How Did Women Entrepreneurship Change over Time in Turkey (2006-2015): A Regression of Pooling Cross Sections Across Time

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Abstract

This study uses the Regression of Pooling Cross Sections Across Time model to analyze whether the tendency to become an entrepreneur in Turkey has changed over time and also whether the gender gap between males and females has been narrowed. The data from the Global Entrepreneurship Monitor (GEM) for the years 2006-2015 for Turkey were employed. The dataset consisted of 56,109 interviews with a rep-

resentative sample of adults (18-64 years old). There was a noticeable increase in the general tendency in the entrepreneurial activity starting from the year of 2011 in Turkey. Although the probability of being a woman entrepreneur increased in Turkey, the gender entrepreneurial gap stayed quite stable at around 4% throughout 2006 – 2015.

<p style="text-align:center">***</p>

Türkiye'deki Kadın Girişimciliğinin 2006-2015 Yılları Arasındaki Gelişim Süreci: Yatay Kesit ve Zaman Verileriyle bir Regresyon Analizi

Öz

Bu çalışmada, Türkiye'de genel girişimcilik endeksi ve erkek-kadın girişimci endeksi arasındaki farkın zaman içindeki değişimi Yatay Kesit ve Zaman Verileri Regresyon Analizi kullanarak araştırılmıştır. Küresel Girişimcilik Monitörü (GEM) projesi tarafından, 2006-2015 yılları arasında Türkiye için toplanan veri seti kullanılmıştır. Veri seti temsili bir örnek olup, 56.109 görüşmeden oluşmaktadır. Türkiye'de 2011 yılından itibaren girişimcilik faaliyetlerinde kayda değer bir artış kaydetmiştir. Aynı zamanda, Türkiye'de kadın girişimci sayısında da artış görülmüş, fakat kadın-erkek girişimcilik oranındaki fark % 4 civarında sabit kalmıştır.

Anahtar Kelimeler: erken dönem girişimci olma olasılığı, yatay kesit ve zaman serisi verileri, cinsiyet farkı, Türkiye, yaş dağılımı, lojistik model

1. Introduction

Women's participation in entrepreneurship is lower than men's in most economies. The economic potential of women cannot be fully utilized. During the last decade, it has been widely acknowledged that the participation of women in entrepreneurship is an important unexploited source of economic growth and social well-being. Women entrepreneurs generate new jobs for themselves and others and being different they can provide different solutions to management, organization and business problems.

The level of entrepreneurship activity has been increased last ten years because of a more positive outlook for entrepreneurship in Turkey. The improvement and application of support system in general and women entrepreneurship have growing significantly. In general, government support policies/program, financial environment related with entrepreneurship have been improved during this period of time. In addition to that the strategies for supporting women's entrepreneurship by women's organizations, state organizations, private enterprises, chambers and national-international development foundations have been growing too. Hence, in 2006, the female entrepreneur index rose from 3.53% to 10% in 2015. In other words, about 4 women out of every 100 women become entrepreneurs in 2006, but in 2015 this number has risen to 10. Entrepreneurship is becoming an increasingly important source of employment for women as well as men in Turkey. However, there is a significant gender gap exists between the overall entrepreneurial activity of male versus female early stage entrepreneurs.

There are studies which investigates the effects of demographic characteristics of individuals (age, gender, income level, education level, and work status) and their perceptions about themselves (networking, fear of failure, alertness to opportunities, self- confidence) on their involvement to the different entrepreneurial activities of Turkey (Cetindamar, Gupta, Karadeniz, & Egrican, 2012; Karadeniz & Özçam, 2018; Karadeniz & Özdemir, 2017b, 2017a; Özçam & Karadeniz, 2012; Özdemir & Karadeniz, 2011). However, there is no study on the time effects of entrepreneurial activity in Turkey within our knowledge. Hence

we would like to analyze whether the tendency to become an entrepreneur in Turkey has changed over time (2006-2015) and also whether the gender gap between males and females has been narrowed. This article contributes to the field of entrepreneurship studies by presenting, for the first time, the time effects of women entrepreneurial activity and gender gap over time in Turkey.

Structure of this paper as follows: In Section 2, is based upon a review of the literature which provides a summary of each form entrepreneurial capital and an entrepreneur's possession, acquisition and exercise of the entrepreneurial capital could be examined in the relation to gender. Section 3 gives a description of the data and the variables used in the empirical analysis. Section 4 presents the results of the econometric estimation and discusses the time effects and gender gap over time, the effects of economic/demographic and perceptual variables on being an entrepreneur and the probability of being an entrepreneur among women with respect to age. The study concludes with summarizing the results, recommending for topics of further research and discussing the policy implications.

2. Literature Review: The Entrepreneurial Capital

Although women have significantly increased their participation in self-employment, female entrepreneurship is still regarded as one of the untapped sources of entrepreneurial activities and happens to be a worldwide phenomenon (Klapper & Parker, 2010; Zwan, Verheul, & Thurik, 2012). Empirical studies suggest that women are less likely to prefer entrepreneurial activity (early-decision stage or latent entrepreneurship) and they seldom take concrete steps to start a new business (later action stage or nascent entrepreneurship) (Bönte & Piegeler, 2013). Because, women have less entrepreneurial capital than men. Then amount and type of entrepreneurial capital available to an individual can have a significant impact in determining propensity to start a new business and the growth of business.

This section[1] will provide a summary of each form entrepreneurial capital and an entrepreneur's possession, acquisition and exercise of the entrepreneurial capital could be examined in the relation to gender. As will be seen, the literature has used the capitals as explanatory factors for the various outcomes of the entrepreneurial process.

According to the resource-based (RB) perspective of entrepreneurship, the entrepreneurial capital is summation of three forms of capital namely; economic, social and personal capital (Firkin, 2003). Then amount and type of entrepreneurial capital available to an individual can have a significant impact in determining propensity to start a new business and the growth of business.

Economic capital refers to "financial assets of any form that are directly convertible into money" (Firkin, 2003, p. 61). The main sources of economic capital for an entrepreneur are household wealth, household income, loans from banks and investors. Economic capital has a prominent role at entrepreneurial decision. The entrepreneurial decision is positively related to individual's incomes, because the availability of income weakens financial constraints (Evans & Jovanovic, 1989; Smallbone & Welter, 2001).

Access to and usage of finance is a major barrier for women to start and grow a successful enterprise (Brush, Carter, Gatewood, Greene, & Hart, 2001; Marlow & Patton, 2005) and women have less access to finance than men (Roomi & Parrott, 2008; Shaw, Carter, Lam, & Wilson, 2005). The gender pay gap in the labour market restricts the financial resources available for the creation of women-owned business. As a result of that, women entrepreneurs start with lower levels of overall capitalization than men (Marlow & Patton, 2005; Shaw et al., 2005). Occupational segregation in the labour market ensures that women have both less work experience and less variety of work experience than their male counterparts (Arenius & Kovalainen, 2006). Women's

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1   The literature review was based on the chapter Do Financial, Human, Social and Cultural Capital Matter? by Sarfaraz, L., Mian, S., Karadeniz E.E., Zali, M.R, Qureshi, M.. (2018). In N. Faghih & M. R. Zali (Eds.), *Entrepreneurship Ecosystem in the Middle East and North Africa (MENA): Dynamics in Trends, Policy and Business Environment*. Springer International Publishing.

experiences in labour market generate an unequal playing field in enterprise. Consequently, there is not much need to finance in the sectors that women operate (Marlow & Patton, 2005; Shaw et al., 2005) and women have smaller businesses compare to their male counterparts (Carter & Shaw, 2006) and women entrepreneurs tend to concentrate in the business sector (Loscocco & Robinson, 1991). In addition, women face more challenges than men in obtaining credits from bank (Shaw et al., 2005), and venture capital or participating in angel investment, which is crucial to starting and running capital intensive business (Brush et al., 2001). Women are less risk takers than males is that they are less willing to borrow money from banks and prefer to use their personal savings or borrow from family and friends (Marlow & Patton, 2005).

Social capital refers to the actual or potential resources which arise from being part of a network of relationships of mutual acquaintance and recognition (Bourdieu, 1986). Social capital consists of strong and weak ties that provide resources which enable individuals to access financial, technological resources, access to information about contacts with new customers, access to distribution channels, new contacts, general advice and market information and providing a bridging lubricant (Putnam, 2000). The strong ties are partner, parents, friends and relatives while the weak ties are business partners, former employers, and generally people not very well known to the entrepreneur.

Entrepreneurs use network connections to build their new ventures—the "bridging approach" to social capital. Thus, we define social capital in the context of entrepreneurship as the goodwill and resources that emanate from an individual's network of social relationships. It is often argued that entrepreneurs must have network in order to survive (Huggins, 2000), as the information and resources embedded in these networks are valuable to the formation and progression of new ventures.

Women entrepreneurs face drawbacks with regards to their social networks, and information and advice they can acquire through them (Robinson & Stubberud, 2009). Boden and Nucci (2000) argue that women have less social capital because they have had fewer years of

work experience and they have lack of managerial experience because of less exposure in the labour market. Atkinson mentioned that social capital is very valuable to women as it provides them to enlarge their business contacts, accessing mentors and other forms of informal support.

Women tend to use different networks. Women most often use family and friends and men use professional contacts such as bank, business consultants, accounts, lawyers, chambers of commerce, small development centres, etc. The strong ties usually offer a wider variety of resources, and information than the weak ties which include friends and family. The established male-dominated networks decrease the chances that a woman will have easy access to these networks (Robinson & Stubberud, 2009).

Personal capital is made up of an expanded view of human capital that comprises of the general and two specific types (industry and entrepreneurial), as well as a person's attributes. Individuals who have high degree of human capital have better ability to identify entrepreneurial opportunities (Davidsson & Honig, 2003; Ucbasaran, Westhead, & Wright, 2008).

General human capital refers to general knowledge and skills acquired through education and work experience. Specific human capital refers to knowledge and skills which are specific to tasks which are useful for establishing and running a business. The experience of working in a specific industry, and previous knowledge (Shane, 2000), work experience in general and entrepreneurial experience (Davidsson & Honig, 2003) increase the degree of human capital.

The importance of education on entrepreneurship has been excessively mentioned in the literature; however, the impact of education on entrepreneurship and entrepreneurial success is tentative (Storey, 1994). Delmar & Davidson (2000); Davidsson & Honig (2003) and Arenius & Minniti (2005) show a clear education effect for nascent entrepreneurs. However, Uhlaner and Thrurik (2004) show that a higher level of education in a country is accompanied by a lower self-employment rate. Blanchflower (2004) reports that education is positively cor-

related with self-employment in the US and negatively in Europe. Grilo and Irigoyen (2006) report a U-shape relationship between education and entrepreneurs.

On the other hand, the literature shows that the qualities of human capital are different between men and women when they start entrepreneurial activity (Boden & Nucci, 2000; Cetindamar et al., 2012; Gonzalez-Alvarez & Solis-Rodriguez, 2011). Gonzales-Alvarez and Solis-Rodriguez (2011) found that men were able to see more entrepreneurial opportunities than women, when they had higher levels of education and concluded that there was a gender difference in the accumulation of human capital. Men also have more industrial experience and entrepreneurial experience than women (Fischer, Reuber, & Dyke, 1993). Shaw et al., (2005) found that men have a greater amount of personal capital (industry experience, age, qualification), and they are likely to have more social capital. On the other hand, different studies suggest that women have lower entrepreneurial self-efficacy than men (Chowdhury & Endres, 2005). These differences allow men and women to develop their unique human capital that has its effect on propensity to start new business.

3. Women entrepreneurship activity in Turkey

Worldwide, more men are acting as entrepreneurs than women. Consistent with this pattern in other countries, almost 70 % of all entrepreneurs in Turkey are men (Figure 1). However, the good news is that the female early stage entrepreneurs rate has been increased. The level of women early-stage entrepreneurship activity in 2006 was 3,53 % which means that about 4 out of every 100 women in Turkey were entrepreneurs according to the "GEM definition. In 2015, 9,76% of women were identified as being involved in entrepreneurial activity; thus, 10 out of every 100 women adults in Turkey were entrepreneurs. Last ten years, generally, there is a more positive outlook for entrepreneurship in Turkey. Therefore the male early stage entrepreneurs' rate has been increased too. Therefore, the ratio of male to female entrepreneurs has not been changed significantly from 2006 to 2015.

Figure 1. Male and Female Early Stage Entrepreneurs

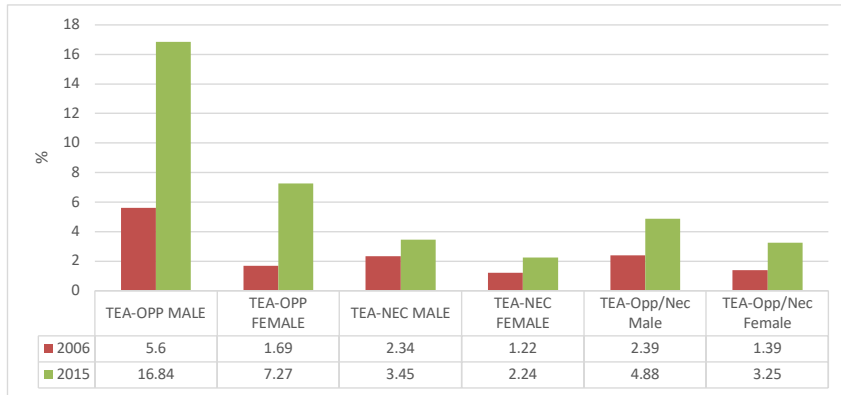|	Male	Female	Male/Female
■ 2006	8.53	3.53	2.4
■ 2015	24.52	9.76	2.5
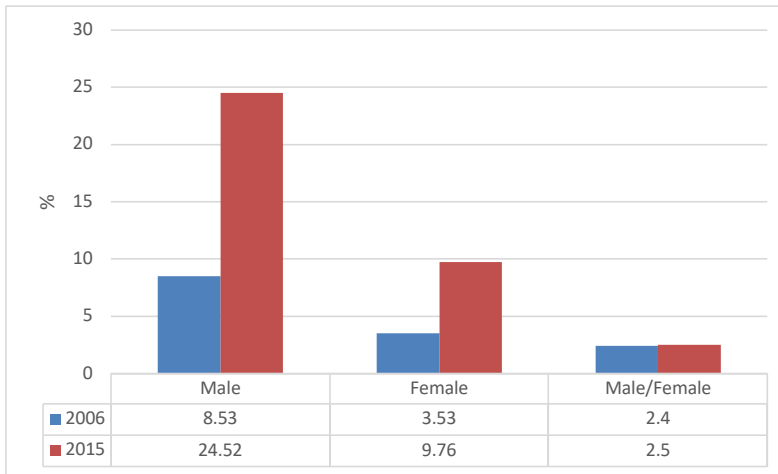
Entrepreneurs who consider starting a new business may be motivated by various factors. Some start their businesses in order to take advantage of particular business opportunities; others are forced by necessity to start up a business because they do not have other real sources of income.

Generally, the number of male and female entrepreneurs who have turned to entrepreneurship in order to pursue a business opportunity is higher than necessity motives. Regarding gender difference, it seems that there is more gender distinction in opportunity entrepreneurship than in necessity-entrepreneurship in 2006. Figure 2 shows that the ratio of opportunity to necessity driven early-stage entrepreneurship for female remained relatively low in 2006 compared to men. That is, women are involved in entrepreneurial activity for necessity motive because they have no other choice of work. However, the results of 2015 offer an interesting outcome: the decision to pursue an entrepreneurial motive for women was more likely to be motivated by opportunity than in necessity in 2015. The increase in opportunity-driven early-stage entrepreneurship for women is more than offset by the increase in necessity-driven entrepreneurial activity. The ratio of opportunity to necessity driven early stage entrepreneurship for female increase to the level of

men ratio. More women start businesses out of opportunity rather than necessity in 2015.

Figure 2. Gender Participation in Opportunity and Necessity Early-Stage Entrepreneurship

	TEA-OPP MALE	TEA-OPP FEMALE	TEA-NEC MALE	TEA-NEC FEMALE	TEA-Opp/Nec Male	TEA-Opp/Nec Female
■ 2006	5.6	1.69	2.34	1.22	2.39	1.39
■ 2015	16.84	7.27	3.45	2.24	4.88	3.25

The perceptual factors are important determinants of entrepreneurial activity in Turkey (Cetindamar et al., 2012; Karadeniz & Özçam, 2017a, 2018; Özçam & Karadeniz, 2012; Özdemir & Karadeniz, 2011). These are mainly: their perception of opportunities within their environment, whether they have sufficient knowledge and skills, and a reduced reluctance to become involved in entrepreneurial activity through fear of failure.

Table 1. Personal Perceptions of Women and Men.

The personal perceptions		2006	2015
Sees good start-up opportunities in the next six months in his/her area (% yes)/ opportunity recognition	Male	38,55	50,9
	Female	28,49	48,3
Has the required knowledge and skills to start a business (% yes) Self-efficacy	Male	66,59	68,84
	Female	42,22	47,84
Fear of failure would prevent from starting a business (% yes)	Male	27,2	31,72
	Female	38,77	40,88

The table 1 shows that the about half of Turkish people appear to believe that there is a change in the degree of entrepreneurial opportunities in Turkey from 2006 to 2015. The increase of opportunity recognition of women was higher than men. More women felt that the economy is providing more opportunities for them.

Possession of knowledge, skills and experience is also deemed important to the successful start-up of a new business. If people believed they possessed the necessary skills, those individuals might be more inclined to pursue entrepreneurship. As can be seen, 48 % of women respondents believed they had the skills necessary for a successful start-up. This figure is lower than the 69% of male respondent. This level of self-belief by women represents higher % of increase from 2006 to 2015 compare to the men. Therefore, it appears that more women are more confident and positive with regard to the skills required to start up a new business.

Fear of failure is an important factor that negatively affects entrepreneurial activity. Many people who choose not to become entrepreneurs are afraid of failing, that is, of making mistakes and losing money. In 2015, 41% of women mentioned that fear of failure prevented them from starting up a business. This figure is slightly higher than men which is 35%. At the same time, the percentage of men and women deterred by fear of failure increased by comparison with 2006.

To sum up, the number of women entrepreneurs increased and the motives of women to pursue an entrepreneurial activity was changed too. More women are involved in entrepreneurial activity opportunity motive: they start their businesses in order to take advantage of particular business opportunities to earn higher income or to be independent. More women are confident about their abilities to start a business. However, more women also had fear of failure which prevented them from starting up a business.

3. Data and Definitions of Variables
3.1. Data

The data used in this paper were collected by means of the national adult population survey (APS) of the Global Entrepreneurship Monitor

(GEM) project conducted in Turkey covering the years of 2006-2015, except for the year of 2009. The dataset consisted of 56,109 interviews with a representative sample of adults (18-64 years old). We have modelled the characteristics of the respondents and their probability of being an entrepreneur using the so-called regression of *Pooling Cross Sections Across Time*. The number of observations that were available in these years was 738, 751, 690, 1,414, 1,505, 1,374, 23,799, 24,183 and 1,656 respectively. Random Sampling Method was used and CATI (Computer Assisted Telephone Interview) was conducted by the vendor company.[2]

3.2. Definitions of Variables

DEPENDENT VARIABLE:

Respondents are asked whether they are either involved in the process of starting up a business in the past year or are active as owner managers of enterprises less than 42 months old.

Being a TEA Entrepreneur, (TEA=1) or Not a TEA Entrepreneur, (TEA= 0);

INDEPENDENT VARIABLES:

1- Age (AGE): between 18 and 64 years,

2- Household income (INC): Lower 33 % = 1, Middle 33 % = 2 and Upper 33 % = 3.

3- Education (EDUCATION): 1=up to Second degree, 2=Second degree, 3=Post Second, 4=Graduate.

4- Gender (GEND): Male = 0 and Female =1,

5- Knowing entrepreneurs (NETWORK): Respondents were asked whether they knew someone personally who had started a business in the 24 months preceding the survey: (NO=0, YES=1),

6- Opportunity perception (OPPORT): Respondents were asked if they believed that, in the 6 months following the survey, good business opportunities would exist in the area where they lived : (NO=0,

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2 The vendor companies, Akademetre and Method Araştırma are members of the European Society of Opinion, Marketing Researchers (ESOMAR), and the Turkish Association of Marketing, and Opinion Researchers.

YES=1),

7- Self Confidence (SKILL): Respondents were asked whether they believed to have the knowledge, skill, and experience required to start a business: (NO=0, YES=1),

8- Fear of Failure (FF): Respondents were asked whether the fear of failure would prevent them from starting a business: (NO=0, YES=1).

4. Econometric Estimation

4.1. The Logistic Regression Model, the Time Effects and Gender Gap Over Time

In Table-2 below, the Model-1 (column 2) is the *Logistic Regression Model* (LRM) with 8 independent variables: Age, Gender, Income, Educ, Skill, Network, FF and Opport) and time dummies. We use binary logistic regression models for our analysis, because the dependent variable in the models have binary (0 and 1) values. The Age variable enters the regression in a quadratic fashion. Because the relationship between dependent variable and age is nonlinear. This regression is augmented with the Gender variable interacted with all of the 8 time dummies: Y07, Y08, Y10, Y11, Y12, Y13, Y14 and Y15 which are equal to 1 for the years that are indicated and 0 otherwise. We use the interaction dummies because the time effects of women entrepreneurial activity will be analysed.

The base year is 2006 and Y07 refers to 2007, Y10 refers to 2010 and so on… There are no data that are available for the year of 2009. The *Logistic Regression Model* (LRM) is given as:

$$\Pr(TEA = 1) = G(\beta_0 + \delta_1 Y07 + \delta_2 Y08 + \delta_3 Y10 + \delta_4 Y11 + \delta_5 Y12 + \delta_6 Y13 + \delta_7 Y14 + \delta_8 Y15$$
$$+ \beta_1 AGE + \beta_2 AGE\text{\textasciicircum}2 + \beta_3 GEND + \beta_4 INC + \beta_5 EDUC + \beta_6 SKILL + \beta_7 NETWORK + \beta_8 FF$$
$$+ \beta_9 OPPORT + \lambda_1 Y07 * GEND + \lambda_2 Y08 * GEND + \lambda_3 Y10 * GEND + \lambda_4 Y11 * GEND +$$
$$+ \lambda_5 Y12 * GEND + \lambda_6 Y13 * GEND + \lambda_7 Y14 * GEND + \lambda_8 Y15 * GEND = G(B'X) \qquad (1)$$

where G(.) is the Cumulative Logistic Distribution Function, *B* is an (26x1) vector of coefficients and *X* is an (26x1) vector in which we have

a constant term, the time dummies, the independent variables (Age and Age squared are separate variables) and 8 interaction terms involving the Gender variable with the time dummies.

Table 2. Estimation of Being a Tea Entrepreneur (Dependent Variable: Being an Entrepreneur =1 and Not an Entrepreneur = 0).

VARIABLES	LOGISTIC REGRESSION MODEL-1	LOGISTIC REGRESSION MODEL-2
Constant	-3.77 (0.00)**	-3.81 (0.00)**
Y07	-0.033 (0.96)	-
Y08	0.009 (0.89)	-
Y10	0.035 (0.95)	-
Y11	0.453 (0.44)	0.856 (0.00)**
Y12	0.447 (0.44)	0.484 (0.06)*
Y13	-0.049 (0.92)	-
Y14	1.49 (0.00)**	1.51 (0.00)**
Y15	1.017 (0.07)*	1.055 (0.00)**
AGE	0.054 (0.00)**	0.0545 (0.00)**
AGE^2	-0.0008 (0.00)**	-0.0008 (0.00)**
GEND	-1.131 (0.007)**	-1.123 (0.00)**
INC	0.3252 (0.00)**	0.35 (0.00)**
EDUC	-0.084 (0.00)**	-0.0837 (0.00)**
SKILL	1.02 (0.00)**	1.021 (0.00)**
NETWORK	0.71 (0.00)**	0.711 (0.00)**
FF	-0.254 (0.00)**	-0.255 (0.00)**
OPPORT	0.382 (0.00)**	0.382 (0.00)**
Y07*GEND	0.38 (0.48)	0.374 (0.00)**
Y08*GEND	0.286 (0.60)	0.374 (0.00)**
Y10*GEND	0.207 (0.66)	0.247 (0.00)**
Y11*GEND	0.314 (0.50)	-
Y12*GEND	0.409 (0.37)	0.40 (0.03)**
Y13*GEND	0.623 (0.15)	0.605 (0.00)**
Y14*GEND	-0.0047 (0.98)	-
Y15*GEND	0.369 (0.42)	0.36 (0.03)**
McFadden R^2	0.1605	0.1604
No of Obs.	56,190	56,190

Note. The numbers in parentheses are the p-values. (**) indicates 5% significance level and (*) indicates 10% significance level.

All 8 independent variables (Age, Gender, Income, Educ, Skill, Network, FF and Opport) and Age^2 are statistically significant. However, some of the time dummies and the interaction terms are not significant. Therefore, we follow a sequential elimination of the insignificant variables and arrive at our final version the *Logistic Regression Model* (LRM) which is displayed in the third column of Table-2 above (Model-2). Among the time dummies, Y11, Y12, Y14 and Y15 are statistically significant and their estimated coefficients remained practically the same. The remaining time dummies, Y07, Y08, Y10 and Y13 are statistically insignificant. All 8 independent variable and Age^2 are again statistically significant and their estimated coefficients are similar to those in the first regression (Model-1). All interaction terms representing gender gaps are significant except for Y11 and Y14. The R-squared remains the same at 0.16.

In Table-3 below, the time effects are calculated as follows (column 2). 2006 is the base year. We take the difference in the Cumulative Logistic Distribution Function (*G*) evaluated at the relevant year (row) and at 2006 using the estimated coefficients in Table-2 above. For example for the year of 2011:

TIME EFFECT at 2011 with respect to 2006 = *G* (-3.81 + 0.856 + 0.0545*ave_Age –0.0008*ave_Age2 – 1.123*ave_Gend + 0.35*ave_Inc - 0.0837*ave_Educ + 1.021*ave_Skill+ 0.711*ave_Network - 0.255*ave_FF + 0.382*ave_Opport) – *G* (-3.81 + 0.0545*ave_Age –0.0008*ave_Age2 – 1.123*ave-Gend + 0.35*ave_Inc - 0.0837*ave_Educ + 1.021*ave_Skill + 0.711*ave_Network - 0.255*ave_FF + 0.382*ave_Opport) = 0.048

(2)

where ave_Age is the sample average of the Age variable over 56,190 observations for 2006-2015 and so on… In eq. (2) above, the only change in taking the difference in G (.) between the years of 2011 and of 2006 is the estimated coefficient of Y11 which is 0.856 that appears only for the year of 2010. G (.) function is evaluated at the sample means of the independent variables since they represent typical charac-

teristics of the respondents in the sample at hand. We have not included the interaction terms representing the changes in gender gaps since here we are measuring only the time effects. There was not an apparent change in the general tendency to be an entrepreneur in the years of 2007, 2008 and 2010 compared with the base year of 2006. *After controlling for the observed factors* which are included in the regression (Age, Gender, Income, Educ, Skill, Network, FF and Opport) there has been an increase in the general tendency in the entrepreneurial activity in the year of 2011 compared to the base year of 2006. The probability of being an entrepreneur was 4.8 % higher in 2011 compared to 2006. After 2011, the time effects or the general tendencies to be an entrepreneur were 2.3%, 11.5% and 6.5% higher in the years of 2012, 2014 and 2015 respectively compared to 2006. It seems like the trend of being an entrepreneur increased on the average after 2010 all else equal. This increase is especially visible in the last 2 years (2014 and 2015).

Table 3. Changes in Entrepreneurial Activity over Time: Time and Gender Gap Effects

YEARS	TIME EFFECTS	GENDER GAPS
2006	-	-0.0375
2007	-	-0.0406
2008	-	-0.0406
2010	-	-0.0404
2011	0.048	-0.0375
2012	0.023	-0.0405
2013	-	-0.0376
2014	0.115	-0.0375
2015	0.065	-0.0407

In Table-3 above, the gender gaps are calculated as follows (column 3). For example in the base year of 2006, the probability of a man to be an entrepreneur is 3.75% higher compared to a woman.

GENDER GAP at 2006 = G (-3.81 + 0.0545*ave_Age

–0.0008*ave_Age2 – 1.123*2 +

0.35*ave_Inc - 0.0837*ave_Educ + 1.021*ave_Skill + 0.711*ave_Network - 0.255*ave_FF +

0.382*ave_Opport) – G (-3.81 + 0.0545*ave_Age – 0.0008*ave_Age2 – 1.123*1 +

0.35*ave_Inc - 0.0837*ave_Educ + 1.021*ave_Skill + 0.711*ave_Network - 0.255*ave_FF +

0.382*ave_Opport) = - 0.0375

$$(3)$$

In eq. (3), 2 are inserted for a man, after – 1.123 which is the estimated coefficient of Gender variable and 1 inserted for a woman. We observe that the gender gap, which is the difference in the probability of being an entrepreneur, stayed pretty stable at around 4% (3.75% in 2006 and 4.07% at 2015) throughout 2006 – 2015.

4.2. The Effects of Economic/Demographic and Perceptual Variables on Being An Entrepreneur

In Table-4 below, the first column lists our economic/demographic and perceptual variables (except for Age which is discussed in the next section and Gender which was already discussed in Table-3 above). In column 2, we present the derivatives (or marginal effects) of the *Linear Probability Model* (LM), Model-3. The derivatives of the independent variables in LM are simply the estimated coefficients which show the marginal effects. However, the magnitudes of the estimated coefficients of LRM which are presented in the third column of the same Table (Model-2) are not directly comparable with the marginal effects of the LM. The marginal effects of the *Logistic Regression Model* (LRM) can be calculated only after we multiply the estimated coefficients of LRM which were presented in Table-2 above, by a Scaling Factor (SF). To show this, we write the derivatives (marginal effects) of the independent variables in LRM in general as:

$$\frac{\partial \Pr(TEA=1)}{\partial x_j} = g(B'X)\frac{\partial (B'X)}{\partial x_j} \qquad (4)$$

where the (26x1) vectors of X and B are as defined above, $g(.)$ is the Probability Density Function of the Logistic random variable, and $g(B'X)$ is a Scaling Factor (SF). The x_j 's are the independent variables except for Age and Gender, $j = 1, 2,…6$, (Inc, Educ, Skill, Network, FF, Opport).

For each of these 6 independent variables, Eq. (3) implies:

$$\frac{\partial \Pr(TEA=1)}{\partial x_j} = g(B'X)*\beta_j \qquad (5)$$

where b_j is the estimated coefficient of the independent variable j. In Table-4 below, we are now able to compare the derivatives (marginal effects) of the *Logistic Regression Model* (LRM) with those of the *Linear Probability Model* (LM) using Eq. (5) above. We observe that the derivatives obtained from these two models are extremely close to each other for each of these independent variables (except Skill). Since LRM is a nonlinear model, the derivatives depend where all independent variables are evaluated; we use the sample means of the independent variables in order to represent the typical characteristics of entrepreneurs in the sample. The closeness' of estimated derivatives confirm that our calculations are correct.

Table 4. Comparison of Derivatives from the Linear and the Logistic Regression Models

INDEPENDENT VARIABLES	DERIVATIVES OF LINEAR REGRESSION (MODEL-3)	DERIVATIVES OF LOGISTIC REGRESSION (MODEL-2)
INC	0.038	0.047
EDUC	- 0.014	- 0.011
SKILL	0.095	0.057
NETWORK	0.098	0.095
FF	- 0.031	- 0.034
OPPORT	0.046	0.051

Note. The derivatives of the LRM are those of the year of 2015.

These derivatives (marginal effects) in the *Logistic Regression Model* (LRM) in Table-4 above (third column), imply that when a respondent's income (Inc) increases to the next upper class, for example from second class (2) to third class (3), then the probability of being an entrepreneur increases by 0.47% holding all other variables constant. Similarly, the probabilities of being an entrepreneur changes by - 1.1%, 5.7%, 9.5%, -3.4 and 5.1 % when the person's education increases and she/he belongs to the next upper education level (Educ), believes to have knowledge, skill and experience (Skill), knows an entrepreneur personally (Network), and has fear of failure (FF), believes good business opportunities exist in the area (Opport) respectively. We observe that Network has the highest effect (9.5%) and Educ has a slightly negative effect (- 1.1%) which is statistically significant but practically insignificant.

In Section 4-3 below, we now turn to the estimation and graphing of the probability of being an entrepreneur among women in Turkey by allowing the Age variable to change from 18 years to 64 years using our Eq. (1) above.

4.3. The Probability of Being an Early Stage Entrepreneur Among Women with Respect to Age

We also like to investigate whether there is an inverse U-shaped concave relationship between the probability of being a TEA entrepreneur and age, and if so, what is this threshold age level, using the Turkish GEM data, 2006-2015. We try to answer this question by using the cumulative distribution function of the *Logistic Regression Model* (LRM) and measuring the age variable on the horizontal axis (Graph-1 below).

This threshold age level (30.9) can be found mathematically as follows:
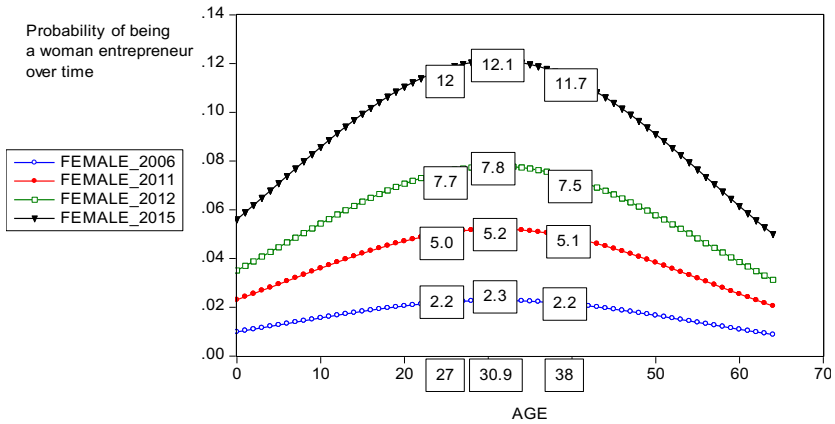
$$\frac{\partial \Pr(TEA = 1)}{\partial AGE} = g(B'\bar{X}) * (\beta_1 + 2\beta_2 AGE)$$

$$= \exp(B'\bar{X}) * (\beta_1 + 2\beta_2 AGE)/(1 + \exp(B'\bar{X}))^2 = 0 \qquad (6)$$

where is the vector in which all independent variables are held constant at their sample means. The solution to Eq. (6) is:

$$AGE = (-\beta_1)/(2\beta_2) = (-0.0545)/(2 * -0.00881) = 30.9 \tag{7}$$

since exp(.) is strictly positive for all values in its domain.

Graph 1. Probability of Being a Tea Entrepreneur among Women with Respect To Age and Time

In Graph-1 above we show the probabilities of being a TEA entrepreneur among women with respect to Age and time together in the case of Turkey. At the threshold age of 30.9, the probability of being an entrepreneur increases from 2.3% in 2006 to 5.2% in 2011 for a typical female respondent in the sample (for ex: all the characteristics of the respondent except gender fixed at sample averages). These probabilities increase steadily to 7.8% and 12.1% in the more recent years of 2012 and 2015. We also calculated the probabilities of becoming entrepreneurs for women at their earlier and later years of age: 27 years and 38 years. As it is clear from the graph above, the probabilities at these 2 levels of age are quite similar. They are about 2.2%, 5.1%, 7.5% and 11.7 for the selected years. Therefore, we conclude that the probability of being a woman entrepreneur increased in Turkey especially after the year of 2010. However, this is due to the fact that there is a general up-

ward tendency in the overall entrepreneurial activity in Turkey, rather than women catching up their male counterparts in entrepreneurship as was discussed in section 3-1 above. The gender gap stayed constant at about 4% over 2006-2015.

5. Conclusion

This study uses the *Regression of Pooling Cross Sections across Time model* to analyze whether the tendency to become an entrepreneur in Turkey has changed over time and also whether the gender gap between males and females has been narrowed.

In addition, the model incorporates the *Logistic Regression Model* (LRM) since the dependent variable (being a TEA entrepreneur or not) is a binary variable. Using the Cumulative Logistic Distribution Function (*G*) and evaluating it at the estimated coefficients allows us to compute the probability distribution of being an entrepreneur for the Turkish respondents. The data from the Global Entrepreneurship Monitor (GEM) for the years 2006-2015 for Turkey were employed. The dataset consisted of 56,109 interviews with a representative sample of adults (18-64 years old).

The following results were observed:

a) An apparent change in the general tendency to become an entrepreneur has not been noticed in the earlier years of data, 2007, 2008 and 2010 compared with the base year of 2006. *After controlling for the observed factors* which are included in the regression (Age, Gender, Income, Educ, Skill, Network, FF and Opport) there was a marked increase in the general tendency in the entrepreneurial activity starting from the year of 2011 compared to again the base year of 2006. The probability of being an entrepreneur has been estimated to be 4.8 % higher in 2011 compared to 2006. After 2011, the time effects or the general tendencies to be an entrepreneur were 2.3%, 11.5% and 6.5% higher in the years of 2012, 2014 and 2015 respectively compared to 2006. It seems like the trend of being an entrepreneur increased on the average after 2010 all else equal. This increase is especially more pronounced in the last 2 years (2014 and 2015).

b) We found that the gender gap, which is the difference in the probability of being an entrepreneur between men and women, stayed pretty stable at around 4% (3.75% in 2006 and 4.07% at 2015) throughout 2006 – 2015 in Turkey.

c) With respect to the derivatives (marginal effects) of the economic/demographic and perceptual variables in the model, we found that when a respondent's income (Inc) increased to the next upper class, for example from second class (2) to third class (3), then the probability of being an entrepreneur increased by 0.47% holding all other variables constant. Similarly, the probabilities of being an entrepreneur changed by - 1.1%, 5.7%, 9.5%, -3.4 and 5.1 % when the person's education increased and she/he belonged to the next upper education level (Educ), believed to have knowledge, skill and experience (Skill), knew an entrepreneur personally (Network), and had a fear of failure (FF), believed that good business opportunities existed in the area (Opport) respectively. We observe that Network has the highest effect (9.5%) and Educ has a slightly negative effect (- 1.1%) which is statistically significant but practically insignificant in Turkey.

d) The probability of being a woman entrepreneur increased in Turkey especially after the year of 2010. However, this was due to the fact that there was a general upward tendency in the overall entrepreneurial activity in Turkey, rather than women catching up their male counterparts in entrepreneurship since the gender gap was already found to stay constant at about 4% over 2006-2015. We found that the threshold age (the maximum probability) of women entrepreneurs to be around the age of 31. This probability of being an entrepreneur increases from 2.3% in 2006 all the way up to 12.1% in 2015 for a typical female respondent in the sample (for ex: all the characteristics of the respondent except gender fixed at sample averages).

However, the gap between male and female entrepreneurship presents some concern and the gender gap has not been changed over time. We need to ensure that the institutional environment in Turkey should support and encourage female entrepreneurship in order to further increase female participation in entrepreneurial activity.

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