ríos-Vargas M, Albert NG. 2011. *The Hispanic Population: 2010*, US Department of Commerce, Economics and Statistics Administration, US Census Bureau.
- Glazerman S, Levy DM, Myers D. 2003. Nonexperimental versus Experimental Estimates of Earnings Impacts. *Annals of the American Academy of Political and Social Science* **589** (1): 63–93.
- Gutter MS, Fontes A. 2006. Racial Differences in Risky Asset Ownership: A Two-Stage Model of the Investment Decision-Making Process. *Journal of Financial Counseling and Planning* **17** (2): 64–78.
- Gutter MS, Fox JJ, Montalto CP. 1999. Racial Differences in Investor Decision Making. *Financial Services Review* **8** (3): 149–162.
- Haliassos M, Bertaut CC. 1995. Why Do So Few Hold Stocks? *The Economic Journal* **105** (432): 1110–1129.
- Hanna SD, Wang C, Yuh Y. 2010. Racial/Ethnic Differences in High Return Investment Ownership: A Decomposition Analysis. *Journal of Financial Counseling and Planning* **21** (2): 44–59.
- Heckman JJ. 1979. Sample Selection Bias as a Specification Error. *Econometrica* **47** (1): 153–161.
- Hill J, Reiter JP. 2006. Interval Estimation for Treatment Effects Using Propensity Score Matching. *Statistics in Medicine* **25** (13): 2230–2256.
- Hixson L, Hepler BB, Kim MO. 2011. *The White Population: 2010*, US Department of Commerce, Economics and Statistics Administration, US Census Bureau.

- Kara A, Kara NR. 1996. Ethnicity and Consumer Choice: A Study of Hispanic Decision Processes across Different Acculturation Levels. *Journal of Applied Business Research* **12** (2): 22–34.
- Keister LA. 2000. Race and Wealth Inequality: The Impact of Racial Differences in Asset Ownership on the Distribution of Household Wealth. *Social Science Research* **29** (4): 477–502.
- Kennickell AB, McManus DA, Woodburn RL. 1996. Weighting Design for the 1992 Survey of Consumer Finances. Working Paper, Board of Governors of the Federal Reserve System.
- Montalto CP, Sung J. 1996. Multiple Imputation in the 1992 Survey of Consumer Finances. *Journal of Financial Counseling and Planning* **7**: 133–146.
- Ogden DT, Ogden JR, Schau HJ. 2004. Exploring the Impact of Culture and Acculturation on Consumer Purchase Decisions: Toward a Microcultural Perspective. *Academy of Marketing Science Review* **8** (3): 1–22.
- Okun BF, Fried J, Okun ML. 1998. *Understanding Diversity: A Learning-As-Practice Primer*, Wadsworth: Belmont, CA.
- Passel JS, Cohn D. 2008. *U.S. Population Projections: 2005-2050*, Pew Research Center: Washington, DC
- Rokeach M, Parker S. 1970. Values as Social Indicators of Poverty and Race Relations in America. *The ANNALS of the American Academy of Political and Social Science* **388** (1): 97–111.
- Rosenbaum PR, Rubin DB. 1983. The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika* **70** (1): 41–55.
- Rosenbaum PR, Rubin DB. 1985. Constructing a Control Group Using Multivariate Matched Sampling Methods that Incorporate the Propensity Score. *The American Statistician* **39** (1): 33–38.
- Rubin DB. 1973. The Use of Matched Sampling and Regression Adjustment to Remove Bias in Observational Studies. *Biometrics* **29** (1): 185–203.
- Rubin DB. 1979. Using Multivariate Matched Sampling and Regression Adjustment to Control Bias in Observational Studies. *Journal of the American Statistical Association* **74** (366): 318–328.

- Rubin DB. 1987. *Multiple Imputation for Nonresponse in Surveys*. John Wiley & Sons: New York
- Rubin DB. 2001. Using Propensity Scores to Help Design Observational Studies: Application to the Tobacco Litigation. *Health Services and Outcomes Research Methodology* **2** (3): 169–188.
- Rubin DB, Thomas N. 2000. Combining Propensity Score Matching with Additional Adjustments for Prognostic Covariates. *Journal of the American Statistical Association* **95** (450): 573–585.
- Smith JA, Todd PE. 2005. Does matching overcome LaLonde’s critique of nonexperimental estimators? *Journal of Econometrics* **125** (1-2): 305–353.
- Straight RL. 2002. Wealth: Asset-Accumulation Differences by Race: SCF Data, 1995 and 1998. *The American Economic Review* **92** (2): 330–334.
- Sung J, Hanna S. 1996. Factors Related To Risk Tolerance. *Journal of Financial Counseling and Planning* **7**: 11–19.
- Terrell HS. 1971. Wealth Accumulation of Black and White Families: The Empirical Evidence. *The Journal of Finance* **26** (2): 363–377.
- Valencia H. 1989. Hispanic Values and Subcultural Research. *Journal of the Academy of Marketing Science* **17** (1): 23–28.
- Wang H, Hanna SD. 1997. “Does Risk Tolerance Decrease with Age?” *Journal of Financial Counseling and Planning* **8** (2): 27–32.
- Yao R, Gutter MS, Hanna SD. 2005. The Financial Risk Tolerance of Blacks, Hispanics and Whites *Journal of Financial Counseling and Planning* **16** (1): 51–62.
- Yao R, Sharpe DL, Wang F. 2011. Decomposing the Age Effect on Risk Tolerance. *The Journal of Socio-Economics* **40** (6): 879–887.
- Yinger JM. 1985. Ethnicity. *Annual Review of Sociology* **11**: 151–180.
- Zhong LX, Xiao JJ. 1995. Determinants of Family Bond and Stock Holdings. *Journal of Financial Counseling and Planning* **6**: 1–8.

Figure 3.1: Scatter Plot of Current Income and Years of Schooling



Notes: First imputation set is used, and the unit is \$10,000

Table 3.1: Descriptive Statistics of Unweighted Characteristics

|                                         | White      |                  | Black      |                  | Hispanic               |                  |
|-----------------------------------------|------------|------------------|------------|------------------|------------------------|------------------|
|                                         | Mean       | 95%Conf Interval | Mean       | 95%Conf Interval | Mean                   | 95%Conf Interval |
| <i>Male</i>                             | 0.805      |                  |            |                  |                        |                  |
| <i>Age</i>                              | 52.693     | 53.145           | 46.645***  | 45.597           | 42.081*** <sup>3</sup> | 41.078           |
| <i>Years of schooling</i>               | 14.217     | 14.149           | 13.011***  | 12.846           | 11.479*** <sup>3</sup> | 11.181           |
| <i>Married</i>                          | 0.683      | 0.670            | 0.450***   | 0.416            | 0.671 <sup>3</sup>     | 0.635            |
| <i>Family size</i>                      | 2.463      | 2.423            | 2.344**    | 2.241            | 3.118*** <sup>3</sup>  | 2.992            |
| <i>The number of children</i>           | 1.465      | 1.417            | 1.531      | 1.395            | 1.215*** <sup>3</sup>  | 1.078            |
| <i>The proportion of children</i>       | 0.573      | 0.559            | 0.570      | 0.535            | 0.475*** <sup>3</sup>  | 0.436            |
| <i>Not working</i>                      | 0.275      | 0.262            | 0.338**    | 0.305            | 0.177*** <sup>3</sup>  | 0.147            |
| <i>Risk tolerance</i>                   |            |                  |            |                  |                        |                  |
| <i>No financial risks</i>               | 0.359      | 0.345            | 0.365***   | 0.331            | 0.639*** <sup>3</sup>  | 0.601            |
| <i>Average financial risks</i>          | 0.413      | 0.399            | 0.293***   | 0.261            | 0.228*** <sup>3</sup>  | 0.196            |
| <i>Above average financial risks</i>    | 0.182      | 0.171            | 0.098**    | 0.078            | 0.083***               | 0.062            |
| <i>Substantial financial risks</i>      | 0.046      | 0.040            | 0.043      | 0.029            | 0.050                  | 0.033            |
| <i>US economy over the next 5 years</i> |            |                  |            |                  |                        |                  |
| <i>Worse</i>                            | 0.211      | 0.199            | 0.098***   | 0.077            | 0.135*** <sup>2</sup>  | 0.108            |
| <i>About the same</i>                   | 0.302      | 0.289            | 0.216***   | 0.187            | 0.275 <sup>2</sup>     | 0.240            |
| <i>Better</i>                           | 0.487      | 0.473            | 0.686***   | 0.654            | 0.590*** <sup>3</sup>  | 0.551            |
| <i>Health status</i>                    |            |                  |            |                  |                        |                  |
| <i>Poor</i>                             | 0.051      | 0.045            | 0.066      | 0.048            | 0.049                  | 0.033            |
| <i>Fair</i>                             | 0.155      | 0.144            | 0.261***   | 0.230            | 0.206*** <sup>2</sup>  | 0.175            |
| <i>Good</i>                             | 0.478      | 0.464            | 0.434**    | 0.399            | 0.494 <sup>2</sup>     | 0.455            |
| <i>Excellent</i>                        | 0.316      | 0.303            | 0.239***   | 0.210            | 0.251***               | 0.217            |
| <i>Current income(\$)</i>               | 770,739    | 574,582          | 101,113*** | 15,120           | 67,413***              | 44,327           |
| <i>Log current income</i>               | 11.182     | 11.121           | 10.290***  | 10.217           | 10.379***              | 10.283           |
| <i>Usual income(\$)</i>                 | 775,675    | 591,951          | 105,012*** | 19,030           | 77,754***              | 52,455           |
| <i>Log usual income</i>                 | 11.472     | 11.426           | 10.422***  | 10.354           | 10.590*** <sup>3</sup> | 10.523           |
| <i>Net worth(\$)</i>                    | 10,373,957 | 8,851,860        | 742,391*** | -184,045         | 410,339***             | 75,274           |
| <i>Log net worth</i>                    | 16.126     | 16.146           | 15.846***  | 15.833           | 15.848***              | 15.836           |
| <i>N</i>                                |            | 4,759            |            | 790              |                        | 639              |

Notes: Multiple imputation is used

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  when compared with white<sup>1</sup>  $p < 0.1$ , <sup>2</sup>  $p < 0.05$ , <sup>3</sup>  $p < 0.01$  when compared with black

Figure 3.2: Histogram of Estimated Propensity Score

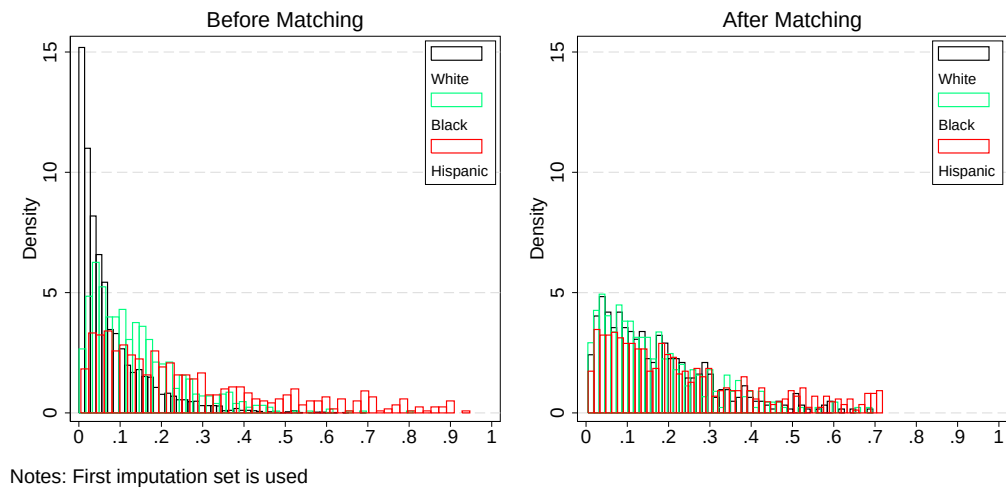


Table 3.2: Proportions of Risk Tolerance

|                                                | <i>White</i> | <i>Black</i> | <i>Hispanic</i>        | <i>All</i> |
|------------------------------------------------|--------------|--------------|------------------------|------------|
| <i>Take substantial financial risks</i>        |              |              |                        |            |
| <i>expecting to earn substantial returns</i>   | 0.032        | 0.039        | 0.042**                | 0.034      |
| <i>Take above average financial risks</i>      |              |              |                        |            |
| <i>expecting to earn above average returns</i> | 0.145        | 0.098***     | 0.080***, <sup>1</sup> | 0.131      |
| <i>Take average financial risks</i>            |              |              |                        |            |
| <i>expecting to earn average returns</i>       | 0.389        | 0.294***     | 0.229***, <sup>3</sup> | 0.357      |
| <i>Not willing to take any financial risks</i> | 0.433        | 0.568***     | 0.650***, <sup>3</sup> | 0.477      |
| <i>N</i>                                       | 4,759        | 790          | 639                    | 6,188      |

Notes: Multiple imputation, sampling and replication weights are used

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  when compared with white

<sup>1</sup>  $p < 0.1$ , <sup>2</sup>  $p < 0.05$ , <sup>3</sup>  $p < 0.01$  when compared with black

Table 3.3: Estimation Results of Risk Tolerance

|                                                       | <i>Method A</i>      | <i>Method B</i>     |
|-------------------------------------------------------|----------------------|---------------------|
| <i>Race/Ethnicity : ref = white</i>                   |                      |                     |
| <i>Black</i>                                          | −0.362***<br>(−4.34) | −0.068<br>(−0.25)   |
| <i>Hispanic</i>                                       | −0.576***<br>(−5.96) | −0.121<br>(−0.52)   |
| <i>Male</i>                                           | 0.665***<br>(8.04)   | 0.598***<br>(3.06)  |
| <i>Age</i>                                            | −0.012***<br>(−5.59) | −0.009<br>(−1.12)   |
| <i>Years of schooling</i>                             | 0.223***<br>(18.16)  | 0.165***<br>(6.29)  |
| <i>Married</i>                                        | −0.002<br>(−0.03)    | −0.264<br>(−1.50)   |
| <i>Family size</i>                                    | −0.015<br>(−0.68)    | 0.036<br>(0.88)     |
| <i>The number of children</i>                         | −0.018<br>(−1.00)    | −0.024<br>(−0.47)   |
| <i>Not working</i>                                    | −0.336***<br>(−4.94) | −0.277<br>(−1.14)   |
| <i>US economy over the next 5 years : ref = worse</i> |                      |                     |
| <i>About the same</i>                                 | 0.162**<br>(2.12)    | 0.166<br>(0.66)     |
| <i>Better</i>                                         | 0.383***<br>(5.45)   | 0.446*<br>(1.81)    |
| <i>Health status : ref = poor</i>                     |                      |                     |
| <i>Fair</i>                                           | 0.194***<br>(1.32)   | 0.274<br>(0.62)     |
| <i>Good</i>                                           | 0.512***<br>(3.67)   | 0.403<br>(0.90)     |
| <i>Excellent</i>                                      | 0.526***<br>(3.66)   | 0.407<br>(0.97)     |
| <i>Logincome</i>                                      | 0.040***<br>(2.69)   | 0.025<br>(0.42)     |
| <i>Lognetworth</i>                                    | 0.471***<br>(9.88)   | 1.427***<br>(3.56)  |
| <i>Cut off points 1</i>                               | 11.005***<br>(15.74) | 25.868***<br>(4.10) |
| <i>Cut off points 2</i>                               | 13.076***<br>(18.53) | 27.401***<br>(4.35) |
| <i>Cut off points 3</i>                               | 14.905***<br>(20.86) | 28.643***<br>(4.55) |
| <i>N</i>                                              | 6188                 | 1391                |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.4: Estimation Results of Asset Allocation: First Step

|                                                       | <i>Stock</i>          |                       | <i>Business Equity</i>  |                        |
|-------------------------------------------------------|-----------------------|-----------------------|-------------------------|------------------------|
|                                                       | <i>Method A</i>       | <i>Method B</i>       | <i>Method A</i>         | <i>Method B</i>        |
| <i>Race/Ethnicity : ref = white</i>                   |                       |                       |                         |                        |
| <i>Black</i>                                          | −0.359***<br>(−4.21)  | −0.316<br>(−1.52)     | −0.375***<br>(−4.48)    | −0.422*<br>(−1.87)     |
| <i>Hispanic</i>                                       | −0.487***<br>(−4.46)  | −0.549***<br>(−3.301) | −0.381***<br>(−4.38)    | −0.349***<br>(−2.79)   |
| <i>Risk tolerance : ref = no risks</i>                |                       |                       |                         |                        |
| <i>Average financial risks</i>                        | 0.539***<br>(9.74)    | 0.404***<br>(2.63)    | 0.120**<br>(2.21)       | 0.119<br>(0.84)        |
| <i>Above average financial risks</i>                  | 0.690***<br>(10.33)   | 0.422*<br>(1.85)      | 0.365***<br>(5.50)      | 0.459**<br>(2.24)      |
| <i>Substantial financial risks</i>                    | 0.546***<br>(5.38)    | 0.705*<br>(1.66)      | 0.526***<br>(4.95)      | 0.423<br>(1.44)        |
| <i>Male</i>                                           | 0.161**<br>(2.14)     | 0.280<br>(0.89)       | 0.286***<br>(3.66)      | 0.223<br>(1.02)        |
| <i>Age</i>                                            | 0.012***<br>(6.30)    | 0.008<br>(0.86)       | 0.012***<br>(5.90)      | 0.009*<br>(1.67)       |
| <i>Years of schooling</i>                             | 0.106***<br>(9.59)    | 0.145***<br>(2.99)    | 0.017*<br>(1.66)        | 0.012<br>(0.45)        |
| <i>Married</i>                                        | 0.146**<br>(2.10)     | 0.165<br>(0.53)       | 0.218***<br>(3.08)      | 0.221<br>(0.81)        |
| <i>Family size</i>                                    | −0.034*<br>(−1.73)    | −0.103*<br>(−1.95)    | 0.017<br>(0.90)         | −0.002<br>(−0.05)      |
| <i>The number of children</i>                         | −0.039**<br>(−2.47)   | −0.020<br>(−0.39)     | 0.028*<br>(1.80)        | 0.048<br>(0.99)        |
| <i>Not working</i>                                    | 0.157***<br>(2.68)    | 0.290<br>(1.28)       | −1.009***<br>(−14.68)   | −0.813***<br>(−2.80)   |
| <i>US economy over the next 5 years : ref = worse</i> |                       |                       |                         |                        |
| <i>About the same</i>                                 | 0.003<br>(0.05)       | −0.057<br>(−0.16)     | −0.053<br>(−0.83)       | −0.074<br>(−0.32)      |
| <i>Better</i>                                         | 0.012<br>(0.20)       | −0.079<br>(−0.29)     | −0.073<br>(−1.24)       | 0.003<br>(0.01)        |
| <i>Health status : ref = poor</i>                     |                       |                       |                         |                        |
| <i>Fair</i>                                           | 0.154<br>(1.15)       | 0.103<br>(0.17)       | 0.054<br>(0.39)         | 0.229<br>(0.46)        |
| <i>Good</i>                                           | 0.194<br>(1.53)       | 0.194<br>(0.31)       | 0.079<br>(0.60)         | 0.232<br>(0.51)        |
| <i>Excellent</i>                                      | 0.273**<br>(2.10)     | 0.346<br>(0.62)       | 0.211<br>(1.55)         | 0.339<br>(0.70)        |
| <i>Logincome</i>                                      | −0.093**<br>(−2.37)   | −0.335*<br>(−1.76)    | −0.250***<br>(−5.65)    | −0.241*<br>(−1.69)     |
| <i>Logincome squared</i>                              | 0.009***<br>(3.64)    | 0.028**<br>(2.20)     | 0.013***<br>(4.45)      | 0.013<br>(1.33)        |
| <i>Lognetworth</i>                                    | 8.010***<br>(8.90)    | 11.476<br>(0.81)      | 14.983***<br>(13.91)    | 76.797**<br>(2.55)     |
| <i>Lognetworth squared</i>                            | −0.224***<br>(−8.78)  | −0.336<br>(−0.79)     | −0.412***<br>(−13.48)   | −2.262**<br>(−2.50)    |
| <i>Constant</i>                                       | −74.524***<br>(−9.48) | −101.120<br>(−0.86)   | −135.049***<br>(−14.38) | −650.082***<br>(−2.60) |
| <i>N</i>                                              | 6188                  | 1391                  | 6188                    | 1391                   |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.5: Estimation Results of Asset Allocation: First Step

|                                                       | <i>Real Estate</i>   |                    | <i>Mutual Fund</i>    |                      |
|-------------------------------------------------------|----------------------|--------------------|-----------------------|----------------------|
|                                                       | <i>Method A</i>      | <i>Method B</i>    | <i>Method A</i>       | <i>Method B</i>      |
| <i>Race/Ethnicity : ref = white</i>                   |                      |                    |                       |                      |
| <i>Black</i>                                          | −0.017<br>(−0.25)    | 0.077<br>(0.38)    | −0.735***<br>(−5.34)  | −0.798*<br>(−1.70)   |
| <i>Hispanic</i>                                       | −0.195**<br>(−2.30)  | −0.099<br>(−0.72)  | −0.480***<br>(−3.36)  | −0.565**<br>(−2.44)  |
| <i>Risk tolerance : ref = no risks</i>                |                      |                    |                       |                      |
| <i>Average financial risks</i>                        | 0.370***<br>(7.32)   | 0.489***<br>(3.47) | 0.619***<br>(8.84)    | 0.996*<br>(1.82)     |
| <i>Above average financial risks</i>                  | 0.576***<br>(9.06)   | 0.640***<br>(2.71) | 0.719***<br>(8.84)    | 1.179**<br>(2.57)    |
| <i>Substantial financial risks</i>                    | 0.461***<br>(4.46)   | 0.621**<br>(2.01)  | 0.473***<br>(4.01)    | 0.361<br>(0.34)      |
| <i>Male</i>                                           | −0.084<br>(−1.20)    | −0.190<br>(−1.01)  | −0.020<br>(−0.23)     | −0.193<br>(−0.53)    |
| <i>Age</i>                                            | 0.024***<br>(12.11)  | 0.022***<br>(3.70) | 0.017***<br>(7.19)    | 0.035***<br>(2.71)   |
| <i>Years of schooling</i>                             | 0.048***<br>(4.89)   | 0.076***<br>(2.82) | 0.136***<br>(10.07)   | 0.214***<br>(3.36)   |
| <i>Married</i>                                        | 0.438***<br>(6.50)   | 0.570***<br>(2.87) | 0.056<br>(0.68)       | −0.343<br>(−0.83)    |
| <i>Family size</i>                                    | −0.011<br>(−0.62)    | −0.013<br>(−0.27)  | −0.003<br>(−0.15)     | −0.004<br>(−0.03)    |
| <i>The number of children</i>                         | 0.013<br>(0.92)      | −0.033<br>(−0.75)  | −0.049***<br>(−2.68)  | −0.141<br>(−1.22)    |
| <i>Not working</i>                                    | −0.120**<br>(−2.15)  | 0.014<br>(0.06)    | 0.096<br>(1.41)       | 0.227<br>(0.60)      |
| <i>US economy over the next 5 years : ref = worse</i> |                      |                    |                       |                      |
| <i>About the same</i>                                 | 0.043<br>(0.71)      | −0.048<br>(−0.22)  | 0.020<br>(0.27)       | −0.598<br>(−1.30)    |
| <i>Better</i>                                         | −0.037<br>(−0.68)    | −0.287<br>(−1.37)  | 0.125*<br>(1.87)      | −0.443<br>(−1.36)    |
| <i>Health status : ref = poor</i>                     |                      |                    |                       |                      |
| <i>Fair</i>                                           | −0.010<br>(−0.10)    | −0.546<br>(−1.52)  | 0.047<br>(0.29)       | −0.233<br>(−0.33)    |
| <i>Good</i>                                           | 0.158<br>(1.53)      | −0.214<br>(−0.56)  | 0.025<br>(0.16)       | −0.224<br>(−0.34)    |
| <i>Excellent</i>                                      | 0.274**<br>(2.54)    | −0.063<br>(−0.15)  | 0.164<br>(1.05)       | 0.036<br>(0.05)      |
| <i>Logincome</i>                                      | −0.273***<br>(−6.81) | −0.203<br>(−0.79)  | −0.150***<br>(−3.55)  | −0.333<br>(−1.12)    |
| <i>Logincome squared</i>                              | 0.019***<br>(7.04)   | 0.019<br>(1.36)    | 0.013***<br>(4.70)    | 0.023<br>(1.29)      |
| <i>Lognetworth</i>                                    | 5.175<br>(1.44)      | −9.672<br>(−0.39)  | 6.788***<br>(7.38)    | 31.451<br>(1.59)     |
| <i>Lognetworth squared</i>                            | −0.139<br>(−1.31)    | 0.361<br>(0.46)    | −0.189***<br>(−7.25)  | −0.916<br>(−1.54)    |
| <i>Constant</i>                                       | −49.799<br>(−1.63)   | 59.287<br>(0.31)   | −64.684***<br>(−8.06) | −273.519*<br>(−1.66) |
| <i>N</i>                                              | 6188                 | 1391               | 6188                  | 1391                 |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.6: Estimation Results of Asset Allocation: First Step

|                                                       | <i>US Bond</i>       |                      | <i>Transaction Account</i> |                      |
|-------------------------------------------------------|----------------------|----------------------|----------------------------|----------------------|
|                                                       | <i>Method A</i>      | <i>Method B</i>      | <i>Method A</i>            | <i>Method B</i>      |
| <i>Race/Ethnicity : ref = white</i>                   |                      |                      |                            |                      |
| <i>Black</i>                                          | −0.188**<br>(−2.45)  | −0.221<br>(−1.33)    | −0.624***<br>(−8.20)       | −0.655***<br>(−4.07) |
| <i>Hispanic</i>                                       | −0.696***<br>(−6.20) | −0.674***<br>(−4.71) | −0.308***<br>(−3.47)       | −0.312**<br>(−2.14)  |
| <i>Risk tolerance : ref = no risks</i>                |                      |                      |                            |                      |
| <i>Average financial risks</i>                        | 0.337***<br>(6.17)   | 0.229<br>(1.41)      | 0.352***<br>(4.31)         | 0.384***<br>(2.65)   |
| <i>Above average financial risks</i>                  | 0.297***<br>(4.31)   | 0.242<br>(1.00)      | 0.418***<br>(3.07)         | 0.578<br>(1.35)      |
| <i>Substantial financial risks</i>                    | −0.101<br>(−0.79)    | −0.259<br>(−0.58)    | 0.172<br>(1.04)            | 0.336<br>(1.34)      |
| <i>Male</i>                                           | −0.059<br>(−0.75)    | −0.070<br>(−0.28)    | −0.197**<br>(−2.47)        | −0.148<br>(−1.02)    |
| <i>Age</i>                                            | 0.008***<br>(3.94)   | 0.010<br>(1.56)      | 0.016***<br>(6.13)         | 0.016***<br>(3.51)   |
| <i>Years of schooling</i>                             | 0.068***<br>(6.04)   | 0.086***<br>(3.01)   | 0.088***<br>(6.95)         | 0.070***<br>(3.32)   |
| <i>Married</i>                                        | 0.266***<br>(3.49)   | 0.238<br>(1.06)      | 0.139<br>(1.59)            | 0.133<br>(0.87)      |
| <i>Family size</i>                                    | 0.098***<br>(5.42)   | 0.011<br>(0.26)      | −0.052**<br>(−2.09)        | −0.073*<br>(−1.72)   |
| <i>The number of children</i>                         | −0.052***<br>(−3.10) | −0.043<br>(−0.79)    | −0.024<br>(−1.20)          | −0.025<br>(−0.70)    |
| <i>Not working</i>                                    | −0.049<br>(−0.79)    | −0.166<br>(−0.69)    | −0.032<br>(−0.42)          | −0.094<br>(−0.76)    |
| <i>US economy over the next 5 years : ref = worse</i> |                      |                      |                            |                      |
| <i>About the same</i>                                 | 0.052<br>(0.79)      | 0.161<br>(0.69)      | 0.079<br>(0.85)            | 0.128<br>(0.77)      |
| <i>Better</i>                                         | 0.068<br>(1.12)      | 0.136<br>(0.45)      | 0.066<br>(0.78)            | 0.128<br>(0.80)      |
| <i>Health status : ref = poor</i>                     |                      |                      |                            |                      |
| <i>Fair</i>                                           | 0.128<br>(0.97)      | −0.046<br>(−0.09)    | 0.016<br>(0.14)            | −0.062<br>(−0.27)    |
| <i>Good</i>                                           | 0.147<br>(1.16)      | −0.066<br>(−0.14)    | 0.231**<br>(2.00)          | 0.212<br>(0.87)      |
| <i>Excellent</i>                                      | 0.153<br>(1.17)      | −0.033<br>(−0.07)    | 0.373***<br>(2.79)         | 0.279<br>(1.05)      |
| <i>Logincome</i>                                      | 0.063<br>(1.28)      | 0.269<br>(0.27)      | −0.692***<br>(−6.53)       | −0.650***<br>(−4.15) |
| <i>Logincome squared</i>                              | −0.002<br>(−0.54)    | −0.007<br>(−0.15)    | 0.067***<br>(9.54)         | 0.068***<br>(6.01)   |
| <i>Lognetworth</i>                                    | −0.539<br>(−0.51)    | 17.160<br>(0.94)     | −34.434<br>(−1.39)         | −19.667<br>(−0.25)   |
| <i>Lognetworth squared</i>                            | 0.008<br>(0.28)      | −0.513<br>(−0.94)    | 1.251<br>(1.55)            | 0.611<br>(0.25)      |
| <i>Constant</i>                                       | 2.802<br>(0.31)      | −148.294<br>(−0.97)  | 231.189<br>(1.21)          | 157.418<br>(0.24)    |
| <i>N</i>                                              | 6188                 | 1391                 | 6188                       | 1391                 |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Figure 3.3: Race and Ethnicity Effects

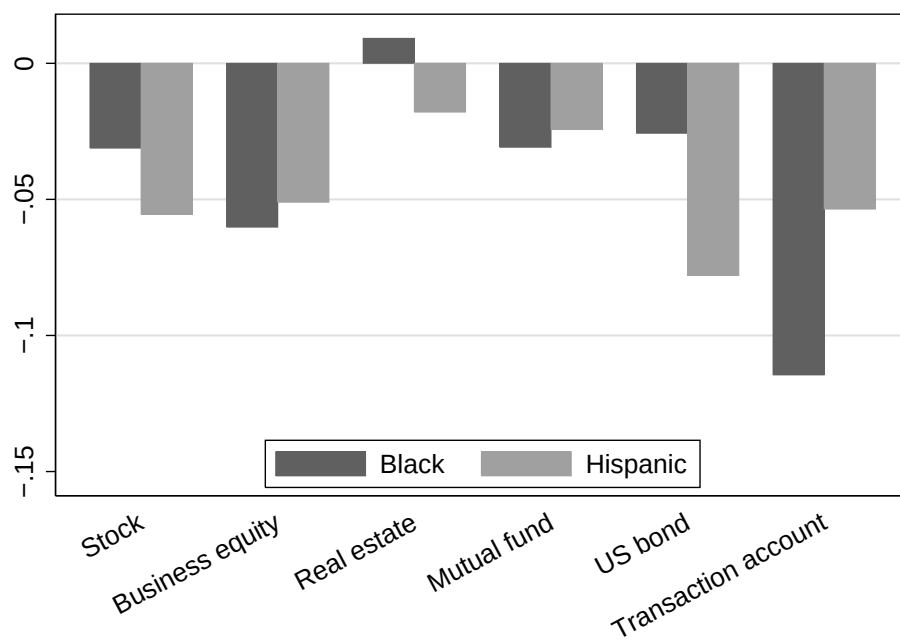


Table 3.7: Estimation Results of Asset Allocation: Second Step

|                                                       | <i>Stock</i>        |                                      | <i>Business Equity</i> |                      |
|-------------------------------------------------------|---------------------|--------------------------------------|------------------------|----------------------|
|                                                       | <i>Method A</i>     | <i>Method B</i>                      | <i>Method A</i>        | <i>Method B</i>      |
| <i>Race/Ethnicity : ref = white</i>                   |                     |                                      |                        |                      |
| <i>Black</i>                                          | −0.020<br>(−0.44)   | 0.019<br>(0.12)                      | 0.038<br>(0.74)        | 0.040<br>(0.37)      |
| <i>Hispanic</i>                                       | −0.062<br>(−1.03)   | −0.053<br>(−0.27)                    | 0.011<br>(0.22)        | 0.010<br>(0.13)      |
| <i>Risk tolerance : ref = no risks</i>                |                     |                                      |                        |                      |
| <i>Average financial risks</i>                        | 0.048<br>(1.58)     | −0.081<br>(−0.57)                    | −0.121***<br>(−4.35)   | −0.073<br>(−0.70)    |
| <i>Above average financial risks</i>                  | 0.033<br>(0.94)     | −0.073<br>(−0.43)                    | −0.129***<br>(−4.36)   | −0.093<br>(−0.96)    |
| <i>Substantial financial risks</i>                    | 0.050<br>(1.19)     | 0.028<br>(0.09)                      | −0.037<br>(−0.95)      | 0.032<br>(0.27)      |
| <i>Male</i>                                           | −0.022<br>(−0.64)   | −0.009<br>(−0.04)                    | 0.051<br>(1.19)        | 0.114<br>(0.77)      |
| <i>Age</i>                                            | 0.001*<br>(1.71)    | −0.001 × 10 <sup>−1</sup><br>(−0.03) | −0.004***<br>(−4.64)   | −0.003<br>(−0.93)    |
| <i>Years of schooling</i>                             | 0.004<br>(0.66)     | −0.028<br>(−0.46)                    | −0.032***<br>(−6.81)   | −0.032***<br>(−2.93) |
| <i>Married</i>                                        | −0.060**<br>(−2.19) | −0.030<br>(−0.21)                    | −0.050<br>(−1.61)      | 0.030<br>(0.17)      |
| <i>Family size</i>                                    | 0.006<br>(0.77)     | −0.008<br>(−0.22)                    | 0.015*<br>(1.93)       | −0.018<br>(−0.77)    |
| <i>US economy over the next 5 years : ref = worse</i> |                     |                                      |                        |                      |
| <i>About the same</i>                                 | 0.019<br>(0.81)     | −0.032<br>(−0.16)                    | −0.061**<br>(−2.39)    | −0.009<br>(−0.09)    |
| <i>Better</i>                                         | 0.037*<br>(1.77)    | 0.024<br>(0.13)                      | −0.036<br>(−1.54)      | −0.012<br>(−0.09)    |
| <i>Health status : ref = poor</i>                     |                     |                                      |                        |                      |
| <i>Fair</i>                                           | −0.061<br>(−0.96)   | 0.195<br>(0.46)                      | 0.027<br>(0.33)        | 0.249<br>(0.79)      |
| <i>Good</i>                                           | −0.079<br>(−1.31)   | 0.195<br>(0.44)                      | −0.037<br>(−0.47)      | 0.143<br>(0.43)      |
| <i>Excellent</i>                                      | −0.085<br>(−1.37)   | 0.117<br>(0.25)                      | −0.025<br>(−0.31)      | 0.143<br>(0.49)      |
| <i>Logincome</i>                                      | −0.001<br>(−0.32)   | −0.008<br>(−0.34)                    | −0.001<br>(−0.48)      | 0.024<br>(0.92)      |
| <i>Lognetworth</i>                                    | −0.014<br>(−1.18)   | 0.060<br>(0.30)                      | 0.049***<br>(3.55)     | −0.005<br>(−0.03)    |
| <i>lambda</i>                                         | 0.088**<br>(2.02)   | 0.050<br>(0.14)                      | −0.005<br>(−0.18)      | 0.056<br>(0.41)      |
| <i>Constant</i>                                       | 0.348<br>(1.04)     | −0.274<br>(−0.06)                    | 0.534*<br>(1.85)       | 0.738<br>(0.23)      |
| <i>N</i>                                              | 6188                | 1391                                 | 6188                   | 1391                 |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.8: Estimation Results of Asset Allocation: Second Step

|                                                       | <i>Real Estate</i>   |                   | <i>Mutual Fund</i>  |                   |
|-------------------------------------------------------|----------------------|-------------------|---------------------|-------------------|
|                                                       | <i>Method A</i>      | <i>Method B</i>   | <i>Method A</i>     | <i>Method B</i>   |
| <i>Race/Ethnicity : ref = white</i>                   |                      |                   |                     |                   |
| <i>Black</i>                                          | 0.091***<br>(2.84)   | 0.081<br>(0.84)   | -0.169*<br>(-1.95)  | -0.084<br>(-0.35) |
| <i>Hispanic</i>                                       | 0.035<br>(0.85)      | 0.077<br>(1.14)   | -0.105<br>(-1.30)   | 0.004<br>(0.03)   |
| <i>Risk tolerance : ref = no risks</i>                |                      |                   |                     |                   |
| <i>Average financial risks</i>                        | 0.050*<br>(1.88)     | 0.047<br>(0.51)   | 0.033<br>(0.78)     | 0.277<br>(0.95)   |
| <i>Above average financial risks</i>                  | 0.079**<br>(2.35)    | 0.084<br>(0.69)   | 0.008<br>(0.17)     | 0.130<br>(0.51)   |
| <i>Substantial financial risks</i>                    | 0.032<br>(0.73)      | -0.020<br>(-0.14) | -0.036<br>(-0.66)   | 0.140<br>(0.27)   |
| <i>Male</i>                                           | -0.040<br>(-1.23)    | -0.146<br>(-1.09) | -0.038<br>(-0.94)   | 0.021<br>(0.09)   |
| <i>Age</i>                                            | 0.004***<br>(4.13)   | 0.002<br>(0.62)   | 0.002<br>(1.53)     | 0.002<br>(0.30)   |
| <i>Years of schooling</i>                             | 0.001<br>(0.29)      | 0.009<br>(0.45)   | 0.019**<br>(2.19)   | 0.012<br>(0.26)   |
| <i>Married</i>                                        | 0.133***<br>(3.94)   | 0.165<br>(1.16)   | -0.066*<br>(-1.89)  | -0.092<br>(-0.34) |
| <i>Family size</i>                                    | -0.013*<br>(-1.85)   | -0.008<br>(-0.36) | -0.011<br>(-1.29)   | -0.035<br>(-0.71) |
| <i>US economy over the next 5 years : ref = worse</i> |                      |                   |                     |                   |
| <i>About the same</i>                                 | -0.004<br>(-0.17)    | -0.011<br>(-0.11) | 0.008<br>(0.28)     | -0.105<br>(-0.58) |
| <i>Better</i>                                         | -0.023<br>(-1.06)    | -0.031<br>(-0.26) | 0.028<br>(1.08)     | -0.094<br>(-0.54) |
| <i>Health status : ref = poor</i>                     |                      |                   |                     |                   |
| <i>Fair</i>                                           | -0.084<br>(-1.64)    | -0.219<br>(-1.25) | -0.200**<br>(-2.36) | -0.356<br>(-1.01) |
| <i>Good</i>                                           | 0.005<br>(0.10)      | -0.086<br>(-0.50) | -0.174**<br>(-2.20) | -0.146<br>(-0.40) |
| <i>Excellent</i>                                      | 0.001<br>(0.01)      | -0.059<br>(-0.31) | -0.192**<br>(-2.38) | -0.275<br>(-0.77) |
| <i>Logincome</i>                                      | -0.003<br>(-0.80)    | 0.007<br>(0.25)   | 0.006<br>(1.45)     | 0.001<br>(0.02)   |
| <i>Lognetworth</i>                                    | -0.060***<br>(-3.32) | -0.156<br>(-1.55) | -0.023<br>(-1.59)   | 0.135<br>(0.80)   |
| <i>lambda</i>                                         | 0.367***<br>(6.84)   | 0.278**<br>(2.47) | 0.111**<br>(2.28)   | 0.070<br>(0.38)   |
| <i>Constant</i>                                       | 0.872*<br>(1.92)     | 2.555<br>(1.49)   | 0.423<br>(0.93)     | -1.981<br>(-0.61) |
| <i>N</i>                                              | 6188                 | 1391              | 6188                | 1391              |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.9: Estimation Results of Asset Allocation: Second Step

|                                                       | <i>US Bond</i>       |                   | <i>Transaction Account</i> |                      |
|-------------------------------------------------------|----------------------|-------------------|----------------------------|----------------------|
|                                                       | <i>Method A</i>      | <i>Method B</i>   | <i>Method A</i>            | <i>Method B</i>      |
| <i>Race/Ethnicity : ref = white</i>                   |                      |                   |                            |                      |
| <i>Black</i>                                          | 0.068*<br>(1.68)     | 0.038<br>(0.26)   | 0.047***<br>(2.63)         | 0.055<br>(1.30)      |
| <i>Hispanic</i>                                       | 0.159<br>(1.49)      | -0.061<br>(-0.19) | 0.073***<br>(4.00)         | 0.090***<br>(3.53)   |
| <i>Risk tolerance : ref = no risks</i>                |                      |                   |                            |                      |
| <i>Average financial risks</i>                        | -0.142***<br>(-2.83) | 0.018<br>(0.12)   | -0.128***<br>(-10.44)      | -0.122***<br>(-4.21) |
| <i>Above average financial risks</i>                  | -0.167***<br>(-3.48) | -0.049<br>(-0.25) | -0.190***<br>(-11.88)      | -0.180***<br>(-3.52) |
| <i>Substantial financial risks</i>                    | -0.089<br>(-1.56)    | -0.099<br>(-0.24) | -0.206***<br>(-8.06)       | -0.243***<br>(-3.88) |
| <i>Male</i>                                           | -0.015<br>(-0.39)    | -0.109<br>(-0.71) | -0.030*<br>(-1.92)         | 0.016<br>(0.43)      |
| <i>Age</i>                                            | -0.004***<br>(-3.92) | -0.001<br>(-0.31) | -0.005***<br>(-13.65)      | -0.004***<br>(-4.60) |
| <i>Years of schooling</i>                             | -0.030***<br>(-2.96) | 0.003<br>(0.07)   | -0.020***<br>(-8.33)       | -0.015**<br>(-2.37)  |
| <i>Married</i>                                        | -0.076*<br>(-1.66)   | 0.154<br>(0.86)   | -0.099***<br>(-6.34)       | -0.116***<br>(-2.90) |
| <i>Family size</i>                                    | -0.013<br>(-0.87)    | 0.028<br>(0.90)   | -0.011***<br>(-2.68)       | -0.002<br>(-0.18)    |
| <i>US economy over the next 5 years : ref = worse</i> |                      |                   |                            |                      |
| <i>About the same</i>                                 | -0.005<br>(-0.19)    | 0.167<br>(0.95)   | 0.007<br>(0.47)            | 0.042<br>(0.84)      |
| <i>Better</i>                                         | -0.019<br>(-0.73)    | 0.140<br>(0.84)   | 0.008<br>(0.60)            | 0.068<br>(1.57)      |
| <i>Health status : ref = poor</i>                     |                      |                   |                            |                      |
| <i>Fair</i>                                           | -0.040<br>(-0.64)    | 0.321<br>(1.14)   | -0.021<br>(-0.84)          | 0.003<br>(0.04)      |
| <i>Good</i>                                           | -0.075<br>(-1.23)    | 0.248<br>(0.97)   | -0.063***<br>(-2.59)       | -0.037<br>(-0.51)    |
| <i>Excellent</i>                                      | -0.090<br>(-1.43)    | 0.222<br>(0.84)   | -0.115***<br>(-4.52)       | -0.089<br>(-1.29)    |
| <i>Logincome</i>                                      | -0.021***<br>(-2.65) | -0.066<br>(-0.74) | -0.004<br>(-1.31)          | -0.003<br>(-0.16)    |
| <i>Lognetworth</i>                                    | 0.031<br>(0.77)      | 0.095<br>(0.33)   | -0.157***<br>(-10.65)      | -0.314***<br>(-3.37) |
| <i>lambda</i>                                         | -0.193<br>(-1.23)    | 0.320<br>(0.59)   | 0.127***<br>(2.83)         | 0.009<br>(0.08)      |
| <i>Constant</i>                                       | 1.086<br>(3.96)      | -1.576<br>(-0.27) | 3.955***<br>(19.25)        | 6.211***<br>(4.74)   |
| <i>N</i>                                              | 6188                 | 1391              | 6188                       | 1391                 |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.10: Estimation Results of Risk Tolerance

|                                                       | <i>Method C</i>     |
|-------------------------------------------------------|---------------------|
| <i>Race/Ethnicity : ref = white</i>                   |                     |
| <i>Black</i>                                          | 0.012<br>(0.08)     |
| <i>Hispanic</i>                                       | -0.122<br>(-0.93)   |
| <i>Male</i>                                           | 0.522***<br>(3.49)  |
| <i>Age</i>                                            | -0.013**<br>(-2.35) |
| <i>Years of schooling</i>                             | 0.169***<br>(7.33)  |
| <i>Married</i>                                        | -0.068<br>(-0.45)   |
| <i>Family size</i>                                    | 0.001<br>(0.04)     |
| <i>The number of children</i>                         | -0.016<br>(-0.39)   |
| <i>Not working</i>                                    | -0.302**<br>(-1.98) |
| <i>US economy over the next 5 years : ref = worse</i> |                     |
| <i>About the same</i>                                 | 0.201<br>(0.88)     |
| <i>Better</i>                                         | 0.429**<br>(2.25)   |
| <i>Health status : ref = poor</i>                     |                     |
| <i>Fair</i>                                           | 0.148<br>(0.480)    |
| <i>Good</i>                                           | 0.293<br>(0.91)     |
| <i>Excellent</i>                                      | 0.304<br>(0.95)     |
| <i>Logincome</i>                                      | 0.058<br>(1.09)     |
| <i>Lognetworth</i>                                    | 1.355**<br>(2.30)   |
| <i>Cut off points 1</i>                               | 24.801***<br>(2.75) |
| <i>Cut off points 2</i>                               | 26.361***<br>(2.92) |
| <i>Cut off points 3</i>                               | 27.684***<br>(3.06) |
| <i>N</i>                                              | 1928                |

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.11: Estimation Results of Asset Allocation: First Step

|                                                           | <i>Stock<br/>Method C</i> | <i>Business Equity<br/>Method C</i> | <i>Real Estate<br/>Method C</i> |
|-----------------------------------------------------------|---------------------------|-------------------------------------|---------------------------------|
| <i>Race/Ethnicity : ref = white</i>                       |                           |                                     |                                 |
| <i>Black</i>                                              | −0.256*<br>(−1.80)        | −0.334***<br>(−2.60)                | 0.062<br>(0.49)                 |
| <i>Hispanic</i>                                           | −0.486***<br>(−3.41)      | −0.300**<br>(−2.48)                 | −0.108<br>(−0.95)               |
| <i>Risk tolerance : ref = no risks</i>                    |                           |                                     |                                 |
| <i>Average financial risks</i>                            | 0.410***<br>(2.83)        | 0.141<br>(1.13)                     | 0.460***<br>(4.49)              |
| <i>Above average financial risks</i>                      | 0.507**<br>(2.55)         | 0.463***<br>(3.21)                  | 0.614***<br>(3.64)              |
| <i>Substantial financial risks</i>                        | 0.632**<br>(2.38)         | 0.400<br>(1.41)                     | 0.514**<br>(2.28)               |
| <i>Male</i>                                               | 0.232<br>(1.16)           | 0.242<br>(1.08)                     | −0.125<br>(−0.74)               |
| <i>Age</i>                                                | 0.010<br>(1.63)           | 0.009*<br>(1.90)                    | 0.023***<br>(5.16)              |
| <i>Years of schooling</i>                                 | 0.125***<br>(4.13)        | 0.009<br>(0.37)                     | 0.078***<br>(3.39)              |
| <i>Married</i>                                            | 0.131<br>(0.58)           | 0.244<br>(1.19)                     | 0.557***<br>(3.35)              |
| <i>Family size</i>                                        | −0.100**<br>(−2.17)       | −0.003<br>(−0.07)                   | −0.019<br>(−0.48)               |
| <i>The number of children</i>                             | −0.045<br>(−1.02)         | 0.046<br>(1.29)                     | −0.012<br>(−0.32)               |
| <i>Not working</i>                                        | 0.208<br>(1.23)           | −0.809***<br>(−3.74)                | 0.093<br>(0.54)                 |
| <i>US economy over the next<br/>5 years : ref = worse</i> |                           |                                     |                                 |
| <i>About the same</i>                                     | −0.123<br>(−0.53)         | −0.040<br>(−0.26)                   | −0.021<br>(−0.13)               |
| <i>Better</i>                                             | −0.122<br>(−0.69)         | 0.010<br>(0.06)                     | −0.174<br>(−1.08)               |
| <i>Health status : ref = poor</i>                         |                           |                                     |                                 |
| <i>Fair</i>                                               | 0.300<br>(0.68)           | 0.132<br>(0.34)                     | −0.313<br>(−1.32)               |
| <i>Good</i>                                               | 0.348<br>(0.74)           | 0.119<br>(0.33)                     | 0.018<br>(0.07)                 |
| <i>Excellent</i>                                          | 0.468<br>(1.08)           | 0.208<br>(0.52)                     | 0.149<br>(0.58)                 |
| <i>Logincome</i>                                          | −0.332*<br>(−1.84)        | −0.252*<br>(−1.94)                  | −0.260<br>(−1.55)               |
| <i>Logincome squared</i>                                  | 0.028**<br>(2.20)         | 0.014<br>(1.52)                     | 0.022*<br>(1.85)                |
| <i>Lognetworth</i>                                        | 11.540<br>(0.94)          | 72.016***<br>(2.93)                 | −9.982<br>(−0.87)               |
| <i>Lognetworth squared</i>                                | −0.340<br>(−0.94)         | −2.121***<br>(−2.85)                | 0.347<br>(0.88)                 |
| <i>Constant</i>                                           | −101.047<br>(−0.98)       | −609.656***<br>(−3.01)              | 67.645<br>(0.82)                |
| <i>N</i>                                                  | 1928                      | 1928                                | 1928                            |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.12: Estimation Results of Asset Allocation: First Step

|                                                           | <i>Mutual Fund<br/>Method C</i> | <i>US Bond<br/>Method C</i> | <i>Transaction Account<br/>Method C</i> |
|-----------------------------------------------------------|---------------------------------|-----------------------------|-----------------------------------------|
| <i>Race/Ethnicity : ref = white</i>                       |                                 |                             |                                         |
| <i>Black</i>                                              | −0.765***<br>(−2.73)            | −0.155<br>(−1.20)           | −0.603***<br>(−4.85)                    |
| <i>Hispanic</i>                                           | −0.480**<br>(−2.44)             | −0.645***<br>(−4.79)        | −0.300***<br>(−2.71)                    |
| <i>Risk tolerance : ref = no risks</i>                    |                                 |                             |                                         |
| <i>Average financial risks</i>                            | 0.922**<br>(2.39)               | 0.204*<br>(1.73)            | 0.368***<br>(3.15)                      |
| <i>Above average financial risks</i>                      | 1.082***<br>(2.99)              | 0.248<br>(1.63)             | 0.522*<br>(1.74)                        |
| <i>Substantial financial risks</i>                        | 0.625<br>(0.82)                 | −0.298<br>(−0.92)           | 0.312<br>(1.36)                         |
| <i>Male</i>                                               | −0.081<br>(−0.29)               | −0.078<br>(−0.41)           | −0.139<br>(−1.16)                       |
| <i>Age</i>                                                | 0.031***<br>(3.53)              | 0.009<br>(1.65)             | 0.015***<br>(3.89)                      |
| <i>Years of schooling</i>                                 | 0.168***<br>(3.10)              | 0.074***<br>(3.14)          | 0.076***<br>(4.31)                      |
| <i>Married</i>                                            | −0.236<br>(−0.82)               | 0.279<br>(1.49)             | 0.145<br>(1.02)                         |
| <i>Family size</i>                                        | −0.033<br>(−0.42)               | 0.020<br>(0.55)             | −0.075**<br>(−2.10)                     |
| <i>The number of children</i>                             | −0.104<br>(−1.01)               | −0.054<br>(−1.25)           | −0.032<br>(−1.01)                       |
| <i>Not working</i>                                        | 0.150<br>(0.58)                 | −0.164<br>(−0.79)           | −0.084<br>(−0.67)                       |
| <i>US economy over the next<br/>5 years : ref = worse</i> |                                 |                             |                                         |
| <i>About the same</i>                                     | −0.337<br>(−0.92)               | 0.218<br>(1.17)             | 0.106<br>(0.69)                         |
| <i>Better</i>                                             | −0.197<br>(−0.90)               | 0.182<br>(0.87)             | 0.121<br>(0.92)                         |
| <i>Health status : ref = poor</i>                         |                                 |                             |                                         |
| <i>Fair</i>                                               | 0.085<br>(0.14)                 | 0.044<br>(0.08)             | −0.072<br>(−0.37)                       |
| <i>Good</i>                                               | 0.105<br>(0.18)                 | 0.075<br>(0.15)             | 0.187<br>(0.92)                         |
| <i>Excellent</i>                                          | 0.311<br>(0.49)                 | 0.120<br>(0.25)             | 0.243<br>(0.96)                         |
| <i>Logincome</i>                                          | −0.202<br>(−1.22)               | 0.188<br>(0.25)             | −0.642***<br>(−4.89)                    |
| <i>Logincome squared</i>                                  | 0.017<br>(1.51)                 | −0.004<br>(−0.10)           | 0.067***<br>(7.19)                      |
| <i>Lognetworth</i>                                        | 25.956*<br>(1.82)               | 13.850<br>(0.87)            | −9.284<br>(−0.48)                       |
| <i>Lognetworth squared</i>                                | −0.757*<br>(−1.77)              | −0.418<br>(−0.87)           | 0.329<br>(0.50)                         |
| <i>Constant</i>                                           | −226.735*<br>(−1.92)            | −119.056<br>(−0.90)         | 63.904<br>(0.44)                        |
| <i>N</i>                                                  | 1928                            | 1928                        | 1928                                    |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.13: Estimation Results of Asset Allocation: Second Step

|                                                           | <i>Stock<br/>Method C</i>          | <i>Business Equity<br/>Method C</i> | <i>Real Estate<br/>Method C</i> |
|-----------------------------------------------------------|------------------------------------|-------------------------------------|---------------------------------|
| <i>Race/Ethnicity : ref = white</i>                       |                                    |                                     |                                 |
| <i>Black</i>                                              | −0.026<br>(−0.34)                  | 0.021<br>(0.25)                     | 0.087<br>(1.25)                 |
| <i>Hispanic</i>                                           | −0.060<br>(−0.56)                  | 0.031<br>(0.49)                     | 0.073<br>(1.19)                 |
| <i>Risk tolerance : ref = no risks</i>                    |                                    |                                     |                                 |
| <i>Average financial risks</i>                            | −0.078<br>(−0.88)                  | −0.081<br>(−1.22)                   | 0.062<br>(0.76)                 |
| <i>Above average financial risks</i>                      | −0.066<br>(−0.58)                  | −0.096<br>(−1.19)                   | 0.085<br>(0.87)                 |
| <i>Substantial financial risks</i>                        | −0.006<br>(−0.04)                  | 0.010<br>(0.09)                     | −0.024<br>(−0.19)               |
| <i>Male</i>                                               | 0.020<br>(0.17)                    | 0.058<br>(0.55)                     | −0.123<br>(−1.30)               |
| <i>Age</i>                                                | $−0.004 \times 10^{-1}$<br>(−0.16) | −0.004<br>(−1.20)                   | 0.005<br>(1.46)                 |
| <i>Years of schooling</i>                                 | −0.008<br>(−0.26)                  | −0.032***<br>(−3.58)                | 0.013<br>(0.95)                 |
| <i>Married</i>                                            | −0.076<br>(−0.78)                  | −0.005<br>(−0.05)                   | 0.197<br>(1.64)                 |
| <i>Family size</i>                                        | 0.001<br>(0.03)                    | 0.004<br>(0.15)                     | −0.017<br>(−0.94)               |
| <i>US economy over the next<br/>5 years : ref = worse</i> |                                    |                                     |                                 |
| <i>About the same</i>                                     | −0.029<br>(−0.22)                  | −0.015<br>(−0.16)                   | −0.006<br>(−0.06)               |
| <i>Better</i>                                             | 0.034<br>(0.32)                    | −0.013<br>(−0.14)                   | −0.030<br>(−0.33)               |
| <i>Health status : ref = poor</i>                         |                                    |                                     |                                 |
| <i>Fair</i>                                               | 0.172<br>(0.46)                    | 0.109<br>(0.39)                     | −0.150<br>(−0.97)               |
| <i>Good</i>                                               | 0.162<br>(0.43)                    | 0.029<br>(0.13)                     | 0.011<br>(0.08)                 |
| <i>Excellent</i>                                          | 0.088<br>(0.23)                    | 0.023<br>(0.10)                     | 0.017<br>(0.12)                 |
| <i>Logincome</i>                                          | −0.003<br>(−0.14)                  | 0.016<br>(1.08)                     | −0.001<br>(−0.05)               |
| <i>Lognetworth</i>                                        | 0.052<br>(0.51)                    | −0.009<br>(−0.08)                   | −0.111<br>(−1.16)               |
| <i>lambda</i>                                             | 0.077<br>(0.48)                    | −0.008<br>(−0.08)                   | 0.352***<br>(2.63)              |
| <i>Constant</i>                                           | −0.520<br>(−0.23)                  | 1.147<br>(0.59)                     | 1.534<br>(0.84)                 |
| <i>N</i>                                                  | 1928                               | 1928                                | 1928                            |

*t* statistics in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.14: Estimation Results of Asset Allocation: Second Step

|                                                           | <i>Mutual Fund<br/>Method C</i> | <i>US Bond<br/>Method C</i> | <i>Transaction Account<br/>Method C</i> |
|-----------------------------------------------------------|---------------------------------|-----------------------------|-----------------------------------------|
| <i>Race/Ethnicity : ref = white</i>                       |                                 |                             |                                         |
| <i>Black</i>                                              | 0.009<br>(0.04)                 | -0.007<br>(-0.06)           | 0.045<br>(1.59)                         |
| <i>Hispanic</i>                                           | -0.024<br>(-0.18)               | -0.102<br>(-0.41)           | 0.081***<br>(3.71)                      |
| <i>Risk tolerance : ref = no risks</i>                    |                                 |                             |                                         |
| <i>Average financial risks</i>                            | 0.144<br>(0.82)                 | -0.034<br>(-0.38)           | -0.113***<br>(-3.95)                    |
| <i>Above average financial risks</i>                      | 0.067<br>(0.38)                 | -0.066<br>(-0.46)           | -0.183***<br>(-5.66)                    |
| <i>Substantial financial risks</i>                        | 0.055<br>(0.26)                 | -0.217<br>(-0.87)           | -0.204***<br>(-4.08)                    |
| <i>Male</i>                                               | -0.110<br>(-0.59)               | -0.119<br>(-0.74)           | 0.010<br>(0.31)                         |
| <i>Age</i>                                                | 0.001<br>(0.24)                 | -0.001<br>(-0.24)           | -0.005***<br>(-5.46)                    |
| <i>Years of schooling</i>                                 | -0.004<br>(-0.07)               | -0.004<br>(-0.12)           | -0.016***<br>(-3.06)                    |
| <i>Married</i>                                            | 0.024<br>(0.12)                 | 0.075<br>(0.41)             | -0.119***<br>(-3.14)                    |
| <i>Family size</i>                                        | -0.022<br>(-0.59)               | 0.033<br>(1.34)             | -0.004<br>(-0.62)                       |
| <i>US economy over the next<br/>5 years : ref = worse</i> |                                 |                             |                                         |
| <i>About the same</i>                                     | -0.097<br>(-0.62)               | 0.090<br>(0.52)             | 0.022<br>(0.61)                         |
| <i>Better</i>                                             | -0.056<br>(-0.44)               | 0.085<br>(0.58)             | 0.038<br>(1.01)                         |
| <i>Health status : ref = poor</i>                         |                                 |                             |                                         |
| <i>Fair</i>                                               | -0.391<br>(-1.17)               | 0.343<br>(1.64)             | -0.034<br>(-0.64)                       |
| <i>Good</i>                                               | -0.227<br>(-0.63)               | 0.233<br>(1.14)             | -0.075<br>(-1.27)                       |
| <i>Excellent</i>                                          | -0.284<br>(-0.73)               | 0.236<br>(1.03)             | -0.122**<br>(-2.06)                     |
| <i>Logincome</i>                                          | -0.005<br>(-0.18)               | -0.021<br>(-0.52)           | 0.003<br>(0.20)                         |
| <i>Lognetworth</i>                                        | 0.062<br>(0.36)                 | -0.018<br>(-0.11)           | -0.310*<br>(-1.83)                      |
| <i>lambda</i>                                             | 0.022<br>(0.09)                 | 0.306<br>(0.72)             | 0.046<br>(0.53)                         |
| <i>Constant</i>                                           | -0.284<br>(-0.07)               | -0.030<br>(-0.01)           | 6.201**<br>(2.48)                       |
| <i>N</i>                                                  | 1928                            | 1928                        | 1928                                    |

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 3.7 Descriptive Statistics

Table A.1 shows the descriptive statistics of weighted characteristics. As described in footnote 1, the descriptive statistics in Table A.1 may not be consistent with the unweighted descriptive statistics in Table 3.1. For example, in Table A.1, average family size of white households is 2.346, while, in Table 3.1, average family size of white households is 2.463. In addition, Table A.2 shows the descriptive statistics of weighted assets. The proportion of households owning stocks is 18.3 percent for whites, 6.2 percent for blacks, and 3.1 percent for Hispanics. As indicated in Haliasson and Bertaut (1995), the proportion of stocks owned is not large.

Table A.1: Descriptive Statistics of Weighted Characteristics

|                                         | <i>White</i><br><i>Mean</i> | <i>Black</i><br><i>Mean</i> | <i>Hispanic</i><br><i>Mean</i> | <i>All</i><br><i>Mean</i> |
|-----------------------------------------|-----------------------------|-----------------------------|--------------------------------|---------------------------|
| <i>Male</i>                             | 0.756                       | 0.567***                    | 0.733** <sup>3</sup>           | 0.726                     |
| <i>Age</i>                              | 52.383                      | 48.098***                   | 42.433*** <sup>3</sup>         | 50.639                    |
| <i>Years of schooling</i>               | 13.731                      | 12.977***                   | 11.494*** <sup>3</sup>         | 13.369                    |
| <i>Married</i>                          | 0.624                       | 0.450***                    | 0.667*** <sup>3</sup>          | 0.604                     |
| <i>Family size</i>                      | 2.346                       | 2.316                       | 3.095*** <sup>3</sup>          | 2.426                     |
| <i>The number of children</i>           | 1.419                       | 1.579***                    | 1.226*** <sup>3</sup>          | 1.420                     |
| <i>The proportion of children</i>       | 0.560                       | 0.573                       | 0.476*** <sup>3</sup>          | 0.552                     |
| <i>Not working</i>                      | 0.330                       | 0.361**                     | 0.182*** <sup>3</sup>          | 0.318                     |
| <i>Risk tolerance</i>                   |                             |                             |                                |                           |
| <i>No financial risks</i>               | 0.433                       | 0.568***                    | 0.650*** <sup>3</sup>          | 0.477                     |
| <i>Average financial risks</i>          | 0.389                       | 0.294***                    | 0.229*** <sup>3</sup>          | 0.357                     |
| <i>Above average financial risks</i>    | 0.145                       | 0.098***                    | 0.080*** <sup>1</sup>          | 0.131                     |
| <i>Substantial financial risks</i>      | 0.032                       | 0.039                       | 0.042**                        | 0.034                     |
| <i>US economy over the next 5 years</i> |                             |                             |                                |                           |
| <i>Worse</i>                            | 0.211                       | 0.094***                    | 0.142*** <sup>3</sup>          | 0.186                     |
| <i>About the same</i>                   | 0.304                       | 0.220***                    | 0.278* <sup>3</sup>            | 0.289                     |
| <i>Better</i>                           | 0.485                       | 0.686***                    | 0.580*** <sup>3</sup>          | 0.525                     |
| <i>Health status</i>                    |                             |                             |                                |                           |
| <i>Poor</i>                             | 0.062                       | 0.070                       | 0.059                          | 0.063                     |
| <i>Fair</i>                             | 0.186                       | 0.261***                    | 0.198 <sup>3</sup>             | 0.199                     |
| <i>Good</i>                             | 0.486                       | 0.440***                    | 0.493 <sup>2</sup>             | 0.480                     |
| <i>Excellent</i>                        | 0.266                       | 0.229***                    | 0.250                          | 0.259                     |
| <i>Current income(\$)</i>               | 85,732                      | 41,302***                   | 48,986*** <sup>2</sup>         | 75,146                    |
| <i>Log current income</i>               | 10.739                      | 10.273***                   | 10.386*** <sup>3</sup>         | 10.632                    |
| <i>Usual income(\$)</i>                 | 91,041                      | 45,399***                   | 54,447*** <sup>2</sup>         | 80,297                    |
| <i>Log usual income</i>                 | 10.901                      | 10.407***                   | 10.546*** <sup>3</sup>         | 10.789                    |
| <i>Net worth(\$)</i>                    | 674,876                     | 105,019***                  | 116,679***                     | 529,308                   |
| <i>Log net worth</i>                    | 15.887                      | 15.834***                   | 15.834***                      | 15.873                    |
| <i>N</i>                                | 4,759                       | 790                         | 639                            | 6,188                     |

Notes: Multiple imputation, sampling, and replication weights are used

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  when compared with white<sup>1</sup>  $p < 0.1$ , <sup>2</sup>  $p < 0.05$ , <sup>3</sup>  $p < 0.01$  when compared with black

Table A.2: Descriptive Statistics of Weighted Assets

|                                    | <i>White<br/>Mean</i> | <i>Black<br/>Mean</i> | <i>Hispanic<br/>Mean</i> | <i>All<br/>Mean</i> |
|------------------------------------|-----------------------|-----------------------|--------------------------|---------------------|
| <i>Stock</i>                       | 40,425                | 3,723***              | 1,742***                 | 30,741              |
| <i>Proportion</i>                  | 0.183                 | 0.062***              | 0.031***, <sup>3</sup>   | 0.148               |
| <i>Business equity</i>             | 125,724               | 4,946***              | 19,537***, <sup>2</sup>  | 96,239              |
| <i>Proportion</i>                  | 0.157                 | 0.056***              | 0.060***                 | 0.131               |
| <i>Real estate</i>                 | 123,666               | 28,140***             | 20,407***                | 98,172              |
| <i>Proportion</i>                  | 0.216                 | 0.134***              | 0.085***, <sup>3</sup>   | 0.189               |
| <i>Mutual funds</i>                | 44,520                | 1,038***              | 3,321***                 | 33,569              |
| <i>Proportion</i>                  | 0.112                 | 0.014***              | 0.015***                 | 0.087               |
| <i>US government savings bonds</i> | 860                   | 752                   | 62***, <sup>3</sup>      | 755                 |
| <i>Proportion</i>                  | 0.146                 | 0.081***              | 0.026***, <sup>3</sup>   | 0.123               |
| <i>Transaction accounts</i>        | 37,439                | 5,307***              | 6,107***                 | 29,247              |
| <i>Proportion</i>                  | 0.962                 | 0.809***              | 0.832***                 | 0.925               |
| <i>N</i>                           | 4,759                 | 790                   | 639                      | 6,188               |

Notes: Multiple imputation, sampling, and replication weights are used; the unit is \$1.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  when compared with white

<sup>1</sup>  $p < 0.1$ , <sup>2</sup>  $p < 0.05$ , <sup>3</sup>  $p < 0.01$  when compared with black

## Chapter 4

# The Effect of Investor Sentiment toward an Exchange Merger on Liquidity

Takanori Hisada , *International Journal of Economics and Financial Issues*

### 4.1 Introduction

Do exchange mergers increase liquidity because of investor sentiment? Investor sentiment is defined as optimism or pessimism about the future stock market (Baker and Wurgler, 2006). Exchange mergers have recently increased because of competition among exchanges. For example, there have been mergers involving the JPX, Euronext, OMX, NYSE-Euronext, and NASDAQ-OMX. There are various benefits from mergers. Exchange companies expect cost reductions, economies of scope, and increased market share. Regarding investors, it is said that an increase of liquidity. Illiquid stocks demand higher returns (Amihud and Mendelson, 1986). If liquidity is greater, investors can more rapidly buy or sell stocks, and listed companies expect to improve their ease of financing owing to increased liquidity. In contrast, regulatory authorities are concerned about market power arising from exchange mergers, because exchange companies may behave as monopolies, raising transaction costs. Therefore, there are many areas of interest in such an analysis, comprising both economic and regulatory issues that

affect investors, listed companies, financial intermediaries, and the overall economy (Nielsson, 2009). However, little is known about the relationship between stock exchange mergers and liquidity.

This study considers two processes that increase liquidity. The first is synergy; cost reductions, economies of scope, economies of scale, and increased market share are examples of synergy. Although Arnold et al. (1999) find that exchange mergers increase liquidity and Nielsson (2009) shows that exchange mergers increase the liquidity of large firms and firms with foreign sales, prior studies suggest that there are various factors that increase liquidity from mergers. This study assumes that economies of scale and network externalities induce greater liquidity through lower transaction costs. The second process that increases liquidity is the investor sentiment effect. Previous studies do not consider the investor sentiment effect. However, this effect is important, because if investors believe that an exchange merger is a positive phenomenon, then liquidity will increase.

Most studies have analyzed exchange mergers in Europe. These analyses involve increases in the potential investor base due to cross-border mergers. Furthermore, the prior literature does not consider market structure, such as the trading system, tick size, and index demand, or the reputation effects from large exchange movements. Index demand and reputation effects increase liquidity. This study uses the events that occurred during the merger between the Tokyo Stock Exchange (TSE) and the Osaka Securities Exchange (OSE) for its analysis; therefore, This case study can exclude the increase in the potential investor base due to the cross-border nature of the merger. Moreover, this study uses firm data that exclude double listings on the OSE and TSE. The firm data can be considered in the market structure and can exclude the TSE's reputation effects and index demand, which affect liquidity.

The main result is that synergy and the investor sentiment effect resulting from mergers occur in the short run with liquidity increases. In particular, the investor sentiment effect occurs more strongly in small stocks. Exchange mergers do not necessarily increase liquidity in the long run.

The rest of the paper is organized as follows. Section 2 presents related literature and hypotheses development. Section 3 describes the data and method, and Section 4 presents the estimation results. Section 5 concludes.

## 4.2 Related Literature

Nielsson (2009) investigates Euronext stock exchange mergers and liquidity. She finds that liquidity increases among large firms and firms with foreign sales. Three reasons that liquidity increases are that each individual firm faces a larger pool of potential investors, and the market may deepen and lower transaction costs, since stock exchange mergers are likely to lead to increased liquidity. Arnold et al. (1999) find that US regional stock exchange mergers lead to liquidity increases that result from economies of scale. Considering the Euronext merger, Pagano and Padilla (2005) find that liquidity increases because of cost synergies.

## 4.3 Hypotheses

According to Black (1986), as noise trading increases, so does market liquidity. With regard to the relationship between liquidity and investor sentiment, Baker and Stein (2004) suggest that in a market with short sales constraints, liquidity can be a sentiment indicator. High liquidity is a sign that the sentiment of noise investors is positive, and is a symptom of overvaluation. De Long et al. (1990) imply that high investor sentiment generates high liquidity. Liu's (2015) empirical analysis indicates that high investor sentiment increases liquidity. In summary, higher investor sentiment generates more noise trading, which in turn increases liquidity.

In psychological analysis, mood most strongly affects judgments about which people lack concrete information (Forgas, 1995). People who are in good moods tend to find positive material more available or salient (Isen et al., 1978), and engage in more use of simplifying heuristics to aid their decisions (Bless et al., 1996). Thus, this study assumes that exchange mergers are a positive phenomenon.

**Hypothesis A:** Liquidity increases owing to cost synergy.

**Hypothesis B:** If noise traders believe that merger events are a positive phenomenon, then liquidity increases because of the high investor sentiment.

**Hypothesis C:** If individual investors are noise traders, they buy small stocks, and the investor sentiment effect occurs more strongly in small stocks.

## 4.4 Data and Method

### 4.4.1 Data

The TSE announced its merger with the OSE on November 22, 2011. The Japan Exchange Group (JPX) was inaugurated on January 1, 2013, and the stock exchanges were integrated on July 16, 2013. This study uses daily data on common stocks of the TSE, excluding those double listed on the OSE, from July 1, 2010, to June 30, 2016; the data are provided by Nikkei NEEDS Financial QUEST (FQ). As mentioned above, this case study can exclude the increase in the potential investor base due to the cross-border nature of the merger. Moreover, the firm data can be considered in the market structure and can exclude the TSE's reputation effects and index demand, which affect liquidity.

### 4.4.2 Method

Like Baker and Wurgler (2006), this study creates an investor sentiment index. Instead of closed-end funds, this study considers exchange-traded funds (ETFs). ETFs are the average difference between the ETFs of the Tokyo Stock Price Index (TOPIX) type and the TOPIX provided by FQ. The initial public offering (IPO) market is often viewed as responsive to sentiment (Baker and Wurgler, 2006). IPO data are provided by each exchange company<sup>1</sup>. This study takes the number of IPOs, NIPOs, and VIX as measures of investor sentiment (Baker and Wurgler, 2007). This study also uses the Nikkei Stock Average Volatility Index and PBR provided by the FQ; PBR is viewed as responsive to sentiment (Li et al., 2016).

The first principal component of the four proxies is estimated.

$$SENTIMENT_t = 0.6768ETF_t + 0.6174NIPO_t + 0.3117VIX_t + 0.2522PBR_t$$

Fixed-effects regression is used to analyze the merger effect.

$$Y_{it} = \alpha + \beta_1 EVENT_{it} + \beta_2 SENTIMENT_{it} + \beta_3 Z_{it} + \eta_i + \lambda_t + \varepsilon$$

---

<sup>1</sup>In particular, IPO data are provided by the JPX, Nagoya Stock Exchange, Fukuoka Stock Exchange, and Sapporo Securities Exchange.

where  $Y_{it}$  indicates liquidity, which is turnover or ILLIQ.  $EVENT_{it}$  is a dummy variable that indicates the merger event.  $Z_{it}$  denotes other control variables. The daily price index is unrelated to the merger but may influence liquidity. There is typically more stock market activity in economic upturns. Daily price index data are provided by NOWCAST.  $\eta_i$  and  $\lambda_t$  denote fixed effects and daily fixed effects.

## 4.5 Estimation Results

Table 4.1 presents the estimation results for turnover, which is defined as the number of shares traded relative to the number of outstanding shares. Event 1 indicates the day that the TSE announced its merger with the OSE. The coefficient of Event 1 is significantly positive, which implies that liquidity increases because of the announcement effect. Event 2 indicates the day that the JPX executed the stock exchange integration. The coefficient of Event 2 is significantly positive, which suggests that liquidity increases due to synergy. However, the coefficient of Event 3 is significantly negative. Event 3 is a dummy that takes a value of 1 for the year after the merger. Liquidity decreases the year after the merger. The coefficient of sentiment is significantly positive, indicating that investor sentiment increases liquidity. This suggests that synergy and investor sentiment occur in the short run, and liquidity decreases one year after the merger. Thus, hypotheses A and B of this study are supported. Surprisingly, the coefficient of the price index is significantly negative.

Retail (small) trade imbalances move stock prices and forecast future returns, suggesting that retail trade moves markets. Retail (individual) investor trades are most likely to be especially influential among small stocks (Barber et al., 2009). Thus, to investigate liquidity, this study investigates the market of small stocks. MOTHERS (markets of the high-growth and emerging stocks) have many small stocks.

Table 4.2 show the estimation results of the turnover of MOTHERS. The coefficient of Event 1 is significantly positive, implying that liquidity increases due to the announcement effect. The coefficient of Event 2 is significantly positive. This suggests that liquidity increases due to synergy. However, the coefficient of Event 3 is negative, although it is not significant. Liquidity decreases after one year. This implies that synergy and investor sentiment occur in the short run, and liquidity decreases one year after the merger. The coefficient of the price index is significantly negative, while the coefficient of sentiment is significantly positive. Investor sentiment in-

creases liquidity. Moreover, the coefficient of sentiment in Table 4.2 is larger than the coefficient of sentiment in Table 4.1. This suggests that investor sentiment occurs more strongly among small stocks, which are more likely to be traded by individual investors. Thus, hypothesis C of this study is supported.

As a robustness check, this study uses the ILLIQ illiquidity indicator (Amihud, 2002). This is a daily absolute return to the yen trading volume on the day. ILLIQ is defined as follows.

$$ILLIQ_t = Average \left( \frac{|r_t|}{Volume_t} \right)$$

Table 4.3 shows the estimation results of ILLIQ. The coefficient of Event 1 is significantly negative, which implies that liquidity increases due to the announcement effect. The coefficient of Event 2 is significantly negative, indicating that liquidity increases due to synergy. However, the coefficient of Event 3 is significantly positive; liquidity decreases after one year. The coefficient of sentiment is significantly negative, which means that investor sentiment raises liquidity. These results suggest that synergy and investor sentiment occur in the short run, and liquidity decreases one year after the merger.

Table 4.4 presents the estimation results of taking the log of turnover and sentiment. The events show similar results as those in Table 4.1. The coefficient of Log sentiment is significantly positive, which suggests sentiment increases liquidity.

For a further robustness check, this study uses sentiment2, which excludes VIX, because high VIX equates to high turnover. The first principal component of the three proxies is estimated.

$$SENTIMENT2_t = 0.7015ETF_t + 0.6442NIP0_t + 0.3048PBR_t$$

Table 4.5 shows the estimation results of turnover in Sentimet2. The coefficient of Event 1 is significantly positive, implying that liquidity increases due to the announcement effect. The coefficient of Event 2 is significantly positive. This suggests that liquidity increases due to synergy. However, the coefficient of Event 3 is significantly negative, and liquidity decreases after one year. This implies that synergy and investor sentiment occur in the

short run, and liquidity decreases one year after the merger. The coefficient of the price index is significantly negative. The coefficient of VIX is significantly positive, while the coefficient of sentiment is significantly positive, and. Investor sentiment increases liquidity.

To confirm endogeneity, the lag of sentiment is used. Table 4.6 shows the estimation results using the lag of sentiment. The events show similar results as those in Table 4.1. The coefficient of Sentimentlag is significantly positive, which suggests sentiment increases liquidity.

Table 4.7 shows the estimation results of turnover in each of the variables. The events show similar results as those in Table 4.1. The coefficients of ETF, NIPO, VIX, and PBR are significantly positive. These values suggest each variable increases liquidity.

## 4.6 Conclusion

This study investigates the relationships among an exchange merger, investor sentiment, and liquidity by analyzing data from the 2013 merger of the TSE and OSE. In contrast to prior studies, this study considers the investor sentiment effect due to an exchange merger. Synergy and the investor sentiment effect occur in the short run with liquidity increases. The investor sentiment effect occurs more strongly in small stocks. An exchange merger does not necessarily increase liquidity in the long run. Regulatory authorities should carefully consider these results when considering mergers. Moreover, exchange companies may mislead investors about liquidity increases over the long term.

# Bibliography

- Amihud, Y., 2002. Illiquidity and Stock Returns: Cross-Section and Time-Series Effects. *Journal of Financial Markets*, **5**(1), 31–56.
- Amihud, Y., and Mendelson, H., 1986. Asset Pricing and the Bid-Ask Spread. *Journal of Financial Economics*, **17**(2), 223–249.
- Arnold, T., Hersch, P., Mulherin, J. H., and Netter, J., 1999. Merging Markets. *Journal of Finance*, **54** (3), 1083–1107.
- Baker, M., and Stein, J. C., 2004. Market Liquidity as a Sentiment indicator. *Journal of Financial Markets*, **7**(3), 271–299.
- Baker, M., and Wurgler, J., 2006. Investor Sentiment and the Cross-Section of Stock Returns. *Journal of Finance*, **61**(4), 1645–1680.
- Baker, M., and Wurgler, J., 2007. Investor Sentiment in the Stock Market. *Journal Economic Perspectives*, **21**(2), 129–151.
- Barber, M. B., Odean, T., and Zhu, N., 2009. Do Retail Trades Move Markets? *Review of Financial Studies*, **22**(1), 151–186.
- Black, F., 1986. Noise. *Journal of Finance*, **41**(3), 529–543.
- Bless, H., Schwarz, N., and Kemmelmeier, M., 1996. Mood and Stereotyping: Affective States and the Use of General Knowledge Structures. *European Review of Social Psychology*, **7**(1), 63–93.
- De Long, J. B., Shlifer A., Summers L. H., and Waldmann, R. J., 1990. Noise Trader Risk in Financial Markets. *Journal of Political Economy*, **98**(4), 703–738.
- Forgas, J. P., 1995. Mood and Judgment: The Affect Infusion Model (AIM). *Psychological Bulletin*, **117**(1), 39–66.

- Isen, A., Shalke, T. E., Clark, M., and Karp, L., 1978. Affect Accessibility of Material in Memory and Behavior: A Cognitive Loop? *Journal of Personality and Social Psychology*, **36**(1), 1–12.
- Li, H., Zhao, S., Sun, Q., and Zhang, T., 2016. Generalized Entropy Optimization Model Applied to Investment Decision Based on Investor Sentiment. Available at :[www.tjfeonline.com/admin/archive/1919.11.20161479531890.pdf](http://www.tjfeonline.com/admin/archive/1919.11.20161479531890.pdf)
- Liu, S., 2015. Investor Sentiment and Stock Market Liquidity. *Journal of Behavioral Finance*, **16**(1), 51-6-7.
- Nielsson, U., 2009. Stock Exchange Merger and Liquidity: The Case of Euronext. *Journal of Financial Markets*, **12**(2), 229-267.
- Pagano, M., and Padilla, A. J., 2005. Gains from Stock Exchange Integration: The Euronext Evidence. Available at: <http://www.ilsole24ore.com/art/SoleOnLine4/Finanza%20e%20Mercati/2006/05/padilla-pagano.pdf>

### Parameter Estimates of Turnover

|                                              |           |         |
|----------------------------------------------|-----------|---------|
| Event1 ( $\times 10^{-1}$ )                  | 0.022***  | (0.003) |
| Event2 ( $\times 10^{-1}$ )                  | 0.028***  | (0.004) |
| Event3 ( $\times 10^{-1}$ )                  | -0.007*   | (0.004) |
| Sentiment( $\times 10^{-2}$ )                | 0.017***  | (0.002) |
| Price index                                  | -0.116*** | (0.012) |
| Constant ( $\times 10^{-1}$ )                | 0.011***  | (0.003) |
| Fixed effect                                 | Yes       |         |
| Trend                                        | Yes       |         |
| <hr/>                                        |           |         |
| N                                            | 2,895,625 |         |
| <hr/>                                        |           |         |
| Robust standard errors are in parentheses    |           |         |
| * $p < 0.1$ , ** $p < 0.05$ , *** $p < 0.01$ |           |         |

### Parameter Estimates of Turnover in MOTHERS

|                                              |            |         |
|----------------------------------------------|------------|---------|
| event1                                       | 0.007***   | (0.002) |
| event2                                       | 0.017***   | (0.004) |
| event3                                       | −0.003     | (0.003) |
| Sentiment ( $\times 10^{-2}$ )               | 0.056***   | (0.012) |
| Price index                                  | −0.577***  | (0.106) |
| Constant                                     | 0.001      | (0.002) |
| Fixed effect                                 | <i>Yes</i> |         |
| Trend                                        | <i>Yes</i> |         |
| <hr/>                                        |            |         |
| <i>N</i>                                     | 249,003    |         |
| <hr/>                                        |            |         |
| Robust standard errors in parentheses        |            |         |
| * $p < 0.1$ , ** $p < 0.05$ , *** $p < 0.01$ |            |         |

Parameter Estimates of ILLIQ

|                                 |            |         |
|---------------------------------|------------|---------|
| Event1 ( $\times 10^{-8}$ )     | -0.095***  | (0.034) |
| Event2 ( $\times 10^{-8}$ )     | -0.236***  | (0.020) |
| Event3 ( $\times 10^{-8}$ )     | 0.063***   | (0.013) |
| Sentiment ( $\times 10^{-8}$ )  | -0.002**   | (0.001) |
| Price index( $\times 10^{-8}$ ) | 8.710***   | (0.744) |
| Constant ( $\times 10^{-8}$ )   | 0.970***   | (0.050) |
| Fixed effect                    | <i>Yes</i> |         |
| Trend                           | <i>Yes</i> |         |
| <i>N</i>                        | 2,822,752  |         |

Robust standard errors are in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Parameter Estimates of Log Turnover

|                                   |            |         |
|-----------------------------------|------------|---------|
| Event1( $\times 10^{-1}$ )        | 0.012***   | (0.002) |
| Event2 ( $\times 10^{-1}$ )       | 0.018***   | (0.003) |
| Event3 ( $\times 10^{-1}$ )       | -0.007**   | (0.003) |
| Log sentiment( $\times 10^{-1}$ ) | 0.034***   | (0.003) |
| Price index                       | -0.095***  | (0.009) |
| Constant                          | -0.005***  | (0.001) |
| Fixed effect                      | <i>Yes</i> |         |
| Trend                             | <i>Yes</i> |         |
| <i>N</i>                          | 2,895,625  |         |

Robust standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Parameter Estimates of Turnover in Sentimet2

|                                 |            |         |
|---------------------------------|------------|---------|
| Event1 ( $\times 10^{-1}$ )     | 0.022***   | (0.003) |
| Event2 ( $\times 10^{-1}$ )     | 0.027***   | (0.004) |
| Event3 ( $\times 10^{-1}$ )     | -0.008**   | (0.004) |
| Sentiment2 ( $\times 10^{-2}$ ) | 0.018***   | (0.002) |
| VIX ( $\times 10^{-2}$ )        | 0.004***   | (0.001) |
| Price index                     | -0.114***  | (0.012) |
| Constant ( $\times 10^{-1}$ )   | 0.013***   | (0.003) |
| Fixed effect                    | <i>Yes</i> |         |
| Trend                           | <i>Yes</i> |         |
| <i>N</i>                        | 2,895,625  |         |

Robust standard errors are in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Parameter Estimates of Turnover in Sentimentlag

|                                    |            |         |
|------------------------------------|------------|---------|
| Event1 ( $\times 10^{-1}$ )        | 0.021***   | (0.003) |
| Event2 ( $\times 10^{-1}$ )        | 0.027***   | (0.004) |
| Event3 ( $\times 10^{-1}$ )        | -0.007*    | (0.004) |
| Sentiment lag ( $\times 10^{-2}$ ) | 0.016***   | (0.002) |
| Price index                        | -0.114***  | (0.012) |
| Constant ( $\times 10^{-1}$ )      | 0.012***   | (0.003) |
| Fixed effect                       | <i>Yes</i> |         |
| Trend                              | <i>Yes</i> |         |
| <i>N</i>                           | 2,892,887  |         |

Robust standard errors are in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Parameter Estimates of Turnover in Each Variables

|                               |            |         |
|-------------------------------|------------|---------|
| Event1 ( $\times 10^{-1}$ )   | 0.015***   | (0.002) |
| Event2 ( $\times 10^{-1}$ )   | 0.023***   | (0.004) |
| Event3 ( $\times 10^{-1}$ )   | -0.008**   | (0.004) |
| ETF ( $\times 10^{-3}$ )      | 0.022***   | (0.007) |
| NIPO ( $\times 10^{-3}$ )     | 0.124***   | (0.030) |
| VIX ( $\times 10^{-3}$ )      | 0.032***   | (0.008) |
| PBR ( $\times 10^{-3}$ )      | 0.223***   | (0.066) |
| Price index                   | -0.096***  | (0.012) |
| Constant ( $\times 10^{-1}$ ) | 0.017***   | (0.003) |
| Fixed effect                  | <i>Yes</i> |         |
| Trend                         | <i>Yes</i> |         |
| <i>N</i>                      | 2,895,625  |         |

Robust standard errors are in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Chapter 5

# Conclusion

In the second chapter, this study investigates gender differences. “Promotion of start-up activities” and “elimination of gender differences” are urgent and important issues facing contemporary society, regardless of country or region. This research is expected to contribute to academic knowledge on the intersection of these two major issues, discussions on a deeper understanding of where the problem is, and discussions of problem-solving through policies based on the study results. In particular, this research finds different relationships for entrepreneurship and intrapreneurship and part-time work. It suggests that women more often conduct independent entrepreneurship outside organizations, and secure employment through part-time work, because it is important to be able to spend time preparing for entrepreneurship, while to eliminate gender differences in intrapreneurship within an organization, more women are engaged full time instead of part time. Therefore, individuals can select an opportunity to have more time off through part-time work, while at the same time, individuals may choose to work full time. It is expected that gender differences will be resolved in both independent entrepreneurship and intrapreneurship with the ability to secure opportunities regardless of gender.

Note that this research is focused on the United States where data is comparatively easy to obtain, so caution should be used in applying the findings to other countries, including Japan. In particular, the results of this study showing that individual family attributes do not strongly explain the gender differences between independent entrepreneurs and intrapreneurship depend on the situation found in the United States, where societal child care environments are considered relatively well developed. Also, when performing a similar analysis for Japan, there may be a greater possibility of

obtaining the result that family attributes are important. Similarly, in the context of Japan's working environment, the distinction between regular employment and non-regular employment may be more important than the distinction between full-time and part-time employment in the US.

In the third chapter, this study investigates racial differences. The imbalance of wealth between races and ethnicities is a political issue. The imbalance of wealth is caused by income, taxation, inheritance, human capital, and portfolio choice (Cagetti and Nardi, 2008). In particular, when considering income, nonwhites have a wage gap relative to whites (Blau and Kahn, 1992), and nonwhites have higher rates of unemployment than whites (Ritter and Taylor, 2011). The government should reduce the unemployment rate and wage differentials among races and ethnicities.

It has not yet been revealed whether the influence of race and ethnicity differences on asset selection is a temporary or long term phenomenon. However, this problem cannot be clarified using cross-sectional data. To solve this problem, it is necessary to use panel data.

As described above, in practice, there is wealth inequality between whites and nonwhites. Prior studies suggest that the reason wealth inequality arises between whites and nonwhites is that nonwhite households are less likely to take risks and hold risky assets than white households. However, white, black, and Hispanic households take risks at a similar level and have similar asset allocations. Differences among races and ethnicities do not necessarily influence risk tolerance and asset allocation. Therefore, these results imply that wealth inequality between whites and nonwhites is not attributed to asset allocation.

This result is a major reversal of the conventional policy proposal of the importance of enhancing racial and ethnic financial education; while there is impact, it is based on cross-sectional data and is obtained at one point in 2010; therefore, it is subject to data period restrictions. If the difference in asset selection is not temporary and actually exists between racial and ethnic groups over time, even if imbalances such as income are eliminated, the disparity of wealth between races and ethnicities is considered unlikely to disappear. To rectify the wealth gap due to asset selection, the government has considered promoting financial education in schools and elsewhere. On the other hand, if the selection of assets between races and ethnicities is similar in the long run, it is thought that the government will promote policies to further eliminate imbalances such as income and heritage rather than enhancing traditional financial education.

In the fourth chapter, this study investigates liquidity differences before and after exchange mergers. The main result is that cost synergies and the

investor sentiment effect resulting from mergers occur in the short run, accompanied by liquidity increases. In particular, the investor sentiment effect occurs more strongly in small stocks. Exchange mergers do not necessarily increase liquidity in the long run. Regulatory authorities should carefully consider these results when considering mergers. Moreover, exchange companies may mislead investors about liquidity increases over the long term.

Unlike previous studies, this case study could exclude the increase in the potential investor base due to the cross-border nature of the merger. Moreover, firm data can be considered in the market structure and can exclude the TSE's reputation effects and index demand, which affect liquidity. Future research will investigate the differences between stock returns and volatility before and after exchange mergers.

Finally, there are presently various differences in society: differences in gender, differences in race, differences in wages, and differences in liquidity. Clarifying the sources of the differences and where they should be reduced or eliminated requires a policy for improvement.

# Bibliography

BLAU, FRANCINE D., AND LAWRENCE M. KAHN. 1992. “Race and Gender Pay Differentials.” NBER Working Paper, No. 4120.

Cagetti M, De Nardi M. 2008. Wealth Inequality: Data and Models. *Macroeconomic Dynamics* **12**: 285–313.

RITTER, JOSEPH A., AND LOWELL J. TAYLOR. 2011. “Racial Disparity in Unemployment.” *Review of Economics and Statistics*, **93**(1), 30-42.

# Acknowledgment

I would like to express my sincere appreciation to Professor Wataru Ohta of Osaka University, who supervised me throughout my doctoral course. He supported me, read my manuscripts carefully, and gave me accurate advice in the seminar. This thesis would not have been possible without his generous support. In addition, his eager and earnest attitude toward research is very inspiring.

I would also like to express my sincere appreciation to Professor Takanori Adachi of Nagoya University. He taught me how to write, revise, and submit a paper and his generous support was instrumental in the completion of this thesis. Furthermore, I find his enthusiasm and focus as a researcher very inspiring.

Finally, I would like to express my sincere appreciation to Professor Yoshiro Tsutsui of Konan University, who supervised me throughout my master course and gave me excellent advice in the seminar.