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Is being risky a part of growing your business? Evidence from Vietnam

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List of Acronyms

SMEs	: Small and Medium sized enterprises
TFP	: Total Factor Productivity
LP	: Labor Productivity
SGP	: Single Factor Productivity
OLS	: Ordinary Least Square
POLS	: Pooled Ordinary Least Square
RE	: Random Effects
R&D	: Research and Development
FDI	: Foreign Direct Investment
ERM	: Enterprise Risk Management

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Abstract

This study is designed to shed light on the owners' individual risk preferences on their firms' total factor productivity via their innovation decisions regarding products and staff by using the 4101 Vietnamese Small and Medium-sized firms panel dataset over the course of 2011 to 2015. The effects of risk aptitude of the individual on a firm's total factor productivity calculated from the Cobb-Douglas production function, along with the usage of the Probit model to indicate the probability of firms' innovative intentions, and later with the application of Pooled Ordinary Least Square and Random Effects model to get estimation results. The outcomes reveal a positive correlation between the individual taste of risk towards the innovation intentions for products, but this result is the opposite for staff innovation. Moreover, the gap between the performance of the two types of owners is explicit, while the risk-averse type yields a lower total amount of productivity compared to its counterparts. The total results are supported by most of the previous papers regarding the relationship between risk aptitude towards innovation intentions and total factor productivity.

Keywords

Entrepreneurship, Risk Preferences, Total Firm Productivity, Innovation, SME.

Chapter 1 | Introduction

1.1 Background

The increasing number of existing businesses and the rise of entrepreneurship place a crucial element in fostering the economy and society. Also, it could be seen as a primary factor for the youth to work towards, advance in their career, and building wealth (Ojiaku & Nkamnebe & Nwaizugbo, 2018). Additionally, the total of entrepreneurs, along with their income and Productivity, is increasing considerably, with 20% was accounted for parts of central and east Asia (GEM, 2020). ADB Asia SMEs Monitor and GSO Vietnam also stated the growth in the number of SMEs up to 2018 was more than 600,000 firms, with an increasing ratio at around 10% per year and contributed directly to Vietnam's GDP, with nearly 43%.

Along with the positive growth flows in Vietnam, Worldbank (2022) reported an annual growth rate of 7.5%, regardless of the previous effect of the pandemic. However, this could also be an alarm for the developing strategy since the sustainability rate has decreased, and to fill in that void, the Productivity of the economy needs to be increased by at least 2%. Worldbank (2016) predicted that Vietnam will achieve prosperity status towards the year 2035, proven by an escalating pace of productivity growth, resulting from the over-competitiveness within the domestic market, along with the urban agglomeration. On top of that, the root cause behind this development happened to be the source of national technological and innovative capacity. Harvard growth lab (2022) also indicates that Vietnam will be the fastest-growing country in the next decade due to its stable economic complexity. Also, noteworthy that the National Digital Transformation Program in Vietnam has drawn up a plan for developing and operating the digital economy to pave the way for the thriving of E-commerce, Fintech, and Edtech. From that, regarding foreign investment, Vietnam can still be considered to be quite a lucrative market as for innovation and digital growth development as a part of the fundamental market. But it still holds a friendly environment for Vietnamese small and middle-sized businesses.

With all the aforementioned statistics, it is clear that there is an increase in the number of people trying to establish their own businesses. Especially a business show called "Shark Tank" where many young entrepreneurs come and seek for their investment opportunities from various investors, and this has shown to the public that there are lots of micros and small firms trying to set up their spot and penetrate the dynamic market of Vietnam (VTV news, 2019). Another point that should be considered is that numerous Vietnamese entrepreneurs, regardless of their gender, were willing to take risks to build up their own "emperor" whenever they saw an opportunity (Forbes, 2019).

There is quite much previous research that has been done to study the relationship between gender differences and their risk perception, which suggests that men are more likely to be risk-taking compared to their female counterparts (Croson & Gneezy, 2009). And many related studies in the Vietnam market have also shown that companies leaders who are female are more likely to be secure in their actions and have a tendency to lean towards risk-averse behaviors (Hoang, Nguyen, and Van, 2019; Cong Duc et al., 2020; Ngoc Hoang et al., 2021). Most of the existing papers have tried to prove the connection between the executive and managing actions from the females' perspective towards their financial management. However, this study aims to conduct an in-depth study of the firm owners' risk behavior towards the firms' Productivity, and I attempt to use the cross-sectional data for the SMEs dataset investigated in Vietnam from 2009-2015 to discover their connection.

1.2 Research questions

- (1) The difference between the firm Productivity of the Firm that takes risks compared to their counterparts.
- (2) The innovation decision and its effects towards Firm's total Productivity
- (3) The gender effects difference between Firm's Productivity.

1.3 Research Limitations

In this study, due to the lack of time and the availability of the dataset, certain limitations are inevitable regarding the use of the econometrics model or the assumptions and requirements of some previous papers for this research and so as the level of student research. Some obstacles and challenges that result during the research timeline will be listed below:

- The assumption of the stability of individual risk preferences, even though this is indeed the scope of this research paper. However, due to the lacking availability of the data, only provides with the 2015 data and the two other years are left out from the whole population. Even though there is a wide range of papers proving that this attribute of human beings is not easily to be altered during the course of time given, they also come along with some strict requirements such as the environment needs to be ideal, the set of behavior needed to be measured under some certain aspects. This could inadvertently create a bias due to the changing individual taste in risk and their related behaviors overtime.
- Another noteworthy point that needs to be considered is the investing or operating sector of the firms. Tracing back to the timeline of the research from 2011 to 2015. There was a high number of firms in the Vietnamese market that were wholly focused on specializing in manufacturing sectors, and the proportion for other types are negligible. On top of that, the market tended to favor those with manufacturing core working businesses due to the economics strategy.
- By measuring the firm performance by total factor productivity, which is proven to be ideal for measuring some unobservable factors such as innovation or risk aptitude. However, it requires the perfect set of panel data, in other words, a perfectly balanced panel set. Leading to the fact that I must remove some of the firms that cannot survive through the surveyed period.

Chapter 2 | Literature Review

2.1 Firm Performance

2.1.1 Measuring Firm Performance

Regarding measuring and detecting firm Productivity, multiple methods have been chosen so far, including single factor productivity (SGP), labor productivity (L.P.), or total factor productivity (TFP) (Syverson, 2011). All of them universally hold their own advantages and disadvantages. SGP seems to be the most rational along with most transparent one since it bases on the proportion of the total output and input of firms. However, this is only true in some specific circumstances, and the drawback it carries is that it simply cannot reflect other externalities and implicit variables. Similar to the touched-above method is L.P., but the main discrepancy between them is L.P. can directly calculate the outcomes of its Firm by relying on the number of labor units and be presented by the value added by an employee. At this point, unlike SGP, L.P. is indeed concerned with the contribution of labor and its linkage to the inputs and outputs of the Firm. But some of the unobservable factors cannot be put into consideration. Fortunately, the last method (TFP) can cover the factor of firms or owner innovativeness, and the measuring matter seems to reign supreme in this case despite some looming limitations. Since TFP cannot be identified explicitly, it is hard to say that this index can be tracked directly with any of its criteria (technology, trading policy, staff training, and market competition). Take a closer look at the association between innovation and firm Productivity, according to the Cobb-Douglass production function, but for another look based on some of the following requirements (Heckman & Leaner, 2007). The function would be as follows.

$$Y_{it} = A_{it} F (K_{it}^{\beta_k} L_{it}^{\beta_l} M_{it}^{\beta_m})$$

Where Y denotes firm performance (which can be comprehended as sales, revenues, or the outcomes by various means like the financial outcome) of the i firm in t time, K is the asset capital used to manufacture firm outcomes, L is the labor force used, M is the number of material inputs, and A is TFP or in other words, labor-augmenting and technological advancement factor that alters the production level of the Firm, and also this can be used to represent the innovation factor, especially for the technology and human investment ones. In order to identify the A element thoroughly, the natural logs of the above function would be taken.

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + \varepsilon_{it}$$

where the natural logarithms of A in this case is

$$\ln (A_{it}) = \beta_0 + \varepsilon_{it}$$

In this function, β_0 is considered as the facet of efficiency of firms, while ε_{it} is still considered an unobservable component. Granted another aspect to break the firm's Productivity into a smaller levels (Bernard & Reding, 2009). More specifically, the firm efficiency (β_0) and other components (ε_{it}) are now defined as ω_{it} and ν_{it} as for Firm productivity level, and other error determiners such as externalities factors u_{it}^q . Giving Cobb-Douglas production function as below:

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + \nu_{it} + \varepsilon_{it}$$

As for seeking the total Productivity of firms from the production function, the calculation would be:

$$\omega_{it} (tfp_{it}) = \beta_0 + v_{it} = y_{it} - \beta_k k_{it} - \beta_l l_{it} - \beta_m m_{it}$$

$$A_{it} = \frac{Y_{it}}{(K_{it}^{\beta_k} L_{it}^{\beta_l} M_{it}^{\beta_m})}$$

Even though the TFP cannot be observed directly, we can use it as a tool to measure and evaluate other forms of impact. Again, it could not be seen transparently as for S.P. and L.P. On the other hand, capturing all the shares out of the production model itself.

2.1.2 Firm Productivity Endogeneity and Selection Bias

As touched above, the TFP equation can be applied finely with the impact evaluation (OLS or Panel estimation). However, TFP is still an unobservable variable and is formulated with a deduction based on all the observed elements. As a result, this can be seen as an exogenous problem. Since the production function cannot solely determine the Firm itself, it merely relies on various factors outside of the firm or even the characteristics of the firm. From that raises a question about the endogeneity of the inputs. Although the ambiguous attributes of the inputs seem to be solved with the controlling proxy variable for the unobservable productivity shocks by applying the fixed effects or instrument variables as well (Levinsohn & Petrin, 2003), this leads us to some other requirements that need to have complied. For such, the data required for implementation or different methods of econometrics.

In order to achieve a fulfilled TFP estimation, Olley and Pakes (1992) suggested that a perfectly balanced panel set of data would be the first step, coming along with all entering and exiting phases from the market of all firms over the examined period need to be removed. However, this drives to another problem for data analysis since all the tackled firms included are selected by some of the ground rules. This inadvertently results in selection bias. To sum up, TFP indeed consists of the following two limitations, which will result in the negativity correlation between its capital coefficient and its inputs (Heckman & Leaner, 2007). Though this could be fixed by applying some principles in choosing firms and maintaining the set of data, this eventually turns into a selection bias. However, this methodology seems to be far more applicable when it comes to capturing multiple aspects of the production function.

2.2 The Characteristics of Entrepreneurship

As SMEs businesses in Vietnam are currently playing an important role in the total economy, with 40% of direct contributions to the total GDP, the flow of entrepreneurship is escalating over time (GEM, 2020). Taking into account the importance of entrepreneurial intention is indeed a crucial factor for the development of the economy. However, this can be eclipsed by the dominant market share that former long-lasting companies have spread out before, the sore reason that can hold back the market or make a remark that SMEs businesses can do is to innovate (Mcguirk et al., 2015), the result from innovation could be fruitful as for the increasing of the total productivity, their spill-over effects to the market, creating more working opportunities for the society, and most importantly to encourage the young generation to take up this chance and from that improve themselves for the sake of the whole.

The intention to become an entrepreneur is driven by various elements, namely, the individual demographic background like age, gender, education level, previous work experience, and so on. However, opinion differs as to whether their impacts on entrepreneurial intentions remains controversial. Kristiansen & Indarti (2004) pointed out that individual age and gender clearly have a positive impact on entrepreneurial desire. Whereas another element that needs further study is the age range of the individuals, which can result in a considerable effect on their entrepreneurial intention (Levesque & Miniti, 2006) in which this phenomenon could be explained by the opportunity cost, and in this case, time. Meaning that the more they grow, the negative co-efficient the intention gets. In terms of gender, Daim and his colleagues (2016) had another examination that produced a desirable result, showing that a much higher intention towards entrepreneurship belonged to the male side. Moreover, Daim (2016) specified that the gender gap between the intention could be seen behalf of the impact of the country and which community that person is based. This result also matches Hatak (2015) showed that the older the individual gets, the lower desire they have for establishing their business.

Surprisingly, there were no considerable differences between the connections between individual education and their intention for entrepreneurship, or if so, the co-efficient or the linkage between them was not significant and inconsistent throughout time (Galloway & Brown, 2002; Davidsson & Honig, 2003). Although many authors have stated that new ideas and opportunities can easily come from the outcome of education and its externalities, the chances that they will take those ideas seriously and apply them into their new or future business still remain vague. As for this part, this does not mean that fostering the educational system is a meaningless effort. Government or policymakers can take advantage of this opportunity in order to encourage entrepreneurial intentions among people by supporting them through policies and welfare for young entrepreneurs.

The aspect of individual tenure or the amount of time in which individuals take self-employment provides sufficient positive evidence to their intention to establish a business, and the level of desire of those who had previous experience was far higher than those who did not (Basu & Varick, 2008). This outcome is also consistent with the connection of previous Takechev and Kolverid research (1999), where they tested the positive correlation between self-employment and entrepreneurial intention. This line of reason could also be seen from another aspect with the involvement of parental impact, the impact within a family or straight forward from parents can unintentionally create a sense of entrepreneurship in the child development process, and they will have a higher tendency of choosing to be self-employment (McElwee & Al-riyami, 2003). Carr and Sequeira (2007) also indicated this hypothesis but with another element of the process of socializing children, where they were also introduced with being exposed to experienced entrepreneurial parents, resulting in the integrating impact of intergenerational influence, leading to the higher intention of entrepreneurship.

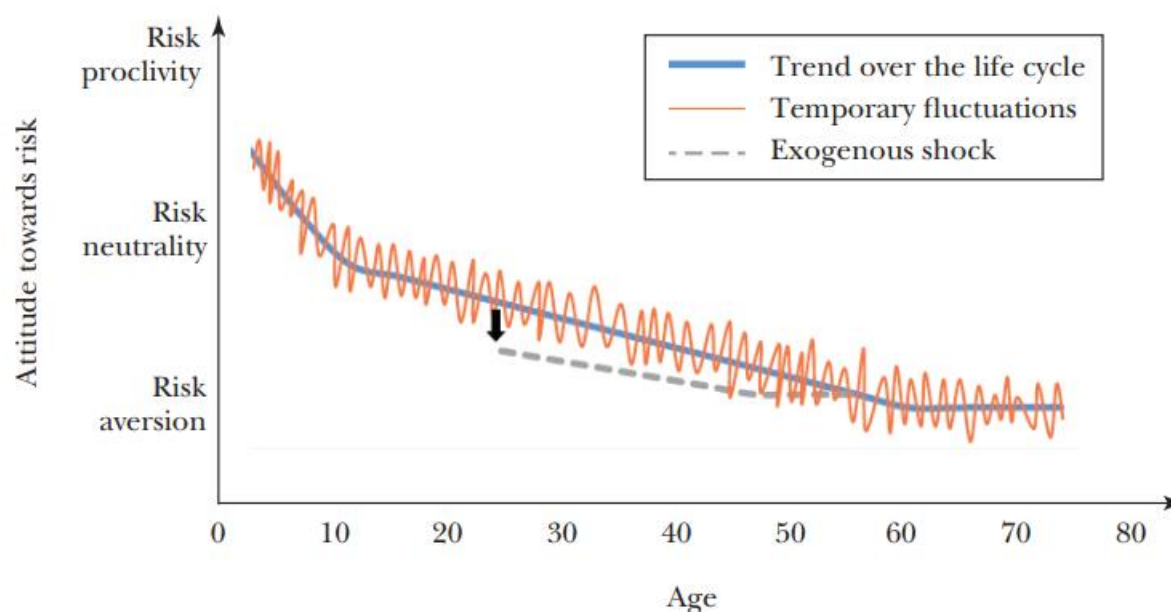
2.3 Risk Preferences

2.2.1 Individual Risk Preferences and their Stability

In the eyes of economists, the risk seems to be a profound basis for the human decision-making process, where people make their choice based on the risk they are willing to take. In the eyes of economists, individuals' risk preferences or attitudes are based merely on the calculation of their subjective expected utility and their uncertainty levels (Savage, 1954). And the prospect theory as well, especially in the business context, where gaining and losing can be treated very differently as to the value that individuals have in terms of potential gains and losses (Kahneman & Tversky, 1979).

When it comes to the stability of individual risk preferences, a large majority of studies have proven that the risk preferences of individuals can change relatively fast depending on the context, the scenarios we analyze, or the period that we investigate (Schildberg, 2018; Andreoni, 2012; Abdellaoui, 2011). The framework for risk preferences attaches to different periods of time within a life cycle, and it sometimes can fluctuate wildly but will tend to move from the part of risk-taking to risk-aversion over time (Schildberg, 2018). Moreover, it could be explained in multi aspects of human behavior, such as gambling context, personality traits, and gender. (Fleeson, 2001).

Figure 1 illustration of the Framework for studying the stability of Risk Preferences



Source: Hannah Schildberg-Hörisch, 2018

The first figure reveals that at around the age of 20s to 30s, the risk tendency of the individuals tends to decline slowly. However, if it comes along with an exogenous shock, this process will be going to be speeded up by an externality impact, which makes the risk preferences of the individuals drop down steeply than usual.

2.2.2 Risk Management and Firm Performance

Many previous papers have clearly indicated the connection between ERM and business performance. The results of these studies are mixed, which means that ERM and firm performance show mixed evidence of a relationship. Gordon et al. (2009) conducted a study examining the relationship between ERM and the performance of 112 US-based firms in 2005 with data sets from 10K and 10Q submitted to the U.S. Securities and Exchange Commission. The results from this research indicate that ERM implementation improves the performance of firms but depends on five factors: firm complexity, industry competition, board of directors, environmental uncertainty, and firm size.

Hoyt and Liebenberg (2011) examined the ERM of US-based insurers and the impact of ERM programs on the value of the companies. The two authors selected a sample of 117 insurance companies. This study found a positive association between firm value and ERM usage.

Another study by Waweru and Kisaka (2013) reinforced the positive relationship between ERM and corporate performance. They examined the level of ERM implementation in companies listed on the Nairobi Stock Exchange - NSE. The results show an increase in the level of ERM implementation among companies that contribute positively to firm value, with a sample of 22 companies listed on the NSE for the year ending December 2009.

Otherwise, there are researches that do not find a significant relationship between ERM implementation and firm performance. The first is Pagach and Warr (2010), who examine the impact of applying ERM principles on the long-term performance of firms. They examine how financial assets and market characteristics change during ERM adoption. They used a sample of 106 companies that announced the hiring of a Chief Risk Officer (CRO) and found that some of the companies that

adopted ERM had reduced earnings volatility. Although the results of the study also show that there is little impact of ERM adoption on a wide range of variables for firms, in conclusion, they do not support the view that ERM is about creating value.

Quon et al. (2012) in Canada examined the relationship between the content of ERM information and the performance of non-financial firms listed on the Standard & Poor's Composite Index (S&P) of the Toronto Stock Exchange (TSX) in 2007 and 2008 through analysis of annual report content. The recession and business results changed dramatically between those two years. They found that ERM information neither predicted nor had any significant effect on company performance.

Another study by Ballantyne (2013) on the relationship between ERM and the financial performance of companies was based on a sample of 134 publicly traded U.S. companies using online and via financial disclosure. The research found that ERM adoption is not associated with a firm's financial performance. This once again reinforces the view that there is no clear relationship between ERM and firm performance.

2.3 Firm Innovation and its Impacts

2.3.1 Firm Innovation Definition and Sources of Innovation

Innovation is the process of learning, defining, conducting knowledge and experiments, and applying it in order to enhance firm products or services, more specifically, increase the production units by developing the material inputs.

Innovation within a firm, working process, or even in a business has been well defined as simply the effort of improving the input/output of the final products, improving the process of working or enhancing the amount of R&D towards the products or services. Resulting in altering the afterward products or the working processes of business (OECD, 2018). This innovative process can be observed through the collection of internal data sets revolving around the Firm's operation before and after the project. This would raise a concern about the variables of measurement because they are mostly dichotomous (Mohnen & Hall, 2013) due to the broad nature of the scope of those activities. Hence, it had to be divided into two distinctive categories, called inputs to innovative activity and outputs of innovative activities (Rogers, 1998).

2.3.2 Innovation measurement

The Firm innovation output, as measured by patent numbers or innovative sales. Firm Productivity correlates positively with a higher innovation output, even when controlling for the skill composition of labor and the physical capital intensity (Crépon et al., 1998). In order to separate innovation elements from productivity equations to be defined and produced for innovative and non-innovative firms, conducting an endogenous switching model based on a firm scale survey in some European businesses (Crowley, 2015 & McCann, 2018) so as to conduct such separations, it is necessary to exclude variables included in the self-selected equation in the productivity equation, such as public support, professional workforce in total, R&D efforts and investments, and the market environment categorization. However, Fawcett and Torremans (2001) have a different approach where innovation is acknowledged as the application and making use of new ideas throughout conducting intellectual rights or patents that firms own or currently applying in their working or manufacturing processes. But the two formers have failed to capture the impact of staff development on the innovation intention or even innovation protocol of the firms. Ceylan (2013) has filled in this void by testing the causal link between the commitment-based H.R. practices towards firm innovation performance or intention by offering explicit long-term career development and growth values for employees. This approach can inadvertently enhance individual, and group motivation in terms of the aspect of their personal and professional capital (Collins & Smith, 2006), this line of idea is also matched with other former research where staff development can increase the probability of Firm innovation (Chen & Huang, 2009; Shipton et al. 2006). To sum up, measuring innovation activities within a firm needs to be conducted between the two internal elements, the investment in R&D, specifically, the product investment, and the enhancement of staff throughout business life.

2.3.3 Innovation and firm performance

A wide range of previous research has pointed out that one of the most effective ways to improve firms' Productivity is to indicate innovative elements (Coad & Rao, 2008; Friesenbichler, 2016; Crowley & McCann, 2018). However, this line of reasoning is not sound when other authors have come up with some opposing remarks. Firstly, due to the transition economies resulting from the increasing innovation within the Firm can inadvertently put a burden on employees' shoulders and decrease their value of contribution (Crowley and McCann, 2018). Another case that yields a similar result in the background of structural, where innovation has an adverse impact on the total Productivity of the firms (Griffith, 2006 & Raffo, 2008). Roper (2008) even provided a rational development behind the fact the innovation can sometimes lower Productivity due to the alteration witnessed during the product's life. New products which were resulted from the process of innovation can intervene in the former process of manufacturing, meaning that former input source, transportation, and other inter-nalities and externalities will be affected, and most of the time leads to productivity reduction. This idea was adapted by Coad and Rao (2008), as the impact of innovation could be understood as a time-lag impact since the initial time could be seen as a waste of resources, and firms need time to be able to modify and optimize their manufacturing or services process before being yielding any progress. In short, turning innovation into Productivity is possible. However, this requires time-delay and could be costly and time-consuming as it requires extra investment because of converting new ideas into practical ones.

2.4 Gender towards firm performance and innovation intentions

2.4.1 Gender and Firm Innovation Activities

A variety of research has pointed out that females are more likely to lean towards being risk-averse compared to males (Croson & Gneezy, 2009; Dohmen et al., 2011; Dohmen & Falk, 2011). Thus, innovative industries are usually gender-biased in terms of the male side. Females are usually less likely to give the green light on new products or technology, according to Carter et al. (2003). Also gender can also indirectly affect education and business location. Those are the factors that can influence innovation. Education is closely associated with innovation (Fischer, 1993; Marvel & Lumpkin, 2007). This is especially true for those majoring in engineering or natural science (Marvel, 2015). In addition, the number of females engaging and practicing those technical majors is significantly lower (Marvel, 2015; Strohmeyer, 2017). As for business location, being in cities or industry clusters gave businesses many benefits, such as access to skilled labor, business network, and technology spillovers, as Baptista & Swann (1998) discovered. However, according to Marvel (2015) and Rosenthal & Strange (2012), women tend to place businesses far from those locations due to family circumstances. Thus, they tend not to have access to those benefits, which hugely affect innovative activities.

Another justification for explaining the gender gap in the background of business innovation is choosing a starting point for business and being more likely to make any innovative decision regarding its services rather than technology or firm characteristics (Blake & Hanson, 2005). Innovation in this sector is harder to measure, and thus female achievements may be underplayed. Then, there is the gender bias in decision-making, which underline male as dominant. Therefore, ideas from females may not be seriously considered (Cooper, 2012). However, the diverse of gender can be the main factor that encourages innovation within firms, but due to the above reasons, females are often held back.

In terms of the Vietnamese market, the risk aptitude of female owners has been clearly described as "more likely to lean towards risk-averse and tend to focus on safe investment and non-threat industry" (Ngoc Hoang et al., 2021), with the studied figure for risk index up to 56% of the total females CEO or female operated firms, and 58% for the gender gap coefficient. Another way to tackle this could be seen in the demographic study for the female attribute in Vietnam. Diana & Leigh (2010) has shown that due to cultural norm and social expectation, the aptitude for risk from females is lower than their counterparts, and be more likely to play safe (risk-averse).

2.4.2 Gender and firm Productivity

Gender stereotypes are still present in the business world, and it is even more so at the upper management level or for being an entrepreneur. As such, female performance is usually underrated and under-appreciated, as Heilman (2001) found out. Much research has been conducted to determine the reason for the underperformance of female-owned businesses, and there are a few root causes. On the aspect of social expectations, a majority still hold their belief that the ultimate goal that women should aim at is the balance of their work and family life, which reduces the expectation from firms in the future. That is because those responsibilities could take their time away from running the businesses effectively. They may not also possess the experience for managing specific industries. As a result, women often migrate to sectors that are deemed "unattractive" by their male counterparts (Loscocco & Robinson, 1991). This also leads to slower growth, reduced size, and less profit & Productivity by female-led firms (Rosa, 1996; Watson & Robinson, 2003).

On the other hand, women may find that there is no need to establish all their businesses in order to help their families. This phenomenon could be seen with 20% higher of males choosing to set up their own company compared to females in 2017. In fact, fewer women expressed their intention to undertake a new business regardless of all the encouragement they have from the political nudge, including paid leave or child-care subsidization (Thébaud, 2015). Fairlie and Robb (2009) concluded that if women decided to start a business out of necessity, they would find it more difficult to access the capital needed and are also more likely to be less experienced in their chosen fields. Those would have a negative impact on the performance of their firms. Access to finance for female-owned firms has been researched a lot in recent years, with varying results. However, some studies pointed out that female-led firms outperform those lead by males. Kalleberg and Leicht (1991) stated that small firms with female leaders are not any less successful than those with male leaders, including survival rate. Furthermore, Brush (1992) presented that in addition to finance, performance should also be measured by other criteria like employee satisfaction, effectiveness, social contribution, etc. Eagly et al. (1995) concluded that there are no differences between male and female leaders' ineffectiveness. Johnson & Powell (1994) also came to the same conclusion with regard to decision-make output. For example, female-controlled SMEs saw less variation in profits, despite having lower profits compared to their male counterparts, according to Watson and Robinson (2003). On the same wavelength, Johnsen and McMahon (2005) revealed that there is no evidence for low performance in finance in female-led SMEs. With all the discouragement wave above, the existence of females within the board is one of the main reasons for the increase in the Firm's performance, particularly for innovative facets.

2.4.3 Differences between gender in the decision of informal loans in establishing a business

The behavior of the owner is one of the factors determining the efficiency of obtaining financial sources for operating SMEs. Therefore, in a highly competitive and volatile environment such as in Vietnam, business owners have to face the risk when making decisions to get informal loans because it is like a gamble. For example, the COVID-19 pandemic in Vietnam was making all the owner's calculations completely turn upside down. The disruption of labor working dropped the enterprise's revenue and made it difficult to pay its debt. Not surprisingly, there were many pieces of research or surveys that indicated that both male and female owners were risk aversion but different in level of tolerance. (Hinz et al.,1997) An intriguing point has been shown that, unlike men, women got their interest in the risk-free portfolio. In fact, a majority of them have the same behavior, even with their pension assets. A rational development behind the conservative behaviors is the fact that there is a gender pay gap, and the lower income flow made the women side more secure with their investment, regardless of the control for social-economic background variables. Reinforcing the above result, (Sunden et al., 1998) also found that men tend to invest twice as little of their wealth in stocks and prepare their retirement plans in a less conservative way than women. Women also become more conservative in the financial areas, which attitude towards the risk of professional investors (Olsen et al., 2001), as they are more likely to invest in fixed-income securities than in employer stock (Bajtelsmit and Van Derhei (1997)). Additionally, the result was the same even in the context of a group or marital status. (Ertac et al., 2012) pointed out that women have a less risky willingness to lead a team. (Jianakoplos and Bernasek (1998); Bernasek and Shwiff (2001))

Single women are riskier than men, for those men who have not had a spouse are more willing to engage in risky investments with the involvement of their pensions into assets, as opposed to those who have already settled, and they are unwilling to make any risky decision.

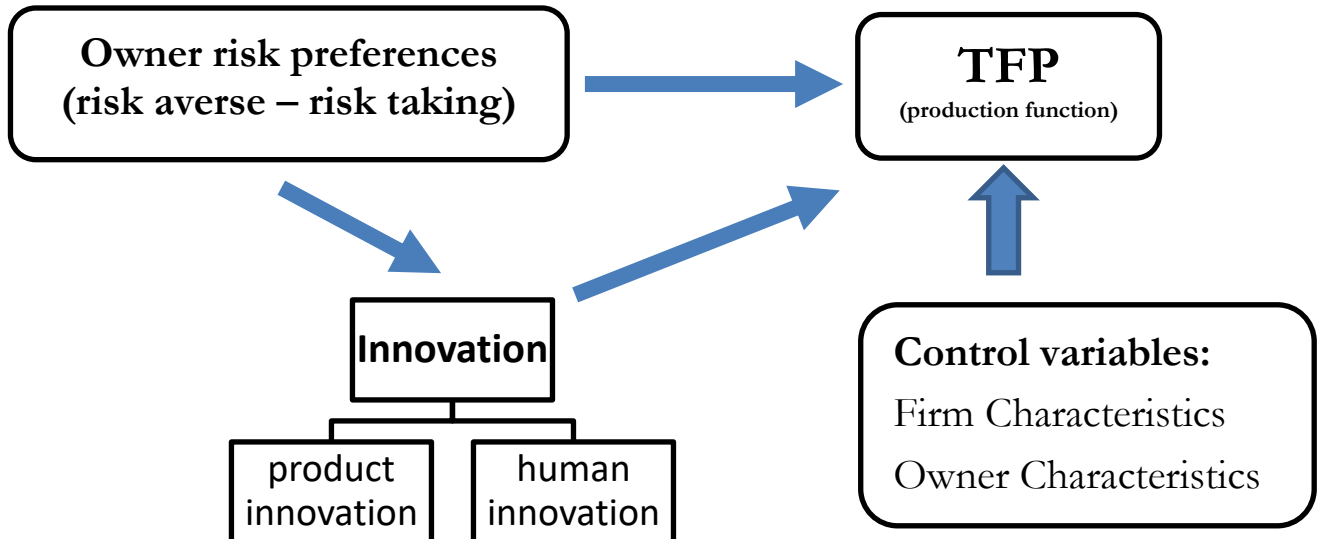
So as to discover the difference in the set of behavior, there were some hypothesized reasons. Several studies have been done with the aim exclusively at the individual risk perception rather than the risk level. (Crosson and Gneezy, 2009) admitted that overconfidence is a major difference. There was evidence shown in previous research. Estes and Hosseini (1988) found out that females were more concern and less willing to take risk in their investment intention when it comes to financial-related scenarios of a company and the amount that they want to invest in. On the other hand, several researchers found that the beliefs from the response from the results between gender when making a risky decision is different is significant. (Barber and Odean, 2000 and Perryman et al., 2016) study showed that female managers might indirectly result in firms having fewer returns and fewer huge losses.

2.5 Conceptual Framework

In this paper, the hypothesis of individual preferences and their firm productivity will be tested in the case of the Vietnam SMEs Vietnam and the use of panel data with nearly 4500 observations throughout the study timeline. Firstly, the individual risk preference would be divided into two groups, and I am trying to find a pattern where a higher risk index (risk-taking) would produce higher performance compared to the other side, based on their decisions related to their personality. Secondly, I would also want to indicate another explanation as to whether the risk index could be related to the innovation intention of the owner and, from that, be considered as an intervening element to foster the improvement of the performance of the firm. However, in this case, I also want to examine whether human innovation and product innovation have any differences in terms of firm performance with previous research alike.

the firm performance would be calculated based on the production function along with the individual and firm characteristics. The risk preferences would be seen under two separated aspects: (i) whether it can alter the performance of the firm or not, (ii) whether it can alter the intention to innovate from the owner or not, (iii) and whether the innovation happens could alter the performance of the firm. The conceptual framework below will summarize all the above ideas and the literature part:

Figure 2 Conceptual Framework



Chapter 3 Data and Research Methodology

3.1 Data Source

In this study, the surveys of manufacturing SMEs in Vietnam will be applied (CIEM 2015). This survey was collected every two years starting from 2005 to 2015 with the cooperation of the Central Institute for Economic Management (CIEM), the Development Economics Research Group (DERG) at the University of Copenhagen, and UNU-WIDER, and the Institute of Labour Science and Social Affairs (ILSSA). All the surveyed enterprises were selected from different regions throughout Vietnam, including the North: Ha Noi, Ha Tay, Phu Tho, and Hai Phong. The South: Ho Chi Minh city, Khanh Hoa, and Long An, the Central: Lam Dong, Nghe An, Quang Nam. This data set was based on face-to-face interviews with firms' owners and was gathered in the form of long-panel data. It consists of a wide range of data, including sales and cost figures; employment status; enterprise characteristics; production, equipment, and technology; and owners' characteristics. At the surveyed time, all the mentioned provinces within the survey accounted for a third of the total manufacturing industry in Vietnam.

However, the availability of the survey provided by UNU-WIDER only from the period of time 2011 – 2013 – 2015, with the total number of enterprises up to 7701 observations. However, due to the restrictions on the stability of all the firms throughout the examined period, I have to remove all the firms that cannot survive throughout the studied time and with the perfectly balanced panel data requirement, say, firms that change their owner, those who went bankrupt, or some who exited the market. As a result, all the observations that failed the meet the two requirements would be removed, giving the total number of observations within this study down to 4101 observations, with 1367 for each year. And in terms of Firm owners' personality traits, specifically, their risk aptitude was first introduced in 2015 and added to the questionnaires.

Table 1 number of observations in dataset 2011-2015

Year	No of Obs	Percentage
2011	1367	33.33%
2013	1367	33.33%
2015	1367	33.33%
Total	4101	100%

Source: Author's calculations

3.2 Research Model

The purpose of this study is trying to explain the correlation between owners' risk aptitude and the outcome performance of their businesses, along with the impact of innovation intention based on their level of individual risk preferences. From that, it differentiates between those who are favored in risk-averse behavior and their counterparts. The Cobb-Douglas production function for risk-averse and risk-taker are assumed to be correlated with the TFP element and be given below:

$$(tfp_{it}) = \beta_0 + v_{it} = y_{it} - \beta_k k_{it} - \beta_l l_{it} - \beta_m m_{it} \text{ (natural logarithm)}$$

In which the TFP of the model will be calculated as:

$$A_{it} = \frac{Y_{it}}{K_{it}^{\beta_k} L_{it}^{\beta_l} M_{it}^{\beta_m}}$$

Where:

y_{it} : is firm performance calculated by revenue of Firm i at year t.

k_{it} : is the total value of physical asset of Firm i at year t.

l_{it} : is the total value of the labor force of Firm i at year t.

m_{it} : is the total value of input materials of Firm i at year t.

Model 1 – the impact of individual risk preferences on Firm's total factor productivity.

$$\ln(tfp_{it}) = \text{risk_averse}_{i,t} + \text{Loan}_{i,t} + \text{Government_Assistance}_{i,t} + \text{Firmage}_{i,t} + \text{Household_Business}_{i,t} + \text{Populous_city}_{i,t} + \text{Constraint}_{i,t} + \text{Induszone}_{i,t} + \text{Firmsize}_{i,t} + \text{Gender}_{i,t} + \text{College}_{i,t} + \text{Age}_{i,t} + \mu_{it}$$

Model 2 – the impact of individual risk preferences on product innovation intentions.

$$\text{Product_investment}_{it} = \text{risk_averse}_{i,t} + \text{Loan}_{i,t} + \text{Government_Assistance}_{i,t} + \text{Firmage}_{i,t} + \text{Household_Business}_{i,t} + \text{Populous_city}_{i,t} + \text{Constraint}_{i,t} + \text{Induszone}_{i,t} + \text{Firmsize}_{i,t} + \text{Gender}_{i,t} + \text{College}_{i,t} + \text{Age}_{i,t} + \mu_{it}$$

Model 3 – the impact of individual risk preferences on human innovation intentions.

$$\text{Human_investment}_{it} = \text{risk_averse}_{i,t} + \text{Loan}_{i,t} + \text{Government_Assistance}_{i,t} + \text{Firmage}_{i,t} + \text{Household_Business}_{i,t} + \text{Populous_city}_{i,t} + \text{Constraint}_{i,t} + \text{Induszone}_{i,t} + \text{Firmsize}_{i,t} + \text{Gender}_{i,t} + \text{College}_{i,t} + \text{Age}_{i,t} + \mu_{it}$$

Where:

$\ln(tfp_{it})$: is the total factor productivity of Firm i at year t.

$\text{risk_averse}_{i,t}$: dummy variable as for whether the owner is a risk-averse or not (coded 1 if yes).

$\text{Loan}_{i,t}$: dummy variable as for whether the Firm did take any formal or informal loan for the establishment purposes or not (coded 1 if yes).

$\text{Government_Assistance}_{i,t}$: dummy variable as for whether the Firm did receive any formal or informal support from the government or not (coded 1 if yes).

$\text{Firmage}_{i,t}$: the number of years that firms had operated.

$\text{Household_Business}_{i,t}$: dummy variable as for whether the Firm legal form of ownership is household establishment or not (coded 1 if yes).

Populous_city_{i,t}: dummy variable as for whether the Firm did base in big cities or not (coded 1 if Ha Noi or Ho Chi Minh city).

Constraint_{i,t}: dummy variable as for whether the Firm did encounter any constraint during the operating period or not (coded 1 if yes).

Induszone_{i,t}: dummy variable as for whether the Firm did base in industrial areas or not (coded 1 if yes).

Firmsize_{i,t}: the number of total employees within the Firm.

Gender_{i,t}: dummy variable for the gender of the owner (coded 1 if male).

College_{i,t}: dummy variable as for whether the firm owner did go to college (coded 1 if yes).

Age_{i,t}: age of the owner.

3.2.1 Dependent Variables

To shed light on the connection between individual risk preferences and their impact on the Firm's Productivity, altogether with their correlation towards the intention of innovation. Therefore, the dependent variables in this study would be the Firm's total factor productivity, Product investment choice, and human investment choice, respectively. Firstly, in terms of risk aptitude, this is a dummy variable conducted by a personality question. Individual risk aptitude was examined from their interview answer, in which all the attendances answered on a 10th scale question regarding their willingness to take risks, where 0 is associated with "risk-averse," and 10 represents "risk-taking." However, in this study, this variable shall be modified slightly. Instead of scaling from 0 to 10, the preference for the individual will be counted as "risk averse" for the value from 0 to 5, and "risk loving" from 6 to 10. There is a rational development behind this, according to Dohmen and his colleagues (2011), who have applied and utilized it under a lottery scenario and predicted successfully experimented with individuals' choices regarding their smoking, drinking, and investment behaviors. With respect to its impact on firm productivity, a wide range of papers have supported that the risk level could be employed to alter other types of aspects within the business world, including individual working performance (Haubrich, 1994), the performance surplus coming from the act innovation of family businesses (Meroño-Cerdán et al., 2018), firm growth and profit-maximizing (Wennberg et al., 2016; Grund & Christian, 2010) altogether reach a conclusion that, risk aversion negatively associated with firm performance throughout various elements.

Secondly, those two other aspects of human and product investment/innovation can be considered as intervening variables since the effects of risk preferences on Productivity can be explained by innovation. And in this case, product innovation (Cooper & Kleinschmidt, 1987; Esteban, 1993; Greve, 2007), the higher the level of risk the owners are willing to take, the higher chance of investment in R&D and new products are implemented, which results positively in the performance of the firms, however, sometimes can be risky. On the other hand, with regard to human investment or staff innovation. This aspect can be considered a safe choice for firms, in the long run, trading-off in the slight decrease initially (Coad & Rao ,2008) due to the time-lag effect, when staff needs time to apply new knowledge to their current working process or acclimatize to it. However, this aspect will be more suitable for those with risk aversion.

3.2.2 Explanatory Variables

Besides all the aforementioned impacts of the risk and innovation effects, there are also some other independent variables that should be included in the model to avoid the possibility of heterogeneity problems in all three models. In the studied model, I will use two main components to control the firm total factor productivity. The first one would be firm characteristics, including firm age, financial structure, firm size, E-trading, etc. (Satpathy et al., 2017; Van, 2012; Oh et al., 2008; Castany et al., 2005). And also demographic information about the owners, such as owner age, owner education level, gender, etc. (Ackah et al., 2021; Kögel, 2005; Alvi & Ahmed, 2014).

Firm age

As for this aspect, many papers have expressed their controversy altogether. Claudio & Urs (2009) have pointed out that the longer the firm exists on the market, the worse it can get in terms of performance because of the rigidity of the organization over the course of time. Reflecting the cost grows, the tangible assets getting obsolete, and the decrease in the amount of investment in R&D. While Alex and his colleagues (2017). stated that on a grander scale, with a series of multiple nations, even though, in general, firm age could be considered as a variable to foster the firm performance, this relationship is also depending on other elements such as innovation intention, financial crisis, and firm survival, the ability to learn and adapt. As for another case, research was conducted in Spain by using panel data and with a total of nearly 2300 SMEs there, indicating that there was little to none as for the impact of firm age on its firm performance (Saeidi et al., 2015). But there was also another noteworthy point was that the firm age would be significant correlated with its outputs and get lower over the course of time (Jaumandreu, 2004). In terms of developing countries, similar trends could be seen, but to a lower extent. Maja has pointed out the negative effect of firm age, as when they get older (2016) with the same technique as Saeidi, but instead receiving a minor impact. It turns out to be negative due to many accumulated aspects within those firms.

Firm size

This could be seen as a crucial facet of firm characteristics that play a pivotal role in the contribution to firm total productivity. In many former research papers, firm size has been used as a mandatory control variable regarding TFP in both developing and developed countries (Chu, 2011; Du & Girma, 2012; De & Nagaraj, 2014; Ibhagui & Olokoyo, 2018). Most of them have suggested that they have a positive correlation with each other, regardless of their actual size. Take a paper by Dhwan (2001) as an example. He pointed out that small firms, in general, produced more effectively than those large ones in the American market from 1970 to 1989, and another in-depth view of this case is that they were measured based on the logarithm of total asset values of the firm. Another interesting viewpoint is when adding the family business component, with the influence of family control and firm size, Wenyi (2011) employed a set of 786 families in Taiwan during the course of 2002-2007, the result reveals that there was a strong connection between firm size and the overall performance of the firm when the element of a family is added, suggested that the potential of the involvement of family managerial control within the firm, this result gets even higher when it comes to SMEs compared to larger firms. A recent paper written by Oyakhilome & Olokoyo (2018) has a new approach when measuring this aspect with the combination of the threshold regression model in a panel data set for the empirical links between the two. And the result is intriguing when small-sized firms were reported to be negatively correlated with firm grows and performance based on its threshold level, but this is most likely to be the side effect of firms applying leverage for their establishment.

Government Assistance

Many previous scholars have had a particular interest in this range of theory, and many approaches have also been employed. First and foremost, Nguyen and his colleagues (2018) have successfully applied the dynamic endogeneity model in order to discover the unobservable factor caused by the assistance of the government, using the same panel data of SMEs in Vietnam between 2007 and 2015, revealing that any facet of support from the government will contribute directly to the growth of SMEs including tax exemptions, loans, incentives, so on. Viet and Charles (2010) also had the same finding, where on the aspect of technical efficiency, Vietnamese SMEs can take full advantage of the government support to increase the amount of technical application within their firm or business regardless of the aspect of the competitiveness of the Vietnam market during that course of time. In the case of developing countries. Generally speaking, guarantee-support from the government could lead to the development of the internal market and, from that, foster internationalization, resulting in enhancing exporting and importing determinants within the entire economy (Shamsuddoha et al., 2009). This case could also be witnessed in some developed countries. As for New Zealand, under the scenario of micro data level, Michele & Philip (2014) studied a micro firm-level data set between 2000 and 2006, in which they compared the firms with assistance from the government with those who did not. The result was quite similar to other papers, but the emphasis part belongs to the enhancement of the sales of the firm, even though the added value and the productivity, in general, were quite limited. They also indicated the importance of the technique's impact on the evaluations.

Populous City

In this paper, I have specifically divided the areas of the population into big cities (Ho Chi Minh city and Ha Noi). Since most of the amount of foreign direct investment and economic activities in Ho Chi Minh and Ha Noi accounted for most of the total number of developments in Vietnam back in 2015 (GSO, 2015). However, the difference between urban and other regions of the countries in terms of productivity and performance has been clearly indicated in various papers. Ronald (1985) showed that exclusively for manufacturing activity in some metropolitan areas, the increase in the number of wages and the reduction of productivity on a grander scale. However, this can be explained by the overly competitive of market during that time, but the opportunity cost of locating in urban areas are significantly higher due to the location of customers and other types of cost. Logan (1965) has covered this aspect, where the metropolis, particularly Sydney, Australia, can favor the needs of firms regardless of the high rent since the other benefits can easily cover them. While in China, many papers have differentiated the different between the rational reason behind the act of choosing to locate in rural or populous areas of a firm, a panel data set on 165 rural and urban firms was investigated the purpose of privatization between the two groups (Xiao-yuanDong et al., 2006) and its result on performance, the urban side showed a significant improvement in the aspects of profitability and firm performance.

Constraints

Although many scholars believe that the impact of constraints on a firm in general and in developing areas specifically is detrimental and could lead to firm exit (Nicholas Bloom, 2010; Fauceglia, 2015; Beck, 2007), a wide range of research has shown that the connection of constraints to firm performance is quite explicit, where firms tend to perform better throughout the pressure they have when embracing constraints, they force firms to make urge decision in order to survive and grow back later. Within the same data set for SMEs in Vietnam, a positive connection between firms' sales and profit has been proven with the financial constraints (Thanh Liem, et al. 2019). Another case could be seen where the borrowing constraints or firm loans could have some underline implications for the survival and growth of firms, where borrowing constraints could trigger the dynamism of a firm and, in the end, result in increasing performance, proving point could also be measured by future size increasing (Gian & Hugo, 2006). Similarly, but specifically aimed at manufacturing firms, micro panel data was conducted in France, where the financial constraints could increase the risk of a firm exit the market. However, if those firms have external access to other sources of financing, this has a positive impact on the firm sales and stock leading to a temporary increase in growth (Patrick & Stefano, 2008). On a grander scale, Thorsten Beck and her team (2005) have gathered a large database of 54 countries regarding their firm-level surveys. But instead of investigating the effect of constraints on firm growth alike sorely, they added another element for controlling the entire model, namely firm size, to determine whether the react level of a firm has any correlation with its size. The result was quite surprising. The small firms had stronger struggle movements and decisions, which benefited them later. While weak levels of react could be seen in some big enterprises due to various reasons.

Industrial Zone

Being accounted as one of the crucial aspects of economic and firm growth, locating at industrial or economic zones can bring tremendous benefits to its firm via many sources, including the spill-over effects they can yield from multiple fields like high-tech or even manufacturing sector (KH Tsai & JC Wang, 2004). Another beneficial point of being situated in an industrial zone is the reduction of constraints cost, Naqeeb (2015) has employed panel data of SMEs within the same zone, and the result has shown that lower costs on product and innovative processes on the network of firms, leading to the increase of labor productivity, firm productivity, and the intention of innovation. On top of that, the key factor behind this phenomenon is the formulation of network alliances. From that, the resource constraints could be minimized compared to other firms outside of the network. The same approach but with different methods has also been adopted for the Vietnamese SMEs market (Joseph & Huong, 2017), but with a deeper study into the physical distance and the cluster effects, since many enterprises in Vietnam still specialize in manufacturing and intra-industry aspect. The results show that higher clusters of the network were seen inside the industrial zone, leading to higher performance within firms. They also suggested that the government should allocate more resources in order to form many other industrial hubs or areas based on the field in which many SMEs are working. However, the reasons behind the clustering result within the area were quite vague. To sum up, industrial zones could be seen as an ideal place to set up a business due to the many advantages that could be yielded from spill-over effects and alliance networks. However, that does not guarantee the stability of the firm since lower productivity sign is proven to be correlated with the exit rate (KH Tsai & JC Wang, 2004).

Household Business

Household business has played an important role in the economy of Vietnam (Oudin & Thang, 2017), and a high number of them are considered to be SMEs in the Vietnamese market. However, whether these elements can improve the performance of the firms or raise other sense of business still calls into question. Chi Huu Nguyen & Christophe (2017) addressed this issue by using the panel dataset of household businesses in Vietnam. The results show that the productivity of the firms could be altered negatively based on the social environment that they have to work in, specifically, in this case is the social network that the entrepreneur has to face. Moreover, family members and hired labors have different outputs with the same given resources.

Gender

The discrepancy between gender within the business context is unequivocally based on many examined contexts, such as closure rates, sales, and performance. Many of them admit that women entrepreneurs are more likely to underperform compared to that of their male counterparts due to various factors such as personal qualities such as risk aptitude (Ahl, 2006). These baselines have also been tested and widened with the advent of many controlling aspects. According to AM Robb and J Watson (2012), they have contributed a broader view of this issue by considering the aspects of firm size thoroughly. However, there was no significant difference between their performance, but the deep-seated belief could be acknowledged as the main factor in discouraging women from starting their own businesses. From another aspect, Walayet & João Paulo (2013) have the same result, but at the CEO level, by conducting a panel data set in the U.S. market, they have found that regardless of their performance, the risk preferences level of them are clearly different, in terms of compensation packages, in which smaller firms are more likely to be less risky, and they represent of those firms are usually females. Another point of view regarding the same problem was indicated, where the fundamental difference between gender and firm performance is through their networking and social capital (John Watson, 2011), by relying on several factors such as education, age, size, industry, and gender. The networking attribute from gender is positively connected with the survival rate of the firm and, on a grander scale, their firm performance. Most importantly, there was no significant difference in terms of gender differences. In the case of the Vietnamese market, Lai Van Vo and his team (2021) have used the continuing data reported from the Vietnamese stock market and their volatility as well as the returns on assets rate to indicate the growth of a business. Surprisingly, those firms with women owners experience higher profitability in the short-term compared to their counterparts. This result could be understood by the risk-aversion mindset. They also show that as for female owners, their decisions and moves on the market were less risky in the aspect of systematic nor astonishing. This line of reason is the same as Tuyen Thanh Hoang and his team (2019), with the same approach from the stock market as well. However, they added another controlling variable, and in this paper, they focused specifically on the sector that those firms are investing and working on, in which female CEOs tended to invest and work in some risk-free or considered to be less risky compared to male CEOs, and the risk index between the gap went up to 58%. Finally, a study also came from Vietnam, giving a panoramic view of the market by employing large-scale data of more than 40000 Vietnamese firms between 2009 and 2013, attempting to discover the causality of firm growth to local financial development based on three main components. The result reveals that the difference in the gender of entrepreneurs could have an impact on firm growth. More specifically, male ownership negatively correlated with all aspects and even the firm growth index. To sum up, even in many other places, and especially in some developed countries, many papers have indicated that a firm's performance could depend on firm owners' gender and the male side tends to be higher in many studying aspects. But this is not the case in Vietnam due to various reasons.

Table 2 List of variables, variable description and expected signs

Variable	Question	Type	Section	Expected signs
TFP	Total gross profit in previous year (million VND) Total assest value (million VND) Raw material inputs (million VND) Total labor costs in previous year (million VND)	Float	AEq1e14 Tot_ass15 Q65ae_15 AEq1d14	(+)
Risk averse	Would you describe yourself as someone who tries to avoid risks (risk-averse) or as someone who is willing to take risks (risk-loving)? Please answer on a scale of 0-10 where 0 means "risk averse" and 10 means "risk loving" – risk averse: 0 – 5; risk taking: 6 – 10	Dummy (1 = risk averse)	Aq131	
Loan	Did you take any formal or informal loan as the sources of start-up capital for this Firm	Dummy (1 = yes)	Aq22	(+/-)
Gov assist	Did you receive assistance from the government?	Dummy (1 = yes)	Aq126	(+)
Firm age	Year of establishment	Int	Q6a_15	(+)
Household Business	Does your Firm sell product via e-trading	Dummy (1 = yes)	Aq12a	(-)
Populous city	City / Province	Dummy (1 = HCM or Ha Noi)	Q3ce_15	(+)
Constraint	Does the firm face any major constraints to growth?	Dummy (1 = yes)	Aq125	(+/-)
Industrial zone	What type of zone is the firms' main production facility located in?	Dummy (1 = industrial zone)	Aq5a	(+)
Investment	Has the Firm made any products investments since	Dummy (1 = yes)	Aq62a	(+)
Human Investment	Has the firm made any human capital upgrading investments since	Dummy (1 = yes)	Aq62ae	(-)
Firm size	Total number of employees	int	Q24ac_15 + q24ab_15	(+)
Gender	Gender of the owner	Dummy (1 = male)	Q2c_15	(+/-)
College	What was the highest professional education completed of respondent?	Dummy (1 = College)	Aq27c	(+)
Age	Year of birth of the owner	int	Aq2d	(-)

Source: Author's calculations

3.3 Econometrics Approach

In this study, I will apply the panel dataset of SMEs in Vietnam in order to discover some further insights into the connection between owner risk preferences and their firm total factor productivity from 2011 to 2015. The rational development behind this is that panel data itself is the finest way to keep track of the trends of firms over the course of years (Green, 2008; Das, 2019). Another noteworthy point is that with the combination of the use of time-series and the application of cross-sectional observations, the amount of collinearity between variables could be reduced within panel data, and from that can inadvertently increase the sense of the reliability of the degrees of freedom. Another point is to eradicate the aspect of bias, indeed using time-series or cross-sectional datasets solely, meaning that the time factor is essential, but not all the time cannot be captured or controlled entirely. By applying panel data, variables listed from the cross-sectional dataset are applicable at a series of times, making it more favorable for keeping track and factors measurement process.

The main parts of this model would include Pooled Ordinary Least Square (POLS), Random Effect Model (RE), Logit model, and Blinder-Oaxaca Decomposition.

Pooled Ordinary Least Square

The use of pooled ordinary least square has been widely applied to many previous papers, especially in those with a panel dataset (Bauer, 2002; Vuko & Cular, 2014; Onakoya et al., 2014) because of its estimation consistency of estimated parameters, from that the density of condition of the random variables from the model can stay intact despite of the entities (i) and time change element (t). A special case as for using POLS in order to control the heterogeneity problem caused by unobserved data. By pointing out the discrepancy between the two key groups within a data set, Bauer (2002) showed that the difference between those educated and those who were not could be minor and disappear. With this line of idea, the application of POLS could be a handy tool in the case of homogeneity. Under the homogeneous restriction, the regression model is

$$E(y_{it} | x) = x'_{it} \beta$$

With the requirements from the model, the mutual effects are unchanged, regardless of the time effect and all cross-section units. Although the endogeneity has still existed, I will trade it off for capturing all the unobserved heterogeneity and, from that, lower than bias risk.

Random Effect Model

The reason behind the application of RE is simply because all the main variables in this study have been assumed to be constant or chosen to be constant over time (risk aptitude, gender, age, loan). The Fixed Effect model seems to be redundant in this case.

With regard to a relatively large sample size of the data set, at around 4300 observations, with the emphasis on the key variable (risk preferences) coming along with the assumption of individual risk will be stable overtime since the availability of the data set does not support the past data, leaving the unobserved observations, in this case, could inadvertently trigger the heterogeneity issue. By using the RE, this problem could be captured by the intercept's distribution. Moreover, the estimation is not required since the degrees of freedom within the model can be interpreted in neither the cross-section nor the time-section effects.

Probit Model

Since the innovative intention of the owners is binary variables, I would attempt to apply the Probit model. With the innovation variable (y) is binary (0/1) along with the explanatory variables (x) can be seen under a linear equation. Altogether the normal distribution is shown below:

$$E(y|x) = \mu = X\beta$$

$$B(y) = \sigma^2 I$$

So, the value of either human or product innovation of Y will be:

$$y = \begin{cases} 0 & - \text{no intentions for innovating} \\ 1 & - \text{have an innovating intention} \end{cases}$$

According to Das (2019), the equation would be:

$$y_i = \begin{cases} 0 & \text{if } y_i \leq k_1 \\ 1 & \text{if } y_i \geq k_2 \end{cases}$$

However, the requirement for this linear model specifies that the probability of estimation has to be ranging from 0 to solve this issue by generalizing the μ and $X\beta$ to a link function. And in this case, the distribution resulting from the outcome of the probability will be altered due to the transformation and, lastly, turning into an inverse normal distribution. The Probit model would be derived from the latent dependent variable as follows:

$$y_i^* = x_i \beta + \epsilon_i$$

The following step would be further calculations to see whether the probability of making an innovative decision or not. And from the above function, the action cause (y^*) would be controlled by two main factors $x_i'\beta$ & ϵ_i .

In this case, Das (2019) has hypothetically assumed that $z_i = x_i'\beta$ making the probability alter as below:

$$P_i = 1 - P\left(\frac{\epsilon_i}{\sigma} \leq -\frac{z_i}{\sigma}\right) = P\left(\frac{\epsilon_i}{\sigma} \leq \frac{z_i}{\sigma}\right) = F\left(\frac{z_i}{\sigma}\right)$$

And under the normal distribution standard requirement. The final Probit link function would be:

$$F^{-1}(P_i) = x_i'\beta$$

Chapter 4: Empirical Results

4.1 Summary Statistics

The Vietnamese SMEs are divided into three distinctive groups including micro, small, and medium sized enterprises.

Table 3 firm types in dataset 2011-2015

Firm Types	No of Employees	No of Obs	Percentage
Micro	0-10	3098	75.54%
Small	10-50	783	19.09%
Medium	> 50	220	5.36%
Total		4101	100%

Source: Author's calculations

Overall, the micro-sized firms accounted for most of the population of the dataset, with a total number of went up to 3098 firms (75.54%), making it the most important type. In contrast, the small size ones made up approximately a fifth number of firms, with 19.09%, followed by the medium-sized type, which was also the smallest type of firm (5.36%).

Table 4 Descriptive Statistics

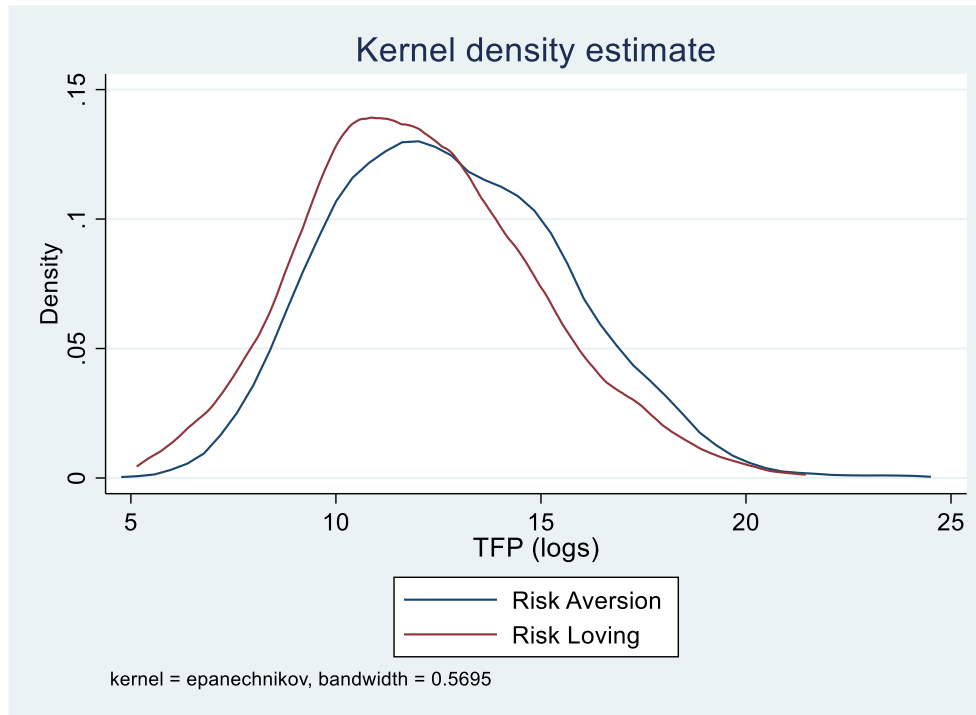
Variables	Mean	Standard Deviation
TFP (logs)	12.37	2.86
risk aversion	0.56	0.49
loan	0.08	0.27
government assistance	0.1	0.31
gender	0.62	0.48
college	0.21	0.41
firm age	16.2	9.64
owner age	46.6	9.21
household business	0.67	0.46
populous city	0.32	0.47
constraint	0.60	0.48
industrial zone	0.04	0.19
product investment	0.52	0.49
human investment	0.25	0.43
Number of firms		4101

Source: Author's calculations

The second table shows the standard deviation along with its mean index for all the outcome variables and explanatory variables used in the three econometrics models. The average percentage of TFP at around 12% for each firm, meaning that the leftover part resulting from other externalities of the firm represents around 12% of their total performance. It is quite surprising that with the total number of male entrepreneurs or owners made up around 62% of the total population. However, the risk-aversion is only 56%, regardless of the previous literature part reporting that males are more likely to lean towards risk-taking attributes. Moreover, only around 10% of the whole reported that they need to take a formal or even informal loan as their main source of setting up their business, a similar figure as for government assistance provision. In terms of owners' educational levels, this figure is recorded at 20% of the total owners did attend college. The regular number of firm's ages is at around 16 years, and as for the age of owners, this number goes up to 46. There is a high number of firms with legal ownership under a family business formulation, at 67%.

When it comes to the constraint issue that their firms are facing, 60% of them claim that they already have a constraint regarding various fields. In addition, with the geographical decision, only 32% of them chose to locate in the populous city (Ho Chi Minh and Ha Noi). Since 80% of them are manufacturing firms, choosing to settle in urban areas can sometimes be considered a constraint due to many reasons. The smallest figure from the table belongs to an industrial zone, with only 4%. This number goes against the touched-above literature regarding the industrial zone. Finally, half of the firms decided to allocate their money and resources to product R&D, while only a quarter of them did the same but for the staff facet.

Figure 3 Kernel density estimation of firms' TFP



Source: Author's calculations

The above graph is the estimation using Kernel density between the total amount of total factor productivity (logs) between firms with their owners are risk-averse and risk-taking, along with the chosen bandwidth of approximately 0.5. It is crystal clear that the TFP index of the risk-takers is higher at the first half of the graph (below 15) and tends to become smaller compared to their counterparts. Indicating that the difference between those attributes is significant as regards the owners with their risky behavior will create more performance, along with the amount of TFP they can produce is equivalent to the micro and small-sized firms. But as for the latter half (> 15) this tendency goes backward, which means that for medium-sized firms, owners coming with safety options (risk-averse) will yield higher performance.

4.2 Regression Results

Before presenting all the regression models, the autocorrelation test for all the key variables will be displayed as below:

Table 5 Correlation between key variables

	TFP	Risk aversion	Loan	Gender	Product innovation	Human innovation
TFP	1.0000					
Risk aversion	-0.1332*	1.0000				
Loan	-0.0263*	0.0113	1.0000			
Gender	-0.0513*	-0.0347*	0.0325*	1.0000		
Product innovation	0.1477*	-0.0765*	0.0160	0.0292*	1.0000	
Human innovation	-1.0689*	0.0657*	0.0034	-0.0272*	-0.2158*	1.0000

Source: Author's calculations

Table 6 Probit Model (Margins)

	Product Innovation		Human Innovation	
Risk averse	-0.0497***	(0.0149)	0.0486***	(0.0138)
Loan	0.0221	(0.0268)	0.0065	(0.0247)
Go assistance	0.0739**	(0.0242)	-0.0377	(0.0228)
Gender	0.0409**	(0.0154)	-0.0292*	(0.0141)
College	-0.0067	(0.0229)	-0.0075	(0.0208)
Firm age	-0.0036	(0.0024)	0.0011	(0.0022)
Firmage2	0.0000	(0.0000)	-0.0000	(0.0000)
Age	0.0136	(0.0071)	0.0052	(0.0066)
Age2	-0.0002**	(0.0001)	-0.0000	(0.0001)
Household business	-0.1059***	(0.0218)	0.0187	(0.0203)
Populous city	-0.2906***	(0.0157)	0.0806***	(0.0153)
Constraint	0.0624*	(0.0261)	-0.0393	(0.0235)
Industrial zone	0.0534	(0.0431)	-0.0028	(0.0383)
Size2	0.1601***	(0.0225)	-0.0508*	(0.0215)
Size3	0.2909***	(0.0415)	-0.0517	(0.0369)
Yeart2	0.0654*	(0.0274)	-0.0223	(0.0248)
Yeart3	0.0372	(0.0201)	0.0331	(0.0185)
<i>N</i>	4101		4101	
chi2	526.02		82.47	
p	0.0000		0.0000	
r2	0.0926		0.0177	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The Probit model above results from the first and second columns indicates the innovation intentions for Product and Human, respectively. The risk attribute to being averse tend not to invest in a product, in this case, matches perfectly with the former research (Cooper & Kleinschmidt, 1987; Esteban, 1993; Greve, 2007), in which product innovation seems to be riskier with various of negative possibilities. On the other hand, risk-averse people are more willing to allocate their resources to staff innovation since this could have a slight back on the performance of the firm. Unlike new products or services, humans need time to improve passive abilities or accelerate the process of working and, from that, create long-term effects, but most importantly, this can be seen as a safety option (Coad & Rao, 2008). With respective figures for product and human innovation being -4.9% and 4.8%. Another plausible result can be seen in intentional innovation decisions for gender while males have a greater tendency to invest money in products and new types of services, with 4% higher than the female side. Conversely, females tend to play safe with regard to innovation investment when they are favored in human investments with approximately 3% higher amount of investment compared to their counterparts.

In terms of Government assistance, the result is only significant concerning in product innovation, with the figure of 7% more likely to make an innovative decision if firms receive any sort of support from the government, in a brief explanation, during the surveyed time, Vietnam is still in the process of attracting FDI and focusing on manufacturing raw materials, so the reinvesting call for manufacturing or production process could be understandable. As opposed to the household business model, where they are less likely to take innovation idea at around 10% if their firms status are household business, this could be explained by the above notions from Gale & Brown (2013), along with Von Hippel with his team (2012) which confirmed that micro and long-lasting household business tend not to make any considerable changing with their firms, if there was, the process would need a long time or gradually take out, so falling behind slightly initially is inevitable. It is also notable that even though a great source of previous research has indicated the positive sign between firms encountering constraints and their performance and survival rate and altogether choosing to innovate seems to be a desperate option, yet viable. However, in this case, econometrically recorded that this effect is only significantly positive as for product innovation with 6% of the whole. As for staff innovation, this seems to be reluctant for firms to do so, but unfortunately, this figure from the table has proven to be insignificant. Lastly, the size of the firm also indicates their intention of innovating intensely, with 16% possibilities higher from small-sized and nearly 30% from medium-sized firms compared to micro-ones. However, the aim for human development in those companies seems to be smaller, at 5% for both, which means that Vietnamese micro firms tend to play safe and play the long game in the market, but this case is the same as for the former variable, insignificant. Loan, owner age, and firm age are also shown to be insignificant.

Table 7 Pooled OLS & Random Effects

	TFP (logs)	
	POLS	RE
risk averse	-0.191** (-2.76)	-0.148** (-2.95)
Loan	-0.216 (-1.75)	-0.205* (-2.28)
Gov assistance	0.269*** (3.87)	0.310*** (3.88)
Gender	0.219** (3.06)	0.231*** (4.46)
college	0.244** (3.21)	0.222** (2.96)
Firm age	0.00606 (0.59)	0.00768 (0.96)
firmage2	-0.0000974 (-0.53)	-0.000130 (-0.89)
age	-0.0866** (-3.26)	-0.0457 (-1.94)
age2	0.000912** (3.16)	0.000487 (1.90)
Household business	-1.381*** (-16.08)	-1.373*** (-18.70)
Populous city	1.271*** (16.49)	1.209*** (21.38)
constraint	0.286*** (3.78)	0.525*** (6.04)
Industrial zone	0.358* (2.54)	0.476*** (3.58)
size2	1.806*** (22.88)	2.151*** (28.27)
size3	4.091*** (27.78)	4.548*** (35.30)
yeart2	0.270*** (3.56)	0.461*** (5.05)
yeart3	2.436*** (40.58)	2.417*** (35.87)
_cons	13.06*** (21.29)	11.78*** (21.85)
N	4101	4101

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The regressions result from the POLS and RE are shown on the above table 4.6. The most transparent result that we could see is the discrepancy between the amount of TFP between risk-averse and risk-taking, with respective figures being 19% and around 15% higher for the risk-taking owners with 1% significant level. This indicates that the difference between the performance of firms based on owners' attributes is true, and specifically, in this case, is their risk aptitude, and could possibly result from the correlation of their risk level towards many facets such as their field of investment and working, this line of reason is matched with the above literature parts and confirmed the findings of Hoyt and Lierbenberg (2011) and Wawer and Kisaka (2013). The converse tendency could be seen in the result for individual gender, with the gap of their performance led by male owners at approximately 22% higher than those led by females, although a wide range of studies from other countries, specifically developed ones, have shown that the gap between firm performance led by women compared to men is undeniable. But many other papers in Vietnam showed the opposite notion, where female firms tend to have higher performance, resulting from stability when it comes to risky decisions or investments. This can be explained throughout many elements, and in this research, the decisions of innovating their products or staff can be used.

As for government assistance, the same results could be seen with 26% and 30% increases when receiving any sort of assistance, indicating that any move conducted by the government could drive some unobservable benefits for the firms. It could be either a technological aspect, financial support, the open order to apply new fields of science, and so on. The same figure for the educational level of the individual reported that around 23% of the break between owners owning at least one tertiary degree. In this case, this phenomenon could be understood under the period that Vietnam was a gold mine in the eyes of the foreign market for manufacturing raw materials. Having a degree could be a huge advantage as for working, manufacturing, and working with other countries.

With regard to household business, the numbers show that this could be the main factor that affects the total performance of the firm since the TFP element can hardly ever be adopted, in both model this number could go down to around 130% with the 1% of significance, This case could be predictable throughout the findings of Chi & Christophe (2017), revealing that household business with the same level of inputs and other conditions, but lacking social capital or simply in an unfavorable environment could provide product negative outputs rate, due to the shortcoming of relative knowledge along with the conservatism and other criteria. To this end, the severe impact it placed on the TFP is foreseeable. On top of that, with the use of the Vietnamese business household data in the same course of time. This also confirmed one more time the finding of Chi. As for the populous city, the result shows that firms and enterprises operating mainly in some urban areas yield significantly higher amounts of TFP, with over 120% in both columns. With this result, the rational answer behind this has been clearly stated above, since Ho Chi Minh city and Ho Noi are considered back in the time to be two major points of economic and financial, combined with the amount of FDI they got and the specialization of raw materials manufacturing. The same explanation could be applied to the industrial zone with the higher amount of TFP firms get if they are a part of the area is around 40%. The most astonishing result lies in constraints. While the results yielded from the POLS is 28%, this figure for the RE is nearly double since the constraints variable is not constant over time. Regarding the firm size, the small and medium-sized industries are obviously superior in comparison with the micro one. And the final point is the year dummy variables, indicating that the amount of growth over the year is minor in the first two years, at around 30%, and this figure later accelerated up to 240% in 2015.

Chapter 5 | Discussions and Conclusion

This study is to aim at discovering the relationship between the owners' risk aptitude and their firms' total factor productivity via the innovation intentions within Vietnamese Small-Medium sized firms. According to the empirical findings above, some crucial findings below will be presented, along with some suggestions for policymakers and other further potential research implications.

5.1 Main Findings

The SMEs field is no longer something that is new under the academic path of Vietnamese Scholars and even the world. However, most of them are explicitly focused on some aspects of constraints problems, gender discrepancies, or outsourcing issues. This study tackles on a grander scale and with a sense of ambiguity between the psychological traits of the individuals, in this case, is risk aptitude, and from that, pointing out some indirect correlation with other elements, and in this study is the innovation intentions and later is total factor productivity. By using a panel data set of 4300 Vietnamese enterprises over the course of 5 years, starting in 2011, along with the Probit model for the innovation intention, as well as POLS and RE model for the TFP measuring.

To begin with, the findings reveal that the positive correlation between individual risk preferences and the intentions to innovate with regard to two aspects of humans and products is statistically significant. The figures for both of them are the same at approximately 5%. Interestingly, innovation and its risk level depending on the trait of individuals, say, safety investment could be considered as human innovation. And in this case, the risk-averse type of people is more likely to lean towards this. Vice versa with the risk-taking, but the impact they have is quite small. These findings are consistent with many previous studies regardless of Vietnamese borders (Ngoc Hoang et al., 2021; Diana & Leigh, 2010). In this stage, the so-called gap between genders is highlighted again. The emphasis on females under many circumstances is observed to be more concerning and that discourages them from making any risky actions.

In terms of the risk aptitude towards the firms' total factor productivity, there is an existing void between those led by risk-taking attribute owners, with the gap could be measured up to around 19% of the whole. From that verifying the findings of Coad & Rao, 2008; Friesenbichler, 2016; and Crowley & McCann, 2018 again. However, this also marks the gigantic gap between the element of firm size and the amount of TFP. According to the kernel density estimation, the amount of TFP from risk-averse firms is significantly higher regarding the amount of TFP (12), which matches with the micro firms' scale. But as for grander scales like medium-sized. The results from both tables still reveal a higher amount of TFP produced by all firms.

As for firms' characteristics, the first noticeable point that needs further discussion is the aspect of encountering the constraints of a firm. Previous papers suggest that firms having constraints, an especially financial one, has more possibilities to raise their performance and survival rate (Thorsten Beck et al., 2005; Patrick & Stefano, 2008; Thanh Liem et al., 2018). Clear results could be seen for the innovation intention when they are likely to take riskier decisions, yet instant performance and higher productivity during the difficult time, matching with the probit table at higher chance of innovative activities went for product innovation during this period, and higher performance at around 30% is the figure for those under constraints as for the POLS and RE results. Conversely, the household business with the adverse intention for innovating new products results in a huge drop in the TFP amount of those firms. Additionally, the notion of ideal geographical results in much higher performance, this has been explained above by the direction of FDI into Vietnam and other types of externalities. In the case of gender and education level of the individuals, the results are quite similar and statistically significant. On the other hand, the regression results of other aspects of the demographic such as the age of the owner, are proven to be insignificant.

5.2 Discussions

Entrepreneurship has been gaining traction recently in the Vietnamese SMEs market, with a majority of interest from Vietnamese researchers and Institutions in a wide range of fields and its application. Take NH Tien and his team as an example for formulating a concept of sustainable entrepreneurial intention in Vietnam (2019). Another case with the same leading author is to pave the way for the development of entrepreneurship in Vietnam by introducing the green entrepreneurship understanding (NH Tien et al., 2020). And also, his later work when introduced the concept into the corporate sustainable development process in Vietnam (NH Tien et al., 2020). To that end, the idea of having a profound insight into the root cause of its performance is of the utmost importance. To be more detailed, with a great number of micro and small firms in Vietnam and their future development in the market makes it exclusively crucial for researchers to have a look at multiple facets of inputs in order to provide many in-depth details for the government and firms themselves for future development. Unlike other countries, this study presents a deeper understanding of the personality traits of the owners in micro, small, and medium-sized enterprises in Vietnam and their relationship towards the TFP of the firms throughout their entrepreneurial intention investment in products and staff. The results yielded from the process could be seen as an integration process for the local and international markets since it does trigger not only the competitiveness of Vietnamese enterprises but also foreign ones.

Adopting new policies in order to encourage and support the intention of innovating at the SME level, especially with micro-scale ones. Not only the case of intentions but also the need to pave the way for the SME's business activities are also indeed urgent. This imposition could result simply through either direct (tax incentives or assistance as for technology or financial packages) or indirect (affirmative benefits). Moreover, since the source of innovation could also achieve from various externalities like the touched-upon entrepreneurial education, the government could also support or offer financial aid provided for other relevant courses. From that, maximizing the working and researching opportunities for firms and the chances to access the market for the youth. But under some circumstances, innovation and entrepreneurship could be utilized with risky traits.

References

- Ojiaku, O. C., Nkamnebe, A. D., & Nwaizugbo, I. C. (2018). Determinants of entrepreneurial intentions among young graduates: perspectives of push-pull-mooring model. *Journal of Global Entrepreneurship Research*, 8(1), 1-17.
- GEM. (2021). Global Entrepreneurship Report 2020/2021. <https://www.gemconsortium.org/report/gem-20202021-global-report>
- World Bank Group. (2022, August 9). *Vietnam's Economy Forecast to Grow 7.5% in 2022*, *New World Bank Report*. World Bank. Retrieved October 16, 2022, from <https://www.worldbank.org/en/news/press-release/2022/08/08/vietnam-s-economy-forecast-to-grow-7-5-in-2022-new-world-bank-report-says>
- World Bank. (2016). Vietnam 2035: Toward prosperity, creativity, equity, and democracy.
- VNA. (2022c, August 24). *Vietnam forecast to be among fastest-growing countries in next decade: Harvard growth lab | Business | Vietnam+ (VietnamPlus)*. VietnamPlus. Retrieved October 16, 2022, from <https://en.vietnamplus.vn/vietnam-forecast-to-be-among-fastestgrowing-countries-in-next-decade-harvard-growth-lab/234567.vnp>
- *Report of Social and Economic in 2020*; General Statistics Office of Vietnam: Hanoi, Vietnam, 2020. <https://www.gso.gov.vn/en/data-and-statistics/2021/01/socio-economic-situation-in-the-fourth-quarter-and-the-whole-year-2020/>
- 2021 ADB Asia Small and Medium-Sized Enterprise Monitor Volume 1: Country and Regional Reviews. <https://data.adb.org/dataset/asia-small-and-medium-sized-enterprise-monitor-2021-volume-1-country-and-regional-reviews>
- VTV News. (2019, June 20). Seven big investors in Shark Tank Vietnam season 3 revealed. english.vtv.vn. <https://english.vtv.vn/tv-show/seven-big-investors-in-shark-tank-vietnam-season-3-revealed-2019062016571889.htm>
- Moulton, S. R. (2019, April 20). *Shark Tank Vietnam's Co-Star Talks Recent Investments And The Country's Startup Ecosystem*. Forbes. <https://www.forbes.com/sites/sara-moulton/2019/04/20/shark-tank-vietnams-co-star-talks-recent-investments-and-the-countrys-startup-ecosystem/?sh=1298d23f6bcd>
- Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic literature*, 47(2), 448-74.
- Hoang, T. T., Nguyen, C. V., & Van Tran, H. T. (2019). Are female CEOs more risk averse than male counterparts? Evidence from Vietnam. *Economic Analysis and Policy*, 63, 57-74.

- Hoang, N., Nahm, D., & Dobbie, M. (2021). Innovation, gender, and labour productivity: Small and medium enterprises in Vietnam. *World Development*, 146, 105619.
- Tran, C. D., Phung, M. T., Yang, F. J., & Wang, Y. H. (2020). The role of gender diversity in downside risk: Empirical evidence from Vietnamese listed firms. *Mathematics*, 8(6), 933.
- Syverson, C. (2011). What determines productivity?. *Journal of Economic literature*, 49(2), 326-65.
- Lynch, L. M. (Ed.). (2007). *Training and the private sector: international comparisons*. University of Chicago Press, chapter 7.
- Bernard, A. B., Redding, S. J., & Schott, P. K. (2009). Multi-product firms and trade liberalization. *Tuck School of Business Working Paper*, (2009-70), 09-21.
- Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *The review of economic studies*, 70(2), 317-341.
- Olley, S., & Pakes, A. (1992). The dynamics of productivity in the telecommunications equipment industry.
- McGuirk, H., Lenihan, H., & Hart, M. (2015). Measuring the impact of innovative human capital on small firms' propensity to innovate. *Research policy*, 44(4), 965-976.
- Kristiansen, S., & Indarti, N. (2004). Entrepreneurial intention among Indonesian and Norwegian students. *Journal of enterprising culture*, 12(01), 55-78.
- Levesque, M., & Minniti, M. (2006). The effect of aging on entrepreneurial behavior. *Journal of business venturing*, 21(2), 177-194.
- Daim, T., Dabic, M., & Bayraktaroglu, E. (2016). Students' entrepreneurial behavior: international and gender differences. *Journal of Innovation and Entrepreneurship*, 5(1), 1-22.
- Hatak, I., Harms, R., & Fink, M. (2015). Age, job identification, and entrepreneurial intention. *Journal of managerial psychology*.
- Galloway, L., & Brown, W. (2002). Entrepreneurship education at university: a driver in the creation of high growth firms?. *Education+ training*.
- Davidsson, P., & Honig, B. (2003). The role of social and human capital among nascent entrepreneurs. *Journal of business venturing*, 18(3), 301-331.
- Basu, A., & Virick, M. (2008). Assessing entrepreneurial intentions amongst students: A comparative study. In *VentureWell. Proceedings of Open, the Annual Conference* (p. 79). National Collegiate Inventors & Innovators Alliance.
- McElwee, G., & Al-Riyami, R. (2003). Women entrepreneurs in Oman: some barriers to success. *Career Development International*.

- Carr, J. C., & Sequeira, J. M. (2007). Prior family business exposure as intergenerational influence and entrepreneurial intent: A theory of planned behavior approach. *Journal of business research*, 60(10), 1090-1098.
- Cerreia-Vioglio, S., Maccheroni, F., Marinacci, M., & Montrucchio, L. (2013). Classical subjective expected utility. *Proceedings of the National Academy of Sciences*, 110(17), 6754-6759.
- Kahneman, D., & Tversky, A. (1979). On the interpretation of intuitive probability: A reply to Jonathan Cohen.
- Schildberg-Hörisch, H. (2018). Are risk preferences stable?. *Journal of Economic Perspectives*, 32(2), 135-54.
- Andreoni, J., & Sprenger, C. (2012). Risk preferences are not time preferences. *American Economic Review*, 102(7), 3357-76.
- Abdellaoui, M., Diecidue, E., & Öncüler, A. (2011). Risk preferences at different time periods: An experimental investigation. *Management Science*, 57(5), 975-987.
- Fleeson, W. (2001). Toward a structure-and process-integrated view of personality: Traits as density distributions of states. *Journal of personality and social psychology*, 80(6), 1011.
- Gordon, L. A., Loeb, M. P., & Tseng, C. Y. (2009). Enterprise risk management and firm performance: A contingency perspective. *Journal of accounting and public policy*, 28(4), 301-327.
- Hoyt, R. E., & Liebenberg, A. P. (2011). The value of enterprise risk management. *Journal of risk and insurance*, 78(4), 795-822.
- Teoh, A. P., Lee, K. Y., & Muthuveloo, R. (2017). The impact of enterprise risk management, strategic agility, and quality of internal audit function on firm performance. *International Review of Management and Marketing*, 7(1), 222-229.
- Pagach, D., & Warr, R. (2011). The characteristics of firms that hire chief risk officers. *Journal of risk and insurance*, 78(1), 185-211.
- Quon, T. K., Zeghal, D., & Maingot, M. (2012). Enterprise risk management and firm performance. *Procedia-Social and Behavioral Sciences*, 62, 263-267.
- Ballantyne, R. (2013). An empirical investigation into the association between enterprise risk management and firm financial performance (Doctoral dissertation, Lawrence Technological University).
- OECD., K. (2018). *OECD science, technology and innovation Outlook 2018*. Paris: OECD Publishing.
- Mohnen, P., & Hall, B. H. (2013). Innovation and productivity: An update. *Eurasian Business Review*, 3(1), 47-65.

- Rogers, M., & Rogers, M. (1998). The definition and measurement of innovation (Vol. 98). Parkville, VIC: Melbourne Institute of Applied Economic and Social Research.
- Crépon, B., Duguet, E., & Mairessec, J. (1998). Research, Innovation And Productivi [Ty: An Econometric Analysis At The Firm Level. *Economics of Innovation and new Technology*, 7(2), 115-158.
- Crowley, F., & McCann, P. (2018). Firm innovation and Productivity in Europe: evidence from innovation-driven and transition-driven economies. *Applied Economics*, 50(11), 1203-1221.
- Fawcett, J. J., & Torremans, P. (Eds.). (2011). Intellectual property and private international law. Oxford University Press.
- Ceylan, C. (2013). Commitment-based HR practices, different types of innovation activities and firm innovation performance.
- Collins, C. J., & Smith, K. G. (2006). Knowledge exchange and combination: The role of human resource practices in the performance of high-technology firms. *Academy of management journal*, 49(3), 544-560.
- Chen, C. J., & Huang, J. W. (2009). Strategic human resource practices and innovation performance—The mediating role of knowledge management capacity. *Journal of business research*, 62(1), 104-114.
- Shipton, H., West, M. A., Dawson, J., Birdi, K., & Patterson, M. (2006). HRM as a predictor of innovation. *Human resource management journal*, 16(1), 3-27.
- Coad, A., & Rao, R. (2008). Innovation and firm growth in high-tech sectors: A quantile regression approach. *Research policy*, 37(4), 633-648.
- Friesenbichler, K., & Peneder, M. (2016). Innovation, competition and productivity: Firm-level evidence for Eastern Europe and Central Asia. *Economics of Transition*, 24(3), 535-580.
- Griffith, R., Huergo, E., Mairesse, J., & Peters, B. (2006). Innovation and productivity across four European countries. *Oxford review of economic policy*, 22(4), 483-498.
- Raffo, J., Lhuillery, S., & Miotti, L. (2008). Northern and southern innovativity: a comparison across European and Latin American countries. *The European Journal of Development Research*, 20(2), 219-239.
- Roper, S., Du, J., & Love, J. H. (2008). Modelling the innovation value chain. *Research policy*, 37(6-7), 961-977.
- Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic literature*, 47(2), 448-74.

- Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association*, 9(3), 522-550.
- Carter, L., & Bélanger, F. (2005). The utilization of e-government services: citizen trust, innovation and acceptance factors. *Information Systems Journal*, 15(1), 5-25.
- Fischer, S. (1993). The role of macroeconomic factors in growth. *Journal of Monetary Economics*, 32(3), 485-512.
- Marvel, M. R., & Lumpkin, G. T. (2007). Technology entrepreneurs' human capital and its effects on innovation radicalness. *Entrepreneurship Theory and Practice*, 31(6), 807-828.
- Marvel, M. R., Lee, I. H., & Wolfe, M. T. (2015). Entrepreneur gender and firm innovation activity: a multilevel perspective. *IEEE Transactions on Engineering Management*, 62(4), 558-567.
- Strohmeyer, R., Tonoyan, V., & Jennings, J. E. (2017). Jacks-(and Jills)-of-all-trades: On whether, how and why gender influences firm innovativeness. *Journal of Business Venturing*, 32(5), 498-518.4
- Baptista, R., & Swann, P. (1998). Do firms in clusters innovate more?. *Research Policy*, 27(5), 525-540.
- Rosenthal, S. S., & Strange, W. C. (2012). Female entrepreneurship, agglomeration, and a new spatial mismatch. *Review of Economics and Statistics*, 94(3), 764-788.
- Blake, M. K., & Hanson, S. (2005). Rethinking innovation: context and gender. *Environment and Planning A*, 37(4), 681-701.
- Cooper, R. (2012). The gender gap in union leadership in Australia: A qualitative study. *Journal of Industrial Relations*, 54(2), 131-146.
- Heilman, M. E. (2001). Description and prescription: How gender stereotypes prevent women's ascent up the organizational ladder. *Journal of Social Issues*, 57(4), 657-674.
- Loscocco, K. A., Robinson, J., Hall, R. H., & Allen, J. K. (1991). Gender and small business success: An inquiry into women's relative disadvantage. *Social Forces*, 70(1), 65-85.
- Rosa, P., Carter, S., & Hamilton, D. (1996). Gender as a determinant of small business performance: Insights from a British study. *Small Business Economics*, 8(6), 463-478.
- Watson, J., & Robinson, S. (2003). Adjusting for risk in comparing the performances of male- and female-controlled SMEs. *Journal of Business Venturing*, 18(6), 773-788.

- Thébaud, S. (2015). Business as plan B: Institutional foundations of gender inequality in entrepreneurship across 24 industrialized countries. *Administrative science quarterly*, 60(4), 671-711.
- 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.
- Kalleberg, A. L., & Leicht, K. T. (1991). Gender and organizational performance: Determinants of small business survival and success. *Academy of management journal*, 34(1), 136-161.
- Brush, C. G. (1992). Research on women business owners: Past trends, a new perspective and future directions. *Entrepreneurship theory and practice*, 16(4), 5-30.
- Eagly, A. H., Karau, S. J., & Makhijani, M. G. (1995). Gender and the effectiveness of leaders: a meta-analysis. *Psychological bulletin*, 117(1), 125.
- Johnson, J. E., & Powell, P. L. (1994). Decision making, risk and gender: Are managers different?. *British journal of management*, 5(2), 123-138.
- Johnsen, G. J., & McMahon, R. G. (2005). Owner-manager gender, financial performance and business growth amongst SMEs from Australia's business longitudinal survey. *International Small Business Journal*, 23(2), 115-142.
- Hinz, T., & Gartner, H. (2005). The gender wage gap within economic sectors, occupations, and firms. *Zeitschrift für Soziologie*, 34(1), 22-39.
- Zheng, Z. J., Croft, J. B., Giles, W. H., & Mensah, G. A. (2001). Sudden cardiac death in the United States, 1989 to 1998. *Circulation*, 104(18), 2158-2163.
- Johannessen, J. A., Olsen, B., & Lumpkin, G. T. (2001). Innovation as newness: what is new, how new, and new to whom?. *European Journal of innovation management*.
- Bajtelsmit, V. L., & VanDerhei, J. L. (1995). Risk aversion and pension investment choices.
- Ertac, S., & Gurdal, M. Y. (2012). Deciding to decide: Gender, leadership and risk-taking in groups. *Journal of Economic Behavior & Organization*, 83(1), 24-30.
- Jianakoplos, N. A., & Bernasek, A. (1998). Are women more risk averse?. *Economic inquiry*, 36(4), 620-630.
- Bernasek, A., & Shwiff, S. (2001). Gender, risk, and retirement. *Journal of economic issues*, 35(2), 345-356.
- Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic literature*, 47(2), 448-74.
- Estes, R., & Hosseini, J. (1988). The gender gap on Wall Street: an empirical analysis of confidence in investment decision making. *The journal of psychology*, 122(6), 577-590.

- Barber, B. M., & Odean, T. (2000). Trading is hazardous to your wealth: The common stock investment performance of individual investors. *The Journal of Finance*, 55(2), 773-806.
- Perryman, A. A., Fernando, G. D., & Tripathy, A. (2016). Do gender differences persist? An examination of gender diversity on firm performance, risk, and executive compensation. *Journal of Business Research*, 69(2), 579-586.
- CIEM, I. (2015). UNU-WIDER. 2016. Characteristics of the Vietnamese Business.
- Dohmen, T., Falk, A., Fliessbach, K., Sunde, U., & Weber, B. (2011). Relative versus absolute income, joy of winning, and gender: Brain imaging evidence. *Journal of Public Economics*, 95(3-4), 279-285.
- Haubrich, J. G. (1994). Risk aversion, performance pay, and the principal-agent problem. *Journal of Political Economy*, 102(2), 258-276.
- Meroño-Cerdán, A. L., López-Nicolás, C., & Molina-Castillo, F. J. (2018). Risk aversion, innovation and performance in family firms. *Economics of Innovation and new technology*, 27(2), 189-203.
- Wennberg, K., Delmar, F., & McKelvie, A. (2016). Variable risk preferences in new firm growth and survival. *Journal of Business Venturing*, 31(4), 408-427.
- Grund, C., & Sliwka, D. (2010). Evidence on performance pay and risk aversion. *Economics Letters*, 106(1), 8-11.
- Cooper, R. G., & Kleinschmidt, E. J. (1987). Success factors in product innovation. *Industrial marketing management*, 16(3), 215-223.
- Martín-Consuegra, D., & Esteban, Á. (2007). Market orientation and business performance: An empirical investigation in the airline industry. *Journal of Air Transport Management*, 13(6), 383-386.
- Hodge, G. A., & Greve, C. (2007). Public-private partnerships: an international performance review. *Public administration review*, 67(3), 545-558.
- Das, P. (2019). *Econometrics in theory and practice*. Springer, 10, 978-981.

Appendix

```
. xtset ID Year
```

Panel variable: **ID** (strongly balanced)

Time variable: **Year**, 2011 to 2015, but with gaps

Delta: 1 unit

```
. *dummy variables for years + sectors*
```

```
. tab Year, gen(yeart)
```

Year	Freq.	Percent	Cum.
2011	1,367	33.33	33.33
2013	1,367	33.33	66.67
2015	1,367	33.33	100.00
Total	4,101	100.00	

```
. *sort firm size*
```

```
. gen sizedum = 1 if Firmsize <=10
```

(1,003 missing values generated)

```
. replace sizedum=2 if Firmsize >10 & Firmsize <=50
```

(783 real changes made)

```
. replace sizedum=3 if Firmsize >50
```

(220 real changes made)

```
. tab sizedum, gen(size)
```

sizedum	Freq.	Percent	Cum.
1	3,098	75.54	75.54
2	783	19.09	94.64
3	220	5.36	100.00
Total	4,101	100.00	

```
. *apply individual risk index for 2011 + 2013*
```

```
. egen risk_max = max( risk), by(ID)
```

```
. gen risk_averse = 1 if risk_max < 5
```

(1,803 missing values generated)

```
. replace risk_averse = 0 if risk_averse ==.
```

(1,803 real changes made)

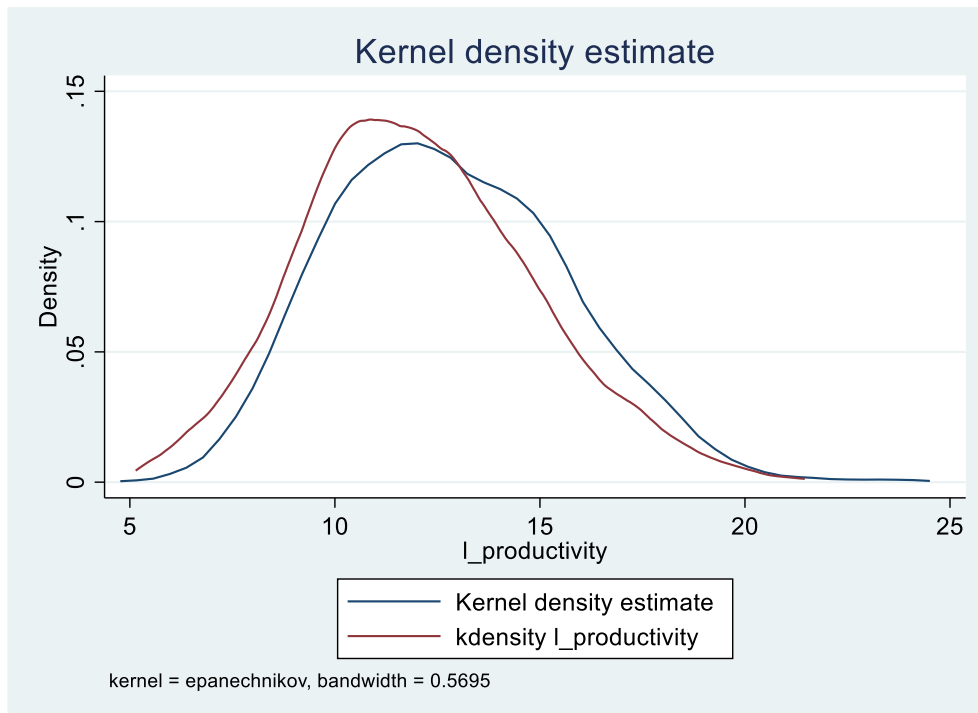
. *descriptive statistics*

```
. sum l_productivity risk_averse Loan Govassist Gender college firmage Firmsize a
> ge Householdbusiness Populouscity constraint Induszone Investment humaninvestme
> nt
```

Variable	Obs	Mean	Std. dev.	Min	Max
l_productivity	4,101	12.37081	2.846171	5.14236	23.93982
risk_averse	4,101	.5603511	.4964049	0	1
Loan	4,101	.0833943	.276511	0	1
Govassist	4,101	.1099732	.3128945	0	1
Gender	4,101	.6232626	.4846273	0	1
college	4,101	.2148257	.4107514	0	1
firmage	4,101	16.20068	9.640537	2	63
Firmsize	4,101	12.83809	26.52892	1	400
age	4,101	46.6535	9.215689	17	65
Householdbus	4,101	.6783711	.4671584	0	1
Populouscity	4,101	.3296757	.4701527	0	1
constraint	4,101	.6057059	.4887581	0	1
Induszone	4,101	.0407218	.197669	0	1
Investment	4,101	.5203609	.4996462	0	1
humaninvest	4,101	.2553036	.4360849	0	1

. *shift of risk-attitude*

```
. kdensity l_productivity if risk_averse==0, addplot(kdensity l_prod if risk_averse==1)
```



```

. *correlation check*
. pwcorr l_productivity risk_averse Loan Gender Investment humaninvestment , star(0.1)

```

	l_prod~y	risk_ave	Loan	Gender	Invest~t	humani~t
l_productivity	1.0000					
risk_averse	-0.1332*	1.0000				
Loan	-0.0263*	0.0113	1.0000			
Gender	-0.0513*	-0.0347*	0.0325*	1.0000		
Investment	0.1477*	-0.0765*	0.0160	0.0292*	1.0000	
humaninves~t	-0.0689*	0.0657*	0.0034	-0.0272*	-0.2158*	1.0000

```

. *gen independant variables list*
. global xlist Loan Govassist Gender college firmage firmage2 age age2 Householdb
> usiness Populouscity constraint Induszone size2 size3 yeart2 yeart3

```

```

. *probit for investment*
. probit Investment risk_averse $xlist

```

```

Iteration 0: log likelihood = -2839.1954
Iteration 1: log likelihood = -2576.5727
Iteration 2: log likelihood = -2576.188
Iteration 3: log likelihood = -2576.1879

```

Probit regression

```

Number of obs = 4,101
LR chi2(17) = 526.02
Prob > chi2 = 0.0000
Pseudo R2 = 0.0926

```

Log likelihood = -2576.1879

Investment	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
risk_averse	-.138454	.0417661	-3.31	0.001	-.220314	-.0565939
Loan	.0617144	.0747882	0.83	0.409	-.0848677	.2082965
Govassist	.205923	.0677857	3.04	0.002	.0730655	.3387806
Gender	.1139317	.0430681	2.65	0.008	.0295198	.1983435
college	-.018564	.0637243	-0.29	0.771	-.1434614	.1063334
firmage	-.0101287	.0065826	-1.54	0.124	-.0230303	.0027728
firmage2	.0001347	.0001191	1.13	0.258	-.0000988	.0003682
age	.0378086	.0196759	1.92	0.055	-.0007555	.0763728
age2	-.0005673	.0002144	-2.65	0.008	-.0009875	-.0001472
Householdbusiness	-.2950155	.0612869	-4.81	0.000	-.4151356	-.1748954
Populouscity	-.8097522	.0489199	-16.55	0.000	-.9056334	-.7138709
constraint	.1738318	.072833	2.39	0.017	.0310818	.3165818
Induszone	.1487514	.1202188	1.24	0.216	-.0868732	.3843759
size2	.4462374	.0639402	6.98	0.000	.3209168	.5715579
size3	.8107115	.1175366	6.90	0.000	.580344	1.041079
yeart2	.1821622	.0764614	2.38	0.017	.0323007	.3320238
yeart3	.1037821	.0560331	1.85	0.064	-.0060407	.2136049
_cons	-.1893119	.4504661	-0.42	0.674	-1.072209	.6935854

`. margins, dydx(*) post`

Average marginal effects

Number of obs = **4,101**

Model VCE: **OIM**

Expression: **Pr(Investment), predict()**

	Delta-method					[95% conf. interval]	
	dy/dx	std. err.	z	P> z			
risk_averse	-.049684	.0149287	-3.33	0.001	-.0789437	-.0204243	
Loan	.0221461	.026832	0.83	0.409	-.0304436	.0747358	
Govassist	.0738951	.0242454	3.05	0.002	.0263751	.1214152	
Gender	.0408842	.0154147	2.65	0.008	.0106719	.0710965	
college	-.0066617	.0228667	-0.29	0.771	-.0514796	.0381562	
firmage	-.0036347	.00236	-1.54	0.124	-.0082601	.0009908	
firmage2	.0000483	.0000427	1.13	0.258	-.0000354	.0001321	
age	.0135676	.007051	1.92	0.054	-.0002521	.0273872	
age2	-.0002036	.0000767	-2.65	0.008	-.000354	-.0000532	
Householdbusiness	-.1058658	.0218162	-4.85	0.000	-.1486247	-.0631069	
Populouscity	-.2905782	.0157499	-18.45	0.000	-.3214475	-.259709	
constraint	.0623793	.0260825	2.39	0.017	.0112585	.1135	
Induszone	.0533792	.0431196	1.24	0.216	-.0311337	.1378921	
size2	.1601316	.0225485	7.10	0.000	.1159373	.2043258	
size3	.2909225	.0414708	7.02	0.000	.2096412	.3722038	
yeart2	.0653686	.0273798	2.39	0.017	.0117053	.119032	
yeart3	.037242	.0200825	1.85	0.064	-.0021188	.0766029	

`. est store Product2`

```
. *probit for humaninvestment*
. probit humaninvestment risk_averse $xlist
```

```
Iteration 0: log likelihood = -2329.7251
Iteration 1: log likelihood = -2288.5648
Iteration 2: log likelihood = -2288.4916
Iteration 3: log likelihood = -2288.4916
```

Probit regression

Number of obs = 4,101
 LR chi2(17) = 82.47
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.0177

Log likelihood = -2288.4916

humaninvestment	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
risk_averse	.1540513	.044051	3.50	0.000	.067713	.2403896
Loan	.0206031	.0781832	0.26	0.792	-.1326332	.1738393
Govassist	-.1195109	.0722934	-1.65	0.098	-.2612034	.0221815
Gender	-.0925649	.0448236	-2.07	0.039	-.1804175	-.0047122
college	-.0237351	.0658147	-0.36	0.718	-.1527295	.1052594
firmage	.0035863	.0070151	0.51	0.609	-.0101631	.0173356
firmage2	-.0000913	.0001286	-0.71	0.478	-.0003434	.0001607
age	.0165428	.0208432	0.79	0.427	-.0243091	.0573947
age2	-.0001095	.000226	-0.48	0.628	-.0005525	.0003334
Householdbusiness	.0591336	.0644338	0.92	0.359	-.0671544	.1854215
Populouscity	.2555706	.0489071	5.23	0.000	.1597145	.3514268
constraint	-.1244828	.0746559	-1.67	0.095	-.2708057	.02184
Induszone	-.0088224	.1214769	-0.07	0.942	-.2469127	.2292679
size2	-.1609391	.0681276	-2.36	0.018	-.2944668	-.0274114
size3	-.1640286	.1170595	-1.40	0.161	-.3934609	.0654037
yeart2	-.0708466	.0785944	-0.90	0.367	-.2248888	.0831957
yeart3	.1050735	.0587273	1.79	0.074	-.0100299	.2201769
_cons	-1.252816	.479942	-2.61	0.009	-2.193485	-.3121474

. margins, dydx(*) post

Average marginal effects
Model VCE: OIM

Number of obs = 4,101

	Delta-method		z	P> z	[95% conf. interval]	
	dy/dx	std. err.				
risk_averse	.0485926	.0138466	3.51	0.000	.0214537	.0757315
Loan	.0064989	.0246611	0.26	0.792	-.041836	.0548337
Govassist	-.0376975	.0227882	-1.65	0.098	-.0823616	.0069666
Gender	-.0291979	.0141188	-2.07	0.039	-.0568703	-.0015255
college	-.0074868	.0207592	-0.36	0.718	-.0481742	.0332006
firmage	.0011312	.0022126	0.51	0.609	-.0032053	.0054678
firmage2	-.0000288	.0000406	-0.71	0.478	-.0001083	.0000507
age	.0052181	.0065734	0.79	0.427	-.0076655	.0181018
age2	-.0000345	.0000713	-0.48	0.628	-.0001743	.0001052
Householdbusiness	.0186526	.020319	0.92	0.359	-.0211718	.058477
Populouscity	.080615	.0152937	5.27	0.000	.0506399	.1105901
constraint	-.0392658	.0235326	-1.67	0.095	-.0853888	.0068572
Induszone	-.0027829	.0383176	-0.07	0.942	-.077884	.0723183
size2	-.0507652	.0214548	-2.37	0.018	-.092816	-.0087145
size3	-.0517398	.0369044	-1.40	0.161	-.124071	.0205914
yeart2	-.0223472	.0247861	-0.90	0.367	-.0709271	.0262326
yeart3	.0331435	.0185088	1.79	0.073	-.003133	.06942

. est store Human2

. *probit result*

. esttab Product2 Human2, wide scalars(chi2 df_m p r2_p) nogap compress replace b(4) se(4)

	(1)		(2)	
risk_ave~e	-0.0497***	(0.0149)	0.0486***	(0.0138)
Loan	0.0221	(0.0268)	0.0065	(0.0247)
Govassist	0.0739**	(0.0242)	-0.0377	(0.0228)
Gender	0.0409**	(0.0154)	-0.0292*	(0.0141)
college	-0.0067	(0.0229)	-0.0075	(0.0208)
firmage	-0.0036	(0.0024)	0.0011	(0.0022)
firmage2	0.0000	(0.0000)	-0.0000	(0.0000)
age	0.0136	(0.0071)	0.0052	(0.0066)
age2	-0.0002**	(0.0001)	-0.0000	(0.0001)
Househol~s	-0.1059***	(0.0218)	0.0187	(0.0203)
Populous~y	-0.2906***	(0.0157)	0.0806***	(0.0153)
constraint	0.0624*	(0.0261)	-0.0393	(0.0235)
Induszone	0.0534	(0.0431)	-0.0028	(0.0383)
size2	0.1601***	(0.0225)	-0.0508*	(0.0215)
size3	0.2909***	(0.0415)	-0.0517	(0.0369)
yeart2	0.0654*	(0.0274)	-0.0223	(0.0248)
yeart3	0.0372	(0.0201)	0.0331	(0.0185)
N	4101		4101	

```

. *using regressionresult.rtf*
. *pooled OLS*
. reg l_productivity risk_averse $xlist

```

Source	SS	df	MS	Number of obs	=	4,101
Model	23122.1667	17	1360.12745	F(17, 4083)	=	550.35
Residual	10090.6572	4,083	2.47138309	Prob > F	=	0.0000
				R-squared	=	0.6962
				Adj R-squared	=	0.6949
Total	33212.8238	4,100	8.10068874	Root MSE	=	1.5721

l_productivity	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
risk_averse	-.1483612	.0502852	-2.95	0.003	-.2469476	-.0497748
Loan	-.20527	.0898923	-2.28	0.022	-.3815078	-.0290321
Govassist	.3098351	.079926	3.88	0.000	.1531366	.4665336
Gender	.2311665	.0518069	4.46	0.000	.1295967	.3327363
college	.2215689	.0749152	2.96	0.003	.0746944	.3684435
firmage	.0076757	.0079737	0.96	0.336	-.0079571	.0233084
firmage2	-.0001297	.0001453	-0.89	0.372	-.0004146	.0001551
age	-.0456917	.0235047	-1.94	0.052	-.0917738	.0003903
age2	.0004868	.0002561	1.90	0.057	-.0000152	.0009889
Householdbusiness	-1.372863	.0734027	-18.70	0.000	-1.516772	-1.228954
Populouscity	1.208565	.0565191	21.38	0.000	1.097756	1.319373
constraint	.5254584	.0869368	6.04	0.000	.3550149	.6959019
Induszone	.4760254	.1328163	3.58	0.000	.215633	.7364178
size2	2.151256	.0760991	28.27	0.000	2.00206	2.300451
size3	4.548336	.1288577	35.30	0.000	4.295705	4.800968
yeart2	.4613437	.0912692	5.05	0.000	.2824064	.640281
yeart3	2.417389	.067397	35.87	0.000	2.285254	2.549524
_cons	11.77873	.5389938	21.85	0.000	10.722	12.83545

```

. est store POLS

```

```
. *random effect*
. xtreg l_productivity risk_averse $xlist, re theta
```

```
Random-effects GLS regression           Number of obs   =    4,101
Group variable: ID                     Number of groups =    1,367
```

```
R-squared:                               Obs per group:
  Within = 0.5818                          min =          3
  Between = 0.7407                         avg =          3.0
  Overall = 0.6934                         max =          3
```

```
corr(u_i, X) = 0 (assumed)                Wald chi2(17)   =    7499.81
theta        = .45292067                  Prob > chi2     =     0.0000
```

```
corr(u_i, X) = 0 (assumed)                Wald chi2(17)   =    7499.81
theta        = .45292067                  Prob > chi2     =     0.0000
```

l_productivity	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
risk_averse	-.1914803	.069337	-2.76	0.006	-.3273783	-.0555823
Loan	-.2164436	.123983	-1.75	0.081	-.4594457	.0265586
Govassist	.2691488	.0694981	3.87	0.000	.132935	.4053625
Gender	.2185835	.0714209	3.06	0.002	.078601	.358566
college	.2437525	.0759348	3.21	0.001	.094923	.3925819
firmage	.0060609	.0102474	0.59	0.554	-.0140237	.0261455
firmage2	-.0000974	.000185	-0.53	0.599	-.00046	.0002652
age	-.0866175	.0265792	-3.26	0.001	-.1387118	-.0345231
age2	.0009119	.0002886	3.16	0.002	.0003464	.0014775
Householdbusiness	-1.380708	.0858418	-16.08	0.000	-1.548954	-1.212461
Populouscity	1.270707	.0770476	16.49	0.000	1.119697	1.421718
constraint	.2858716	.0757072	3.78	0.000	.1374882	.434255
Induszone	.357708	.1407788	2.54	0.011	.0817865	.6336294
size2	1.805871	.0789402	22.88	0.000	1.651151	1.960591
size3	4.09058	.1472738	27.78	0.000	3.801928	4.379231
yeart2	.2701962	.0758552	3.56	0.000	.1215229	.4188696
yeart3	2.435623	.0600156	40.58	0.000	2.317995	2.553251
_cons	13.05695	.6131659	21.29	0.000	11.85517	14.25873
sigma_u	1.0152816					
sigma_e	1.1492912					
rho	.43832597	(fraction of variance due to u_i)				

```
. est store RE
```

. *productivity between OLS and RE*
 . esttab RE POLS

	(1)	(2)			
	l_productivity	l_productivity			
			Householdb~s	-1.381*** (-16.08)	-1.373*** (-18.70)
			Populoucity	1.271*** (16.49)	1.209*** (21.38)
risk_averse	-0.191** (-2.76)	-0.148** (-2.95)	constraint	0.286*** (3.78)	0.525*** (6.04)
Loan	-0.216 (-1.75)	-0.205* (-2.28)	Induszone	0.358* (2.54)	0.476*** (3.58)
Govassist	0.269*** (3.87)	0.310*** (3.88)	size2	1.806*** (22.88)	2.151*** (28.27)
Gender	0.219** (3.06)	0.231*** (4.46)	size3	4.091*** (27.78)	4.548*** (35.30)
college	0.244** (3.21)	0.222** (2.96)	yeart2	0.270*** (3.56)	0.461*** (5.05)
firmage	0.00606 (0.59)	0.00768 (0.96)	yeart3	2.436*** (40.58)	2.417*** (35.87)
firmage2	-0.0000974 (-0.53)	-0.000130 (-0.89)	_cons	13.06*** (21.29)	11.78*** (21.85)
age	-0.0866** (-3.26)	-0.0457 (-1.94)	N	4101	4101
age2	0.000912** (3.16)	0.000487 (1.90)	t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001		