

LABOUR MARKET AND SELF-EMPLOYMENT: THE ISRAELI CASE

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ABSTRACT

The aim of this paper is to present and analyze the labour market from the perspective of self-employment. It investigates the phenomenon of this form of employment from several aspects: on the one hand, it examines the factors influencing the choice of Israelis to be self-employed among Arabs and Jews in Israel, and, on the other hand, it examines the extent to which human capital and family background characteristics determine the employment choice. The main aim of the paper is to characterize the phenomenon of self-employment in the labour market. By using 2008 data Israel Census, hypotheses concerning the effect of demographical variables on self-employment are formulated and tested, using logistic regression. The results support the research hypotheses, and the most notable predictors of self-employment are discussed. Thus, we conclude that family background, gender, age, number of children and an interaction between nationality and occupation are the most significant predictors of self-employment. Many factors affect the self-employment status of citizens of Israel, with the single strongest predictor being gender – males in Israel are more likely to be self-employed. Also, more urbanized areas such as Tel-Aviv and the Centre, have higher self-employment rate than less populated areas such as the South.

Keywords: Labour market, Self-employment, Entrepreneurship.

JEL Classification: J01, J12, L26.

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1. Introduction

One of the most important challenges facing the modern world today is the problem of integrating ethnic minorities into the general labour market, usually dominated by the ethnic group that constitutes most of the country's population. Many researchers and countries deal with the problem of integrating minority groups into the labour market, and this is true for countries that absorb migrants, as well as for countries with indigenous minorities. Thus, and in order to successfully integrate minorities into the labour market, it is necessary to first examine whether there are differences in the nature of the employment of the minority group as opposed to the majority. One of the issues raised in this discussion is the way in which the labour force of each of these two groups is divided between self-employed and salaried employees.

The extent to which individuals are affected by their personal characteristics (e.g. education, gender, race or ethnicity), their parents' characteristics (e.g. their education and profession) and the culture in which they are raised is a source of concern for many social policy researchers. The factors that will be examined as potentially having an effect on the individual's choice to be self-employed or a salaried employee are 11 explanatory variables: gender, age, country of birth, marital status, number of children, nationality, seniority, education, occupation, industry and area of residence. In other words, the study examines whether there are differences between minorities and the majority group in the characteristics and rate of the self-employed in Israel; are there differences between the sexes in choosing employment status; how do age, marital status, number of children, education and country of birth influence choice; and, finally, how the geographical area of the individual's residence, occupation, and the industry in which he is employed affect the choice of the Israeli whether to be independent or salaried (i.e. employed). The examination will be conducted in the Israeli economy where the minority group includes the Arab population, while the majority includes the Jews.

Although the minority group in this study is not composed of immigrants, in many respects their situation is like that of immigrants in European countries. The main hypothesis in this study is that Israeli Arabs – the minority group - are more affected by family background than Jews are.

The results show that many factors affect the self-employment status of citizens of Israel, with the single strongest predictor being gender – males in Israel are more likely to be self-employed. In addition, in more urbanized areas such as Tel-Aviv and the Centre have higher self-employment rates than in less populated areas such as the south of Israel and Negev.

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We can see that across both nationalities, professional and skilled workers are more likely to become self-employed than non-skilled workers. Nevertheless, Arabs and Jews tend to prefer different areas of occupation for self-employment. Arabs are much more likely to be self-employed in the academic, management, agency and sales areas of occupation. Age is a strong predictor of self-employment, with a positive correlation – individuals in mid-adulthood are more likely to be self-employed.

The paper is organized as follows. Section 2 reviews the literature; section 3 presents the research question and its hypotheses; section 4 provides information on the data source; section 5 describes the empirical methodology used for the research; section 6 presents the results of the regressions and descriptive statistics, and section 7 presents the conclusions.

2. Literature review

The labour market can be divided into two main tracks: salaried employees and the self-employed. The latter, as suggested in research literature, can be examined using two approaches. The first considers self-employed as labour-force category. In this case, the difference between self-employed and salaried employees is the identity of the proceeds payer. In other words, does the payer act as customer or employer? The second approach refers to the self-employed as a category of the business sector, referred to "small businesses." In fact, this approach views the self-employed as entrepreneurs. Previous literature made clear distinction between self-employed workers who work alone, and self-employed workers who employ several employees, however and in contrast to previous studies, in the current study, we consider these two categories as self-employed.

Data from the OECD show a large variance in the percentage of the self-employed in the OECD countries (OECD data for 2017): Norway 6.454%, Italy 22.913%, USA 6.294%, Australia 10.415%, the Netherlands 16.692%, Canada 8.276%, Turkey 32.009%, Spain 15.696%, Brazil 32.307%, Portugal 16.649%, Switzerland 14.746%, United Kingdom 15.108% and Israel 12.426%.

Many researchers have tried to account for the differences between the countries described above and understand the reasons that make individuals decide whether to be salaried employees or self-employed. The variance and its causes range on the spectrum between the sociological field and the economic sphere, and the integration between them (refers to economic considerations and considerations that are not economic).

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Individuals have economic considerations; they examine alternatives and compare possible incomes. The expected income from the alternatives is influenced by factors that characterize each individual such as traits and skills, availability of equity (required for starting an independent business) and job offers, general employment and the number of jobs offered. Self - employed are likely to have to spend more hours, lose the guaranteed income at the end of each month, and lose social benefits only to salaried employees, such as unemployment benefits.

There is surprisingly little formal modelling of individuals' choices between dependent and self-employment, and here we would like to elaborate on the choice to be self-employed and not a salaried employee. In particular, we would like to discuss several points that can help in understanding the subject:

2.1 Nationality

A discussion of the rate of self-employed among ethnic minorities shows a situation that is not uniform. Many studies have documented the tendency of minorities and immigrants to choose self-employment as a way to receive higher returns on their human capital (Portes & Jensen, 1989; Waldinger, Aldrich, & Ward, 1990; Le, 1999; Clarck & Drinkwater, 2000; Fairlie, 2007). However, minorities may be in a state of lack of financial and social capital needed for self-employment (Aronson, 1991; Hout & Rosen, 2000; Robb & Fairlie 2007) or suffer from discrimination (on the part of lenders, suppliers, customers) as business owners (Coate & Tennyson, 1992; Blanchflower, 2009).

In some European countries, the rate of self-employed among minorities is higher than in the general population, while the United States has less self-employed among blacks and Sephardim, apparently due to an initial lack of liquidity. In Sweden and Denmark, for example, the rate of self-employed among immigrants is much higher than that of the rest of the population. It was also found that the income of self-employed immigrants is lower than the income of wage earners (Andersson & Wadensjö, 2004). Andersson and Wadensjö conclude that immigrants who chose to be self-employed did so because they found it difficult to find work as salaried workers.

Other studies have reached different conclusions; for example, Borjas (1986) found that in the 1970s and 1980s the rate of self-employed among immigrants in the US was greater, and Shahor (2014) found that in Israel the rate of self-employed among minorities is greater. However, it is possible that in Israel too, the convergence of the rate of self-employed among minority members to the rate of self-employed in the society at large (i.e. Jewish) can indicate economic integration.

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As noted in the various factors and motivations that influence different levels of immigrant communities to work as self-employed in target countries, these factors - positive factors and push factors - are also important incentives of the decision of members of national and ethnic groups as self-employed and business entrepreneurs. (Clark & Drinkwater, 2010).

This phenomenon of the number of self-employed members of national, ethnic and religious minorities or immigrant communities, as opposed to the number of self-employed members of the national-ethnic-religious majority, is recognized by other countries. As we'll see in the Country of Birth section, in Britain, the proportion of self-employed and business entrepreneurs of Chinese, Indian, and Pakistani origin was relatively higher than that of the British English (Clark & Drinkwater, 2010).

2.2 Gender

Gender clearly affects workers' considerations and decisions due to the pervasive expectation that women care for their families (Carr, 1996; Arum, Aldrich, & Ward, 2000; Lohmann, 2001; Lombard, 2001; Budig, 2006). Thus, family characteristics, notably the presence of children and marital status, predict women's self-employment more strongly than men's (Arum, 1997; Boden, 1999; Carr, 1996; McManus, 2001; Renzulli, Aldrich & Moody, 2000; Taniguchi, 2002).

Lombrad (2001) showed that the likelihood that an American woman chooses self-employment is positively related to her relative earning potential as self-employed, but also to her demand for flexibility and a non-standard work week. Kraus (2003) as well as Walker and Webster (2004) show that self-employed women are also more likely to work at home, an indication that the need to take care of family duties plays a greater role in women's self-employment than in that of men. According to Arum (1997) and Budig (2006) these results hold only for non-professional self-employed women, but Lohmann (2001) found that this conclusion holds for professional women as well.

Carr (1996) found that women earn less than men and salaried women; so that women with children in kindergarten will choose to work independently because of flexibility, although flexibility can hurt a woman's income. The characteristics of human capital, including education, age and past work experience, are expected to predict the employment status of both men and women.

Budig (2006) argued that women enter non-professional independent work to balance the demands of work and family life. However, family factors do not account for the entry of

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women into independent professional and managerial work; these women are more like their husbands and seem to be in a career model of independent employment.

2.3 Marital Status and Number of Children

Studies show that the highest rate of self-employed was found among married men and married women with children. The longer the marriage period, and the larger the number of children in the family, the greater the likelihood that married men and women to be self-employed (Özcan, 2011).

These data indicate the great influence of the basic socioeconomic unit - a family unit - in the decision of both men and women to be self-employed and involved in business entrepreneurship. The family is a framework in which a joint household is managed with a constant and continuous flow of income and various financial expenses. Due to the commitment, responsibility and constraints associated with managing the family unit and raising children, a commitment involving ongoing financial costs, both men and women seek to secure an additional source of income from self-employment (Özcan, 2011).

The rate of self-employed among divorced and widowed men is also high relative to the rate of self-employed among single men, since the economic motive associated with raising children and other financial obligations remains unchanged.

The trend that shows higher rates of self-employment among married men and women is found not only among the national-ethnic majority groups of the population, but also among immigrant groups representing national, ethnic and religious minorities. In a study conducted in Germany, the proportion of self-employed married men and women was higher among immigrants from Eastern European countries than among single men and women who immigrated from various countries in Eastern Europe (Constant & Zimmerman, 2006). This percentage of self-employed married men is similar to that of married self-employed German men and women.

2.4 Education

It seems that it can be assumed that, the more educated a person is and the more professional skills he/she acquired during his professional academic education, the more inclined he will be towards self-employment, an area of occupation that will give maximum expression to his professional experience and acquired professional skills, as well as higher income in his work. As self-employed, however, this is not always the case.

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Regarding human capital, experience (often documented by age) is often positively related to independent employment (e.g., Aronson, 1991; Parker, 2009), but empirical studies of formal education and independent employment produce conflicting results, as education is a resource for salaried employment. Moreover, low-educated people may find themselves "pushed" into low self-employment due to lack of skills to work as salaried employees, thus offsetting the correlation between education and self-employment (e.g., Luber, Lohmann, Müller, & Barbieri, 2000; Arum & Müller 2004).

A study in Finland shows that those with a college education are not enthusiastic about being self-employed, and if these people turn to self-employment, they will turn to business initiatives and seek to open large businesses that employ a large number of employees (Kangasharju & Pekkala, 2002).

Another perspective on the impact of education on the choice to be self-employed rather than salaried is the barriers in the labour market the individual has to cope with, and which prevent him or impede him from integrating as a salaried worker into the labour market. One of these barriers is low education (up to 12 years of schooling), or high-school education (with a matriculation certificate) that does not enable the individual to integrate into a wide variety of jobs as a salaried employee in various sectors of the labour market. Since these jobs require the worker to have a suitable academic and professional education, the education barrier determines a person with a low and middle level of education to become self-employed.

2.5 Age

A series of studies have pointed to the fact that age is a factor and a variable that affects an individual's will (determination) and decision to become self-employed, so that in relation to human capital and experience, often predicted by age, age is often positively associated with self-employment (Aronson, 1991; Parker, 2009).

Many studies in the United States, Britain, France, and Germany have pointed to a recurring pattern whereby young people aged 20-30 and older people aged 55-64 are less likely to be self-employed than people aged 30-45.

Heim (2015) examined the effect of age on the decision of people in the United States from 1994 to 2012 to be self-employed and confirmed the claims made in previous studies that workers aged 55-64 were less likely to be self-employed than younger workers. The reason for this is the continuing improvement in the American economy, in the salaries of salaried

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employees, including the retail and service providers, in their retirement conditions and in the retirement benefits that employees in these sectors receive in the US.

Minola, Criaco, & Obschonka (2016) confirm this finding (people aged 50 and older are less likely to become self-employed or otherwise involved in business entrepreneurship), but their research performed in 21 countries in Europe and North America shows that the cultural component influences the age variable in the decision of an individual to start his own business.

From the Israeli data we can see that once the age of the person rises, the greater the tendency to be self-employed. In the 65-69 age group there is the largest number of self-employed individuals from the other younger age groups, 26.7% in this age group are self-employed as of 2008, compared with 6.3% in the 25-29 age group, and 10.7% in the 30-34 age group.

2.6 Tenure

Both men and women become self-employed after working for a number of years as salaried employees in the profession or in their field of work. Men and women generally seek to utilize their professional experience and network of potential customers they have acquired as part of their work to manage the independent business over time and to ensure a flow of income at least in the early stages of their self-employment (Özcan, 2011).

Ardagna & Lusardi (2010) indicate that personal characteristics, such as gender, age, and status in the labour force are important factors for entrepreneurship, and they highlight the relevance of social networks, accumulated skills, self-esteem, and attitudes toward risk. They also found that people who know other entrepreneurs are less likely to start large businesses in countries with higher levels of regulation to enforce contractual engagements.

2.7 Occupation

Both self-employed men and women in Israel and in other countries engage in a wide variety of professions, which are reflected in their experience, professional skills in a variety of fields and their level of education.

The average activity expectancy of a small independent business employing two workers in Israel is about five years. However, the larger the volume of business activity and the number of employees, the greater the likelihood that it will be closed. In high-tech, most

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start-up companies fail, fail to profit, or return investors' money and close by the fourth year of activity. According to the report of the Central Bureau of Statistics between the years 2011-2016, 4,029 start-up companies were opened in the State of Israel, 37% of which were closed before the end of 2016 (Levy, 2018).

In 2016, 396 start-ups were closed, compared to 302 in 2015 and 263 in 2014, despite the fact that 2016 was a record year in the capital increase of Israeli start-up companies. These data indicate that there has been a systematic increase in the number of start-ups that have been closed. Most start-up companies in Israel open and close in the Tel Aviv area (Levy, 2018).

2.8 Economic Branch

The main change recorded among the self-employed population in the state of Israel between 1983 and 2008 is the transition of many self-employed individuals from work as neighborhood service providers to work as providers of public and corporate services (Swirski & Ophir, 2008). This significant change reflects the changes that took place in the Israeli economy and society from the 1980s until the end of the first decade of the 2000s. These changes were manifested in a gradual but systematic reduction in government involvement in many sectors of the Israeli economy, privatization of government services, and transferring the controlling interest, or the ownership of these companies, to the hands of Israeli and foreign capital owners. These economic and structural changes were accompanied by a large increase in the rate of higher education among certain sectors of the population, such as first and second-generation Mizrahi Jews, whose level of academic education until the 1980s was not high. The rate of academic higher education among women and Arabs also increased significantly.

The authors also point to the growing prevalence of academic education among many sectors of the Israeli society, which has led to the creation of a growing public of individuals who have acquired academic and technical skills in higher education institutions. Between 1983 and 2008, the number of self-employed individuals providing professional and other services to public institutions and private corporations increased steadily, from 32.4% of the total self-employed in 1983 to 42.5% in 1995 and 52.5% in 2008.

Among the public-corporate service providers, the proportion of professionals, professional specialties, and administrative staff increased from 80% in 1983 to 85.7% in 2008. In absolute numbers, this increased from 28,870 in 1983 to 52,805 in 1995, and 134,599 in 2008. While the number of self-employed professionals increased between 1983 and 2008

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by 4.7, the number of self-employed technical service providers increased by only 3.1 times, while the number of self-employed domestic service providers increased by only 1.9.

2.9 Residential area

Professional literature indicates that the size of the labour market in a particular geographical area of a country and the rate and degree of employment opportunities in this market greatly influence the decision of people to be self-employed. In Ireland, as of the end of 2016, in the western regions of the country, where the economy is based on agriculture and various construction works, the average self-employed rate was about 20% of the total labour force in these provinces, while the largest cities in the country - Dublin, Cork and Galway - the total was about 10% on average, since these large cities in Ireland have a wide range of work opportunities (WDC, 2017).

In Israel, as of 2008, there is no clear distinction between the rate of self-employed in large cities and the percentage of self-employed in the periphery in the northern and southern regions, although the percentage of self-employed in the south is lower than the average of self-employed in large cities (Swirski & Ophir, 2014).

2.10 Country of birth

The country of birth and the factors derived from or affecting this variable play a significant role in the decision of individuals to be either salaried employees or self-employed. When referring to the country of birth in the context of the choice between being a salaried employee or self-employed, it is an individual who migrates from a particular country (the country of origin) to another country (the country of destination) in which he lives and works, and this individual does not always have a different national, ethnic or religious origin of the demographic characteristics of most of the population in the target country.

Borjas (1986) conducted a broad study in the United States in the 1980s and found that the degree of assimilation and integration of immigrants in American society had a significant impact on their decision to be self-employed. The longer an immigrant lives in the United States, the more likely he is to become self-employed. The economic crises leading to increased unemployment rates among employees in various sectors of the US economy have reduced employment opportunities and opportunities of immigrants in the United States and increased their willingness to become self-employed.

The study of Li (2001) was based on an examination of the socio-economic status of immigrants in Canada who arrived in the country between 1980 and 1995 and their degree

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of integration into the local labour market. The study found that immigrants who came to Canada in years of economic prosperity, immigrants with higher education and who are over 40 will be more inclined to be self-employed and start businesses of their own. The study also found that immigrants in Canada are more likely to be self-employed, to try to overcome the difficulties of adapting to and integrating into the Canadian society as well as the difficulties in integrating into the local labour market as salaried employees.

A study conducted in Finland by Kangasharju and Pekkala (2002) found that Scandinavian immigrants who chose to be self-employed prefer to set up and run large businesses (businesses that employ a large number of salaried workers and offer a wide range of services and products) than to set up and operate small businesses.

There are other variables that affect the choice to be self-employed but they are not presented in the model such as: The economic structure impacts opportunities for self-employment, different industrial structures, business cycle, labour market regulation and state regulation concerning the establishment of a business and tax regulations, programs intended to encourage individuals to establish new businesses, differences among societies in psychological traits and cultural differences may also play an important role in the relevant decision process. The main reason for not taking those variables into consideration is the data, that is, these variables were not reflected in the Israeli population census.

3. Research question and hypotheses

The research question is “What factors affect Israelis' choice to be self-employed and not salaried?”.

Analysis of the factors will include reference to economic status, education and demographic characteristics among different ethnic groups in Israel. In other words, the study will examine whether there are differences between the minorities and the majority group in the characteristics and rate of those self-employed. The examination will be conducted in the Israeli economy where the minority group includes the Arab population, while the majority includes the Jews.

Although the minority group in this study is not composed of immigrants, in many respects their situation is similar to that of immigrants in European countries. Our main hypothesis in this study is that Arabs are more affected by family background than the Jews.

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Based on literature review above, the research hypotheses are:

- H1: Various factors (besides income potential) are associated with self-employment.
- H2: The self-employment rate is higher in denser regions of Israel.
- H3: Professional and skilled workers are more likely to become self-employed than unskilled workers, across both nationalities.
- H4: Experience (by age proxy) is positively associated with self-employment.
- H5: Family characteristics (the presence of children) predict women's self-employment.
- H6: Occupation interacts with nationality in prediction of self-employment.
- H7: Immigration (for Jews only) is negatively associated with self-employment.

4. The database

The population census of 2008 was used in this paper, since it provides the fullest and most reliable picture of the country's population and its characteristics on the "determinant date" (a certain point of time to which the census refers). The census collects data at a given point in time for a representative 20% sample of the entire population (as opposed to other surveys, in which data are collected only on a small part of the population), thus drawing conclusions for the entire population based on these data is more reliable.

The census is carried out in Israel every decade and has been held six times so far: in 1948, 1961, 1972, 1983, 1995 and 2008. The census constitutes one of the most important sources of information that is the basis for official analyses of the Central Bureau of Statistics.

The original data has been aggregated by the source into categorical variables only, and some categories have been unified for the purpose of this study. All self-employed subjects are referred to as "self-employed," whether they employ other people or not, while all salaried employees are referred to as "other." The specified levels of "education" were aggregated to 5 categories, ranging from "no-secondary education" to "PhD or equivalent."

Marital status was defined to have 3 levels – "single," "married," and "other" (divorced, widowed). Number of births was adjusted to have 4 levels – for mothers of no, few, several

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or many children. The variables “economic branch” and “occupation” were left with the originally specified levels in the census data (15 and 8 levels, respectively).

5. Empirical methodology

In order to establish what predicts the employment status, a logistic regression model was fitted to the data as follows:

In the current data there are 11 explanatory variables: Nationality, Gender, Country of Birth, Immigration, Marital Status, Education, Occupation, Economic Branch, Region, Number of Births and Age.

Let X_i be such that $x_{i,j} \in \{0,1\}$ is a dummy variable for the i -th predictor variable in the model matrix, and let $y_i \in \{0,1\}$ be the self-employment status of the i -th observation. The probability mass function associated with the i -th observation is:

$$f(y_i) = \pi_i^{y_i} (1 - \pi_i)^{1-y_i} \quad (1)$$

The likelihood function for n independent observations is:

$$\mathcal{L}(\beta; y_1, \dots, y_n) = \prod_{i=1}^n f(y_i) = \prod_{i=1}^n \pi_i^{y_i} (1 - \pi_i)^{1-y_i} \quad (2)$$

The log-likelihood function:

$$\ln \mathcal{L}(\beta; y_1, \dots, y_n) = \sum_{i=1}^n \left[y_i \ln \left(\frac{\pi_i}{1 - \pi_i} \right) \right] + \sum_{i=1}^n \ln(1 - \pi_i) \quad (3)$$

The log-likelihood is optimized using Iteratively Reweighted Least Squares to obtain the Maximum Likelihood Estimator $\hat{\beta}$.

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6. Descriptive statistics and logistic regression

The data consist of 376,844 observations on 1 dependent variable (binary self-employed or salaried employment status) and 11 categorical variables, most of which have multiple levels (e.g. "Economic Branch" – 15 levels). In the following analyses, descriptive statistics are presented for the variables hypothesized.

Table 1. Sample percentages of self-employment by gender across nationality

	Arab population:		Jewish population:	
	Female	Male	Female	Male
Other	94.35	83.41	91.46	81.71
Self Employed	5.65	16.59	8.54	18.29

Table 2. Self-Employment percentages across geographical regions

	Tel-Aviv	Jerusalem	North	Haifa	Centre	South	Judea
Other	84.45	87.47	86.03	88.08	85.92	89.11	87.79
Self employed	15.55	12.53	13.97	11.92	14.08	10.89	12.21

Table 3. Self-Employment rate across age

	15-24	25-34	35-49	50-69
Other	97.08	90.74	83.66	81
Self Employed	2.92	9.26	16.34	19

Table 4. Percentages of self-employment across occupations for Arabs and Jews

	Arabs other	Jews other	Arabs Self Employed	Jews Self Employed
Unskilled	96.79	93.47	3.21	6.53
Academic	81.17	85.03	18.83	14.97
Free profession	95.59	86.30	4.41	13.70
Management	59.14	81.77	40.86	18.23
Clerks	96.01	97.74	3.99	2.26
Agency and Sales	76.31	84.31	23.69	15.69
Skilled Agriculture	80.73	58.83	19.27	41.17
Skilled Industrial	85.05	81.26	14.95	18.74

Table 5. Self-Employment percentages of Arab and Jewish women by number of births

	Arab women		Jewish women	
	Other	Self Employed	Other	Self Employed

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No Births	97.17	2.83	No Births	95.57	4.43
1-2 Births	95.58	4.42	1-2 Births	90.83	9.17
3-7 Births	91.42	8.58	3-7 Births	88.82	11.18
8+ Births	90.04	9.96	8+ Births	90.22	9.78

The data were analyzed using R version 3.5.1, using the default built in Generalized Linear Model function ('glm').

To test H_1 A "full" model with all the 11 predictor variables has been fitted to the data. The reference group for the full model was as follows: Jewish, female, aged 15-24, unskilled with no secondary education, from Tel-Aviv. For models with subsets of predictors, the reference group is specified explicitly to provide a reasonable interpretation of the model parameters.

The null deviance (deviance for a model with intercept only) was 295795 on 375960 degrees of freedom. The residual deviance after fitting the full model was 240777 on 375907 degrees of freedom. The model explains 22% of the deviance, which is significant ($\chi^2(53) = 48018, p < 0.001$).

Classic regression model variable methods such as forward, backward and stepwise selection (using Akaike Information Criterion (AIC)) all failed to select a subset of the predictors and retained the full model.

The odds-ratio (OR) is easily calculated for dummy variables using $OR_j = \exp(\beta_j)$, but they should be interpreted with caution, as they represent the likelihood of being self employed within a very specific reference group, as described in the previous section. The predictors with the highest odd ratios were: "Age 50-69" (OR=7.3), "Age 35-39" (OR=5.86) and "Occupation" levels 1,0,6,5,2 all had OR in the range 3.2-3.8.

To test H_2 a logistic model with the predictors associated with region was fitted to the data. All variables (dummies for regions, reference group was Tel-Aviv) were significant at any significance level. And in order to test H_3 a logistic regression model with the dummy variables associated with "Occupation" was fitted to the data (reference group is unskilled workers). All variables were significant at any significance level. H_4 was tested using a logistic regression model with the age variable dummies as predictors. All coefficients were highly significant and H_5 was tested on a subset of the data with only women (N=180,350), as data about the males' number of children were not available in the current dataset.

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H_6 was tested using a logistic regression model with two predictor variables – nationality (2 levels) and occupation (8 levels) and H_7 was tested using a logistic regression model on a subset of observations with Jewish nationality.

7. Conclusions

The results clearly show that there are demographic variables, which affect self-employment. The formal hypothesis testing framework (e.g. Pearson's χ^2 test) is not suitable for these data, due to the large sample size and potentially collinear variables (consider for example the obvious association between age and education).

There are some differences between groups which are evident even in the descriptive statistics: e.g. table 1., which shows that males are more likely to be self-employed than females. This is in agreement with Georgellis and Wall (2005) who found that German men are more responsive to the wage differential between salaried and self-employment, men are more concerned about liquidity constraints when considering self-employment and are more likely to be salaried or self-employed, depending on their father's employment status. Such differences might arise from different market opportunities and occupational strategies employed by men and women.

Economic branches, education, real-estate, and industry are also good predictors of self-employment: only 4.6% of those working in education are self-employed, in contrast to 14.88% of the rest of the sample; 19.8 % of those working in real estate and renting businesses are self-employed, in contrast to 12.33% in the remaining sample; only 7.4% of workers in the field of industry are self-employed, compared to 14.3% of the other observations. Notably high (in terms of self-employment rates) areas of occupation are skilled industrial (for Jews – 18.74%) and skilled agriculture (for Jews 41.17%, for Arabs 19.27%), and management was particularly high for Arabs (40.86%, 18.23% for Jews). This confirms hypothesis 3 and hypothesis 6, with a clear interaction between occupation and nationality. These differences might arise from the nature of these occupations, with some being more organizational than others are, and from different profession preferences between cultures.

Age is a predictor of self-employment status; people in mid-adulthood are considerably more prone to engage in self-employment across different cultures (Minola, Criaco & Obschonka, 2016). Indeed, in the current data individuals aged 25-34 were 3.39 times

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more likely to be self-employed than the reference group (age 15-24), and age groups 35-49 and 50-69 were 6.5 and 7.8 times more likely to be self-employed, respectively. 19% of the individuals in the last age group are self-employed, in contrast to 2.92% in the first age group. The positive correlation between age and the likelihood of being self-employed might arise from the acquisition of relevant education and experience, which may be still unavailable in the reference group, due to obligatory secondary education or military service.

More urbanized areas of the country have higher rates of self-employment, as hypothesized, with Tel-Aviv being the highest (15.55%) and Centre the second highest (14.08%). The least self-employed are was the South (10.89%), thus confirming hypothesis 2. For women, the number of children was a significant predictor of self-employment status. As can be seen, women with 3-7 children were approximately 3 times more likely to be self-employed in both nationalities. This is in concordance with Boden (1999), as women are usually the main caretakers of children, and thus have to adopt a flexible schedule.

Immigration (considering both country of birth and year of immigration) was a significant predictor of the self-employment status. The year of immigration is correlated with age and might lead to misleading results. The results reveal that self-employment is notably high among Jews born in Asia (19.93%), Europe (19.07%) and Morocco (18.2%). The self-employment percentage is notably low in immigrants from the former USSR (7.34%). The main wave of immigration from the former USSR to Israel occurred during the 1990s, and indeed the self-employment rate among those who immigrated after 1990 is approximately 7%, when one of the possible explanations is mentality and form of regime. The results from Fairlie and Meyer (2003) might not be adequate to shed light on this because for most immigrants from the former USSR there was probably no self-employment – it was a socialist country with nationalized facilities, perhaps immigration give a new sense of freedom or for those 7% self-employment was the option in lack of other alternatives.

Professional and skilled workers are more likely to become self-employed than non-skilled workers, across both nationalities. Nevertheless, Arabs and Jews tend to prefer different areas of occupation for self-employment: Arabs are much more likely to be self-employed in the academic, management and agency and sales areas of occupation.

Indeed, many factors affect the self-employment status of citizens of Israel, with the single strongest predictor being gender – males in Israel are more likely to be self-employed. More urbanized areas such as Tel-Aviv and the Centre have higher self-employment rate than less populated areas such as the South.

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8. Appendixes

Appendix No 1. The parameter estimates for the full model

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-4.379	0.07237	-60.51	0
Nationality Jew	-0.09902	0.01897	-5.219	1.796e-07
Sex Male	0.5358	0.03421	15.66	2.743e-55
Age25-34	1.079	0.03152	34.24	7.124e-257
Age35-39	1.77	0.03267	54.16	0
Age50-69	1.989	0.03385	58.74	0
C. of birth Asia	0.4137	0.04614	8.966	3.064e-19
C. of birth Africa	0.6743	0.03827	17.62	1.666e-69
C. of birth Europe	0.4803	0.04414	10.88	1.447e-27
C. of birth USSR	0.6669	0.04091	16.3	9.414e-60
C. of birth America	0.9666	0.02819	34.29	1.102e-257
C. of birth Morocco	0.4362	0.04609	9.465	2.947e-21
C. of birth Romania	0.3622	0.05604	6.462	1.033e-10
Immigration92+	0.6091	0.04062	15	7.893e-51
Immigration90-91	0.3965	0.04148	9.558	1.202e-21
Immigration80-89	0.5326	0.04032	13.21	7.627e-40
Immigration72-79	0.2171	0.045	4.823	1.414e-06
Immigration61-71	0.0053	0.03768	0.1407	0.8881

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	Estimate	Std. Error	z value	Pr(> z)
Marital Other	-0.08457	0.01952	-4.333	1.469e-05
Marital Single	-0.4548	0.01959	-23.21	3.403e-119
Education2	0.1635	0.01744	9.373	7.064e-21
Education3	0.1035	0.01925	5.377	7.57e-08
Education4	0.03277	0.02583	1.269	0.2046
Education5	0.02381	0.04862	0.4898	0.6243
Occupation0	1.321	0.03299	40.05	0
Occupation1	1.34	0.03187	42.05	0
Occupation2	1.164	0.03396	34.29	1.204e-257
Occupation3	-0.6818	0.0395	-17.26	8.922e-67
Occupation4	1.449	0.02992	48.44	0
Occupation5	1.239	0.05038	24.59	1.634e-133
Occupation6	1.301	0.03164	41.11	0
Econ. branch B	-2.008	0.04454	-45.09	0
Econ. branch C	-3.968	0.1781	-22.28	5.956e-110
Econ. branch D	-0.6165	0.04615	-13.36	1.05e-40
Econ. branch E	-0.8468	0.04298	-19.7	2.083e-86
Econ. branch F	-0.97	0.04826	-20.1	7.324e-90
Econ. branch G	-1.157	0.04529	-25.55	5.804e-144
Econ. branch H	-1.474	0.05256	-28.04	5.348e-173
Econ. branch I	-0.6457	0.04268	-15.13	1.073e-51
Econ. branch J	-3.754	0.07686	-48.84	0
Econ. branch K	-2.476	0.0468	-52.92	0
Econ. branch L	-1.494	0.04505	-33.16	4.304e-241
Econ. branch M	-0.1107	0.04408	-2.512	0.01199
Econ. branch N	-0.5014	0.05879	-8.529	1.474e-17
Econ. branch O	-1.566	0.2222	-7.049	1.805e-12
Region1	-0.1315	0.02124	-6.193	5.898e-10
Region2	-0.1491	0.01878	-7.937	2.078e-15
Region3	-0.2626	0.02034	-12.91	3.799e-38
Region4	-0.1582	0.01574	-10.05	8.992e-24
Region6	-0.3232	0.01976	-16.36	3.756e-60
Region7	-0.1504	0.02874	-5.234	1.657e-07
Births1	-0.09078	0.0418	-2.172	0.02989
Births2	0.06732	0.03635	1.852	0.064
Births3	0.06476	0.03538	1.83	0.06721

Note: parameter estimates for the full logistic regression model

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Variable	Importance (Wald statistic)	Variable	Importance (Wald statistic)
Age50-69	58.74	Econ. branch D	13.36
Age35-39	54.16	Immigration80-89	13.21
Econ. branch K	52.92	Region3	12.91
Econ. branch J	48.84	C. of birth Europe	10.88
Occupation4	48.44	Region4	10.05
Econ. branch B	45.09	Immigration90-91	9.56
Occupation1	42.05	C. of birth Morocco	9.46
Occupation6	41.11	Education2	9.37
Occupation0	40.05	C. of birth Asia	8.97
C. of birth America	34.29	Econ. branch N	8.53
Occupation2	34.29	Region2	7.94
Age25-34	34.24	Econ. branch O	7.05
Econ. branch L	33.16	C. of birth Romania	6.46
Econ. branch H	28.04	Region1	6.19
Econ. branch G	25.55	Education3	5.38
Occupation5	24.59	Region7	5.23
Marital Single	23.21	Nationality Jew	5.22
Econ. branch C	22.28	Immigration72-79	4.82
Econ. branch F	20.10	Marital Other	4.33
Econ. branch E	19.70	Econ. branch M	2.51
C. of birth Africa	17.62	Births1	2.17
Occupation3	17.26	Births2	1.85
Region6	16.36	Births3	1.83
C. of birth USSR	16.30	Education4	1.27
Sex Male	15.66	Education5	0.49
Econ. branch I	15.13	Immigration61-71	0.14
Immigration92+	15.00		

Note: Variable importance (Wald's statistic abs. value) for 55 predictors