Migrant labor in Greek agriculture

-A case study-

Thesis Report

Supervisor: Dr. Ir. Marrit Van Den Berg, Assistant Professor
Student: Andreas Tsakiridis
Registration Number: 790920-843-050

Programme: MSc in Management, Economics & Consumer Studies
Specialization: Economics, Environment & Policy
Chair Group: Development Economics

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1.1 Background

1.1.1 Migration in Greece

Over the last decades Greece, Italy, Spain and Portugal became destinations for many citizens of East and Southern Europe, Middle and Southeast Asia (including Pakistan, India, China) and Northern Africa (mainly from Egypt, Morocco and Algeria). This influx of migrants transformed the aforementioned EU-member countries from traditionally emigration countries (especially after the Second World War) to immigration countries. The socio-political conditions combined with economic hardship in immigrant source countries, and liberalization of labor markets in western developed countries played an important role in shaping the current migration pattern.

In the case of Greece, the first substantial immigration inflow from Central and East European communist countries took place during the mid-1980s (the majority were Poles). During the same period a significant number of Greek-origin citizens from ex-soviet countries repatriated.

In the beginning of 1990s, the Albanian government permitted the provision of Albanian passports, and large groups of Albanians crossed the Greek-Albanian borders and the Adriatic Sea. Italy and Greece were in the forefront of destination places. The mountainous border with Greece, which is a cheaper, less risky and easier passage compared to the Italian sea-border as Albanians could avoid the high cost of cooperation with illegal transportation channels, and additionally the cultural affinity attracted a lot of Albanians to emigrate in Greece. On the other hand, the special features of Greek economy characterized by segmented markets, the traditionally co-existing informal economy in combination with the necessity for production mobilization under low labor cost made Greece a suitable place for emigrant settlement.

Despite the fact that the Albanian emigration boom coincided with the simultaneous need of Greek economy for low cost manual labor -so in economic terms supply and demand intersected- the regulatory frameworks of both governments (Albanian and Greek) were unprepared for managing such an overwhelming transmission of labor force. In contrast to other countries, like Italy and Spain, which faced a similar emigration stream a few years earlier, Greece did not have any robust regulatory mechanism until 2001. In this year the law 2910/2001 was established, which was a better version of the first law on migration issues (1975/1991). Four years later, the law 3386/2005 replaced the previous one followed by the supplementary law 3536/2007[1].

[1] See appendix 3 for a more detailed description of Greek legislation on migration.

The emigration regulatory scheme in Greece still suffers from bureaucracy and gaps despite improvements over time. The weaknesses of regulatory institutions alongside the lack of co-operation displayed by Greek public servants hindered the efforts of the newly arrived emigrants to settle down and forced them to stay illegally in Greece after the expiration of residence licenses. Undocumented emigrants were easily channeled to low-paid informal economy jobs, and forced to live under poor conditions with the fear of deportation.

1.1.2 A profile of the immigrant population in Greece

Nationality and gender composition

In the population census of 2001 in Greece, 797,091[2] non-Greek citizens (both documented and undocumented) were counted out of 11 million citizens in total (7 per cent of the entire population). More precisely, 438,036 Albanians constitute 57.4% of the total foreign population followed by 35,104 Bulgarians (4.6 per cent of total non-Greek citizens), Georgians (3 per cent), Romanians (2.9 per cent) and Russians (2.3 per cent) (Cavounidis, 2004: 36; Cholezas and Tsakloglou, 2008:6-7). The number of EU/EFTA nationals who live in Greece run into fifty thousand (Glytsos, 2005:820).

Information gathered from the population census in 2001 suggests that the gender composition of immigrants is well-balanced (54.5 per cent of the total immigrants were male and 45.5 per cent were female) but a further look across immigrant groups with different countries of origin makes this composition highly skewed. Albanian male immigrants for example compose the 58.7 per cent of the total Albanian population whereas Bulgarian females make up the 60 per cent of total Bulgarian population in Greece (Kasimis and Papadopoulos, 2005:103). Ukraine and Moldavia have also female presence in Greece while Philipinos and Pakistanis represent the two extremes (90 per cent of Philipinos are women and the 95 per cent of Pakistanis are men).

Table 1.1
Foreign population in Greece (2001 Census)

	All	% of Total	Females	% of All
Albania	438,036	57.5%	180,887	41.3%
Bulgaria	35,104	4.6%	21,216	60.4%

[2] Unfortunately, there are demographic data for only 762,191of them

Georgia	22,875	3.0%	13,036	57.0%
Romania	21,994	2.9%	9,547	43.4%
US	18,140	2.4%	9,335	51.5%
Russia	17,535	2.3%	10,990	62.7%
Cyprus	17,426	2.3%	9,142	52.5%
Ukraine	13,616	1.8%	10,274	75.5%
UK	13,196	1.7%	7,927	60.1%
Poland	12,831	1.7%	6,955	54.2%
Germany	11,806	1.5%	7,060	59.8%
Pakistan	11,130	1.5%	476	4.3%
Australia	8,767	1.2%	4,662	53.2%
Turkey	7,881	1.0%	3,883	49.3%
Armenia	7,742	1.0%	4,127	53.3%
Egypt	7,448	1.0%	1,775	23.8%
India	7,216	0.9%	494	6.8%
Iraq	6,936	0.9%	2,095	30.2%
Philippines	6,478	0.8%	4,949	76.4%
Canada	6,049	0.8%	3,126	51.7%
Italy	5,825	0.8%	3,068	52.7%
Syria	5,552	0.7%	1,152	20.7%
Moldova	5,176	0.7%	4,007	77.4%
Other	53,432	7.0%	26,456	49.5%
Total	762,191	100%	346,639	45.5%

Source: National Statistical Service of Greece (2001)
Cited by Cholezas and Tsakloglou (2008)

According to the same census of population, just under half of Greece's immigrants reside in the Athens conurbation with the second biggest concentration being found in the municipality of Thessaloniki. Specific islands like Mykonos, Kea, Skiathos and others also attract a significant proportion of immigrants due to the increased employment opportunities during the touristic summer period. In contrast with the predominant spatial pattern of immigrants in Greece which is likely drawn by the economic conditions in each area, the North-West border areas host many immigrants.

Education

Data concerning the educational levels of immigrants are limited and the existing ones (from the population census 2001) should be used with caution. The validity of these data is dubious firstly because they are self-declared information and secondly there is weak compatibility between educational

systems across the countries. Kasimis and Papadopoulos (2005) state that the educational levels of immigrants are relatively good as the one-tenth of them have attained higher education, one-half secondary, one-third primary and one-tenth had no education at all.

Amongst immigrants, the Albanian and some Asian groups (other than Philipinos) have the lowest educational level whilst EU-nationals, Cypriots and citizens from United States (US) and ex-Soviet Union have the highest. The empirical findings of a study of Albanians in Thessaloniki (second –in population- urban center in Greece after Athens) in 2001, contradict the data from the population census concerning their educational level. The sample of 1297 Albanian immigrants indicates that their overall educational achievement was higher than this of local Greeks of comparable age (Labrianidis, Lyberaki, Tinios and Hatziprokopiou, 2004:1193).

Greek labor market and employment status of immigrants

Data from the Population Census in 2001[3] recorded 413000 foreigners who declared that they moved to Greece in order to find a job (IMEPO, 2004:13). From the entire foreign population in Greece just over half of them are employed (51 per cent) mainly in the construction sector (24.5 per cent), services (20.5 per cent) and agriculture (17.5 per cent). Undoubtedly migrant labor is a structural factor in the labor markets of the above mentioned sectors. Table 1 illustrates the migrants' distribution in different sectoral labor markets grouped by nationality.

Table 1.2

Nationality of foreigners in Greece by sector of employment (percentage), 2001

Nationality	Population (No)	Agriculture	Manufacturing	Construction	Commerce, hotels, restaurants	Other Ser-vices	Sector not de-clared
Albanian	226301	20.8	10.8	32.1	13.5	16.9	5.8
Bulgarian	23147	32.8	6.5	10.8	13.2	31.1	5.7
Romanian	14808	24.2	12.9	26.2	14.4	15.5	6.8
Former USSR	36605	6.5	13.6	16.5	17.5	39.9	6.0
Polish	7333	2.9	10.0	36.3	13.2	31.3	6.3
Pakistani	9238	13.3	43.2	13.5	13.1	5.9	11.1
Indian	6062	52.7	18.3	8.3	5.8	5.2	9.7
Filipino	4948	1.1	2.2	0.7	8.3	82.2	5.5
Egyptian	4823	13.7	14.8	26.7	23.4	14.6	6.7
Bangladeshi	4101	2.4	52.2	5.5	26.1	5.0	8.7
Cypriot	5670	1.5	9.8	4.1	18.1	59.4	7.0
USA	5438	5.5	6.6	3.8	22.5	53.5	8.0
Australian	3200	10.6	9.1	5.3	30.3	37.7	7.2
Canadian	2254	9.1	9.1	4.8	28.4	40.0	8.7

[3] The only reliable data for immigrants' employment till 2004 are derived from the Population Census in 2001, residence permit records and IKA (Social Insurance Institute).

EU-15	15786	4.9	8.6	3.9	26.4	47.1	9.2
Other	21960	4.2	15.1	16.6	28.2	29.0	6.9
Total	391674	17.5	12.2	24.5	15.7	23.7	6.4

Source: National Statistical Service of Greece (2003)
Cited by Kasimis and Papadopoulos (2005)

The majority of Albanians immigrate to Greece for seasonal or quasi-permanent dependent employment, which is mainly offered by the construction sector, agriculture, tourism and in-house services (Kasimis, et al. 2003: 170). Albanian and Polish men have primacy in the construction labor market while 52 per cent of Albanian women work in domestic service, 19 per cent in tourism, 15 per cent in agriculture and 9 per cent in industry (Baldwin-Edwards, 2004:55). Apart from Albanians most of Bulgarians and Indians are employed in agriculture and many Bangladeshi and Pakistani are absorbed by the manufacturing sector.
According to a report by OECD (2002) the ninety per cent of the immigrant work force, is occupied in manual job positions. This evidence indicates that Greece is the country, amongst twenty five OECD member-countries, with the highest concentration of immigrants in manual jobs (Cavounidis, 2004:46).

1.1.3 Socio-economic effects of migration in Greece

Most of the times, the migratory phenomenon is caused by demographic, socio-economic and political changes in the sending and/or host countries. Subsequently immigration also affects social structures, economic conditions and population dynamics of both countries to a lesser or greater extent. The positive or negative effects of migration vary across countries as they are linked to educational, social and cultural characteristics of immigrants and indigenous citizens, legislation, quality of coordination mechanisms and agreements between immigrants sending and receiving countries, institutional environment and other factors differing in time and place.

According to the *neoclassical economic theory*, the effect of foreign workers on natives' wages and employment opportunities can be assessed only if the production technology is specified and consequently reveals how native workers, immigrants and capital interact in the production process. The interaction among foreigner laborers, capital and natives may also diverge according to which groups of foreigner and native workers are under study. Sometimes immigrants may be substitutes for a group of natives and complements for another native group. In the first case, a decline in natives' wage rate and employment is expected (the demand curve in the native labor market shifts down) and in the other case to have the opposite effect as the supply of migrant workers increases (Borgas, 1989: 477-481).

In the case of Greece it is complicated to demonstrate the overall effect of immigration on the economy and society because of the widespread shadow economy, different migration patterns among nationalities, limited official data concerning the precise number, legal and employment status of immigrant workers and disparities in the socio-economic environment between urban and rural areas, touristic and non-touristic, marginalized mountainous and natural resource endowed lowland regions.

In general, migration appears to benefit Greek economy and society. Research findings based on various data and methodological approaches suggest that the relation between foreign workers and Greek nationals is more complementary rather than substitution, as most of immigrants undertake low-prestige or badly paid jobs which natives usually reject (Fakiolas, 2003:553). During the last decades, alike their counterparts in other Mediterranean countries, young Greeks are encouraged by their families to obtain higher educational skills and sometimes with the tolerance of their parents,[4] tend to prolong their academic studies in order to be 'rewarded' afterwards with better paid vocational positions.

The shift on vocational preferences which is also an outcome of economic and social developments in Greece coincided with the inflow of immigrants which contributed to the change of traditional employment structures by satisfying the arisen demand for seasonal, low cost and flexible employment by the prevalent small-size family firms in basic sectors of the economy (agriculture, tourism, manufacture). Data from Eurostat indicate that in 1986 almost half of the working Greek population (49.3 per cent) accounted as salary based employees, 35.3 per cent worked as 'employers and self-employed' and 15.4 per cent worked as 'family workers' (Cavounidis, 2006: 642)[5]. In contrast with Greece, the 81.0 per cent of the employed population of all European Union members (EU-12) worked as salary based employees during the same year. This difference underlines the peculiar employment structure of Greek economy few years before the first considerable migration stream in the beginning of 1990s (Cavounidis, 2006: 642). In addition, Eurostat data from 1989 to 2007 depict the fluctuations in agricultural labor input[6] over these years in the EU-27 and Greece. Since 1989 the total agricultural input is declining almost every year while the number of salaried workers is increasing and the number of non-salaried workers is decreasing (Eurostat, 2008). Eventually, Greek employment structure seems to converge with the current EU-27 employment structure.

[4] In Greece the majority of universities and institutes which provide tertiary education programmes are funded and ruled by the state. Students are not obliged to pay tuition fees for their undergraduate studies but all other living expenses have to be carried out by the students and eventually their families.

[5] The spouses and the children of the proprietors of enterprises can only be considered as family workers.

[6] See appendix 2 the exact definition of the agricultural labor input according to Eurostat (http://epp.eurostat.ec.europa.eu).

Although research on the role of immigrants in rural areas is fairly limited their impact on these areas should be acknowledged not only in the economic grounds but also in social content. Immigrants covered the 'holes' of the declining native agricultural labor force with low cost and maintained the population levels of many marginalized rural areas. They also contribute to the management of rural landscape substitute family members from domestic and agricultural tasks. This gave the opportunity of many Greek women to move from non-income generating domestic service to enter in the salaried labor market (Kasimis*et al,* 2003:179; Lawrence, 2005:325).

Inevitably, migration has negative effects in conjunction with the positive, and may bring in the foreground smoldering cultural norms and perceptions of the host population which were concealed before immigration stream. The Greek case is not an exception of the rule. More specifically, the influx of immigrants –mainly illegal Albanian immigrants at this period- in Greece since 1990s, was escorted with the discontent of indigenous population and raised political debates for social security reasons. The Greek mass media and press acerbate the public resentment by linking mainly Albanian undocumented immigrants with the majority of crimes in Greece. Further research on statistics and scientific sources advocates the low participation rate of immigrants in serious crimes like murder and rape (Baldwin-Edwards, 2004:59). Fortunately, during the last decade the mass media and press became more cautious with their reports and the continuous contact of Greeks with economic immigrants reduced negative stereotyping.

The negative economic effects of migration are more related to illegal migration. It has already been mentioned that immigrant and natives are complementary labor units in most of the sectors. The only sector in which immigrants and natives seem to be substitutes is the construction sector (Hajdinjak, 2005:6). In this situation, unregulated immigrants together with native workers who accept to work with wage less than the officially minimum and without any social security may displace other workers (natives or regularized immigrants). This will keep the production cost in low levels but will also have a social effect. From one side the state is losing tax revenues but from the other hand informal labor indirectly contributes to the GDP and inflation decreases (Glytsos, 2005:825).

1.2 Problem statement

Agriculture is an important sector in Greek economy and society. When Greece accessed the European Economic Community (EEC) in 1981, agriculture played a key-role in the national economy, employing 30 per cent of the total working population and constituting 18 per cent of Gross Domestic Product (GDP). It is worth mentioning that during 1980s, the implemented national

agricultural policies supported farm income by subsidizing production but the institutional environment of agriculture remained unchanged. This policy framework led to the reduction of structural expenditures for agriculture and did not improve its international competitiveness (Karanikolas and Martinos, 2007:40).

In the beginning of the 1990s, agricultural income had risen substantially due to the national agricultural measures and Common Agricultural Policy (CAP) funds, but Greek agriculture had to adjust to changes of CAP in 1992. The CAP reform accompanied with the set of legislative proposals, *Agenda 2000*, aimed to lower the level of protectionism in farm prices and provide direct income support to farm households/enterprises, which perform better within a more competitive market. This market-oriented support scheme of CAP also stressed the need for technological modernization and restructuring of agriculture towards intensive crops (Kasimis and Papadopoulos, 2005:106).

In the same period (1993-1994), 21.9 per cent of the total labor force was engaged in agriculture and produced –approximately- the 14 per cent of GDP (Rezitis*et al*., 2002:1346) while agricultural products like cotton, olive oil, tobacco and others accounted for almost 35 per cent of the total gross value of Greek exports. The respective means for the European Union (EU-15) were 5.9, 2.8 and 12 per cent (Damianos and Skuras, 1996:273).

In 2003, the percentage of the labor force engaged in agriculture declined to 17 per cent but agricultural products still accounted for almost one third of the total value of exports. In the same year agriculture shaped 50 per cent of Gross National Product (GNP) (Kasimis*et al*., 2003:172).

The agricultural sector in Greece is characterized by small and fragmented farm lots (the average size of holdings is 4.3 hectares), underemployment and increasing pluriactivity[7]. It is estimated that more than 50% of the total number of rural households are pluriactive (Damianos and Skuras, 1996:273). In comparison with other EU-state members, Greek agriculture is a family-based productive activity and labor intensive despite the use of other inputs like machinery, fertilizers, agrochemicals and irrigation systems. The average farm labor input expressed in annual work unit[8] (AWU) per 100 hectares equals to 13.6 for Greece and 5.5 for EU-15[9] (Rezitis*et al*., 2002:1346).

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[7] Pluriactivity refers to farm households which the whole family and not the farm operator alone, allocates labor and other resources between farm and non-farm activities in response to perceived pressures and opportunities at home and externally (Arkleton Trust, 1985:25).

[8] Annual Work Unit (AWU) represents the total annual working time of an individual. One AWU is the minimum number of working hours per year as specified in national labor agreements. Where no minimum number is specified, one AWU is considered to be 1800 hours (EUROSTAT, 1996).

[9] According to EEC's Common Agricultural Policy (CAP) framework, any person involved in semi-agricultural (such as agro-tourism), livestock or/and agricultural production activity is considered as farmer on the premise that more than half of the available working time is devoted to this activity and yields more than half of the total income (Kazakopoulos *et al*, 2003:398).

The decreasing agricultural labor force over the years is in line with the continuous tendency of farm-owning families to channel their children out of agricultural activities and direct their aspirations to occupations with higher social prestige. The preference towards white-collar employment which dates back to World War II, raised questions in the Greek Ministry of Agriculture in the 1970s about the succession issue in farm enterprises (Cavounidis, 2006:648).

Although the aforementioned vocational trend is not only detected amongst farm families but corresponds to a general societal disdain for manual work and various family-based occupations (e.g. artisan units which manufacture textiles, clothing, metal and leather products), it is inherent in the massive rural exodus of the 1960s and 1970s. The internal migration from rural to semi-urban areas and urban metropolises dwindled the involvement of family members to farm work and concurrently caused gender imbalances and changes in the reproductive capacity and age structure of countryside populations (Kasimis*et al.,* 2003:173). More specifically, during the periods 1981-1991 and 1991-1996 approximately 276000 and 30000 workers respectively abandoned agriculture (Glytsos, 1999:132).

While a significant proportion of rural population migrated to urban areas where employment opportunities in the secondary and tertiary sector are more abundant, some rural areas exhibit a converse demographic trend since the beginning of 1990s. The population in these areas increased and new non-farm dependent jobs created. It is beyond doubt that the vast inflow of immigrants in the same period played an essential role in preserving –to some extent- these areas unaffected from the prevalent depopulation powers and labor force ageing (Iosifides*et al.,* 2006:92).

The prefecture of Kozani is semi-urban with its mining industry absorbing the majority of young local workers and being the most important source of income for the area. Agriculture in Kozani prefecture is primarily based on extensive production of EU-subsidized products but is traditionally well known for livestock products. Livestock farms depend more on labor input so they are more affected from the declining local labor force. Many small and medium farms in disadvantageous non-urban areas cannot compete with the large scale production of farm enterprises because of labor shortages and insufficient technology. Most operators of these farms are old and few of them have children who are willing to keep on running the business. Immigrants cover the labor gaps but it is questionable the efficiency of the hired and family labor. Last years many farms abandoned their commercial activities and turn into self-consumption farms although the labor scarcity is surpassed with immigrant labor supply.

According to data and specialists from the Center of Agricultural Extension in Kozani, farms which are not profitable anymore are suffering from managerial supervision and initiatives implying that since extra labor was available the farm operators and family members became deficient and carry out fewer tasks in the farm. Beyond all dispute, in Greek countryside hiring workers in the

farm is also a symbol of social prestige but is probably some farms need to re-organize their structure and utilize more efficiently their production factors.

On the other hand, immigrants in Greece tend to work in positions which do not reflect their education and acquired skills in their source countries. In many cases their skills are not transferable to the labor market of the host country or they prefer to benefit from low-prestige jobs (and incompatible with their educational background) but with higher returns compared to the wage rate of their previous job in the country of origin. In addition, budget constraints impede an appropriate job-seeking procedure. These *pull* and *push-factors* may develop fruitful conditions for informal economies. Alike other South-European countries, Greece is characterized by informal markets which yield profit for specific sectors and labor groups but incur substantial social losses for the rest of native and migrant population. In addition, there are limited data concerning the immigrant's remittances which can be related to informal economies. The lack of data on the remittance behavior of immigrants does not facilitate the inquiry of immigration effect on the immigrant-sending countries and host country consumption levels.

1.3 Research objectives and questions

Objectives

The objectives of the research are twofold: (1) to outline the key-factors of immigrant employment in Kozani's agricultural sector and figure out if the use of total and hired labor by the farm households is allocated efficiently. The conclusions of this research may draw more efficient patterns of labor allocation; (2) to examine if the socio-economic characteristics of immigrants employed in agriculture differ from those who work in non-agricultural sectors and if these affect the remittance behavior of immigrants. Research on this issue may shade light on immigrant market mechanism and determinants of occupational mobility across sectors.

Questions

1). Which factors and characteristics of Greek farm households influence the decision of hiring extra (immigrant) labor?

2). Are Greek farm households efficient concerning the allocation of extra labor?

3). Do the socio-economic characteristics of Albanian immigrant workers employed in the agricultural sector differ from those employed in other sectors?

4). Do the socio-economic characteristics of Albanian immigrant workers account for variance in remittance flows?

In the Chapter 2, the most prominent migration theories are deployed in order to gain an insight on potential immigrant household strategies and incentives to migrate, as these issues can be highly correlated with the occupational choice and remittance patterns of immigrants. Chapter 3 provides theoretical considerations on farm household strategies and labor demand, efficiency indicators, earnings, occupational status and remittance behavior of immigrants. In Chapter 4, the methodological approach is illustrated and the results of analyses are presented in Chapter 5. The last chapter concludes.

Chapter 2:MIGRATION THEORIES

In early economic studies labor is treated as an immobile production factor across countries with two prominent theorems underlining the *neoclassical trade theory*; the *Hecksher-Ohlin Theorem* and the *Factor-Price Equalization Theorem*. According to the first theorem, a country will specialize and export goods that make relatively intensive use of the country's relatively abundant factors. For example, countries with relatively large populations and labor-intensive production technology will trade labor-intensive goods such as textiles for capital-intensive goods like computers. The *Factor-Price Equalization Theorem* suggests that even in the absence of immigration flows, free trade of goods will lead to the convergence and finally the equalization of the factor-prices (wage rates and price of capital) across countries (Borjas, 1989:459).

The modern literature on the economics of migration stresses three related issues. The first issue refers to the determinants of the population size and the characteristics of immigrants to any particular host country; the second concerns the adaptation process of immigrants to the host country; and the third topic deals with the effect of immigrant flows on the economic, social and political conditions in the source and host countries (Borjas, 1989: 458).
No single theory of international migration provides principles and analytical tools for a full understanding of contemporary migratory processes. Conducted research on the international migration from different disciplines developed a range of theories like the *neoclassical economic theory*, *dual labor market theory, the theory of the new economics of labor migration, world systems theory, network theory* and *the institutional theory* which aim to explain the initiation and perpetuation of international migration flows over time.

2.1 The initiation of international migration

The *neoclassical economics theory* which is probably the oldest theory of international migration, suggests that international migration in macroeconomic perspective occurs due to differences in the supply and demand for labor across countries and regions within countries. Wage rate differentials between two countries with dissimilar capital and labor endowment will motivate laborers from the relatively labor abundant country with low equilibrium market wage to migrate to the relatively capital abundant country where the market wage rate is higher. The transfer of workers from one to the other country will ultimately lead to wage increase in the capital-poor country and wage decrease in the capital-rich country. The same flow of labor between countries will be accompanied by investment capital flow from the labor-scarce to the labor-abundant country as invested capital in poor countries yields higher rate of return comparatively to other more developed countries (Massey *et al*, 1993:433).
In micro-level, the *neoclassical economic theory*, assumes that individuals maximize utility and given the employment rate differences across countries, expected earnings, migration cost, immigration policies in both the source and host country and other factors, they 'choose' the country of residence in order to maximize their welfare. The existence of a 'global migration market' which defines the direction of immigrant flows across potential host countries is the key feature guiding this theory (Borjas, 1989:460; Massey *et al*, 1993; Mc Govern, 2007:219).

The *new economics of labor migration* perceive migration as a decision which is made not only by an individual (the potential immigrant) but by a larger group of related people -such as families and households- in order to maximize earnings and overcome risks and market failures in their country. Under this scope, migration is a household strategy for the optimal allocation of household resources like family labor. In developed countries, market imperfections and income uncertainty can be ameliorated through private insurance markets or governmental policies but in many developing countries these institutional mechanisms are absent or inaccessible to many households thereby rendering migration as a risk-diversification mechanism (Stark and Bloom, 1985; Massey *et al*, 1993). It is important to mention that under the *neoclassical economics* view the immigrant adopts an income-maximizing strategy and no remittances occur while models of the *new economics of labor migration* include remittance flows (Constant and Massey, 2002).

The *dual labor market theory* departs from the micro-level decision models of neoclassical economics without accepting or denying that economic agents make rational and self-interest decisions. This theory suggests that the structure of advanced industrial developed countries creates a permanent demand for

immigrant labor. The two economists, Doeringer and Piore, adherents of the *dual labor market theory,* distinguish a primary labor market which is characterized by well-paid jobs with promotion possibilities and satisfactory working conditions; and a secondary labor market segment which refers to low-paid working positions which actually attract socially discriminated workers from the job hierarchy (Cain, 1976: 1222). According to the theory, immigration flows are only caused due to pull-factors posed by the labor receiving countries regardless the push-factors in sending countries.

The *world systems theory* shaped by various theoretical sociologists views migration as an outcome of the development process and the establishment of a capitalist world market since the sixteenth century. Entrepreneurs and owners of large firms outsource capital and skilled laborers (managers, consultants, technicians) in poor countries in order to access or create new consumer markets and benefit from cheaper labor and the low-cost exploitation of natural resources. The governments of many decolonized poor countries maintain the institutions which were established by former colonial regimes, generating in this way income inequality and pervasive paucity for the majority of the population.

2.2 The continuation of international migration

The *network theory* focuses on the role of migrant social networks in the decision-making process of potential immigrants. Bonds of kinship, friendship and common country of origin create interpersonal ties between immigrants, former immigrants and non-immigrants and as the number of immigrants reach a certain threshold; these networks reduce the cost and the risk of migration.

The *institutional theory* links the enduring international movement of people with the development of profit and non-profit institutions which facilitate it. The impact of these institutions on the migration process and the likely social gains is ambivalent as profit organizations and entrepreneurs can provide services to immigrants in exchange for fees set on the underground economy. On the other hand, humanitarian groups and a variety of organizations support immigrants through the provision of social services, shelters, language courses, training programmes, information on obtaining required legitimate documents (Massey *et al*, 1993).

2.3 The South European model of immigration

The Greek economy alike other Southern European economies (Spanish, Italian, Portuguese), is characterized by informality[10], segmented markets, flexibility, duality and dynamism of small-scale enterprises (King, 2000:15). Under this scope, Southern European economies constitute another type of European capitalism with late industrialization, important agricultural and tourism sectors for the economy, and family-based informal economy being its main elements (Kasimis and Papadopulos, 2005:100). Akin socio-economic characteristics of Southern European countries in combination with common emigration experience induce a new migration model (*South European model of immigration* put forward by King, 2000) which deviates from the classic Fordist model. Whereas the Fordist immigration model refers to the postwar industrial reconstruction plan of north-west European countries in the 1950s and 1960s (controlled and legal inflow of south European economic immigrants recorded as *guest workers* in some host countries), the South European model is defined by different migration mechanisms and motives. The main forces which shaped this model are the illegal status of a considerable proportion of immigrants and the heterogeneity of immigrant groups according to their nationality, motives, gender composition and socio-cultural conditions of the country of origin.

Chapter 3: LITERATURE REVIEW

3.1 Household composition, labor markets and labor demand

Labor-demand oriented theories like efficiency wage and bargaining theories, predict wages to be higher than the market clearing level. This means that employment is ultimately determined by the firms' demand for labor. Contrary to labor-demand theories, the search-matching theory presumes that labor supply creates its own labor demand even if wages do not adjust to any increase of labor supply (Carlsson, Eriksson and Gottfries, 2007).

[10] Greece has the largest shadow economy in the European Union estimated at 28-35% of the total economy while the respective percentage for most of the northern European economies is between 12 and 15 per cent (Baldwin-Edwards, 2004:53; Fakiolas, 2003:536).

The neoclassical economic approach suggests that farm proprietors are profit-maximizing producers while farm laborers aim to maximize utility through their earnings. If there are no market imperfections and subject to profit-maximization conditions, the supply and demand for labor will determine the wage level. Hence, supply side parameters will not affect the demand for labor and vice versa, in fixed wage levels. The application of this approach to farm households (especially in less developed countries), however, the neoclassical view has been criticized by scholars and researchers due to emerging market distortions or failures (e.g. lack of insurance markets for risks faced by farm households) which make farm household production and consumption decisions non-separable, and consequently farm households cannot be treated, simultaneously, as profit maximizing producers and utility maximizing consumers (Löfgren and Robinson, 1999:663). The non-separation of farm household production and consumption decisions can be present because of (1) changes in farm family composition and observed farm employment[11]; (2) efficiency discrepancies between family and hired labor; (3) the household shadow price of a production-consumption good is not given exogenously by the market but is set endogenously through the household's internal supply and demand interactions. The last may occur (a) due to transaction costs; (b) if thefarmer is not a price taker; (c) the farmer perceives a market purchased product as imperfect substitute of a household produced good (Benjamin, 1992:292; Löfgren and Robinson, 1999:663).

The test of the non-separation hypothesis attracted the interest of many economists as it is very informative to figure whether family labor and household structure affect the total farm labor use. In the study of Lopez (1984) concerning the labor supply and production decisions of self-employed farm producers in Canada, education has a significant effect on labor supply responses and allocative decisions from on-farm to off-farm markets (Lopez, 1984:81). Huffman (1980) also found evidence that the higher the educational level of farmers - accompanied with enhanced extension services- leads to increased off-farm labor supply by farm households (Huffman, 1980:14). Departing from the role of education in farm and off-farm labor supply decisions, Wallace and Hoover (1966) conclude that technological changes induce an upward shift to farm labor demand given a constant price for the product and subject to specific-labor market conditions. In the research of Skoufias (1993) on agrarian households in India, the seasonal nature of agricultural activities determines the response of farm wages and employment to shifts in the labor demand or supply. In relation to conventional and sustainable farming practices, Tegegne*et al* (2001), suggest that sustainable farmers utilize more family labor in comparison with conventional farmers.

Deolalikar and Vijverberg (1987) tested the heterogeneity of family and hired labor with farm level data from an Indian region (Matartaluka) and Malaysia.

[11] In the extreme case of no farm-labor market, this correlation implies that the farm's labor input will exclusively depend on farm family composition.

Their results postulate the heterogeneity between family labor and hired labor which can be attributed to different farm labor demand during busy and slack agricultural periods. There is no proof that skill differences in the two types of labor result in labor heterogeneity (Deolalikar and Vijverberg, 1987:301).

3.2 Technical and allocative efficiency

Efficiency is, in a broad sense, a term to describe the transformation process of a set of inputs into a set of outputs. As efficiency is a relative term, for the performance-evaluation of stakeholders, firms, governments and any other economic units a comparable standard has to be set (Forsund and Hjalmarsson, 1974:141). The measurement of efficiency is important because it might lead to resource savings -which are particularly essential in periods of financial stress- and managerial improvement. In addition, efficiency measurement can be a useful indicator for policy formulation.
The current interest in efficiency measurement was spurred by the work of M. J. Farrell, whose approach defines economic (overall) efficiency as the product of technical and allocative efficiency. Technical efficiency captures the ability of producing a specific output –given technology- with a minimum level of inputs, while allocative efficiency refers to the optimal input proportions given relative prices. Farrell's model is a frontier function model (deterministic nonparametric frontier) which attributes any deviation from the frontier to inefficiency (Bravo-Ureta and Rieger, 1991:421). This makes technical efficiency estimates sensitive to outliers as measurement errors are embedded to the one-sided component. In order to overcome this problem, stochastic frontier production models can be employed because of a composed error structure with a two-sided symmetric term which reflects random effects; and a one-sided component for inefficiency (Bravo-Ureta, Solis, Lopez, Maripani, Thiam and Rivas, 2007:58).

Rezitis*et al* (2002) measured the technical efficiency of Greek farms using survey data of the 1992-1995 period. The results exhibit positive relation of technical efficiency with the economic size of farms (Rezitis*et al*, 2002:1356). In the study of Karagiannis and Sarris (2005), technological advances and specialization of production contribute to increased technical efficiency of tobacco farmers in Greece during the period 1991-1995, but technical efficiency is negatively related to the ratio of family to total labor, farm debts and direct income transfers (Karagiannis and Sarris, 2005:449). Bravo-Ureta and Pinheiro (1997) estimated the technical, allocative and economic efficiency of sixty peasant farmers in Domonican Republic and the research outcome shows that younger farmers with higher educational attainment are technically more efficient while the household size is negatively related to allocative efficiency. The positive association of educational level with allocative and

technical efficiency is also supported by the findings of Huffman (1977), Kumbhakar, Ghosh and McGuckin (1991) and Yang (2004).

3.3 Earnings and occupational status of immigrants in the host country

International migration is a very important phenomenon which fueled policy-oriented debates in Europe during the last years. Since the beginning of the previous century or even earlier, many countries all over the world have faced migration and its effects as migrant-sending or migrant-receiving countries. Historically, patterns of migration vary across places and through time due to observed and unobserved changes in the political and socio-economic conditions of many countries. Differences in employment structures, income-generating opportunities, political regimes, cultural affinity, geographical proximity, family relationships, individual's aspirations, migration policies and other factors may trigger hundreds or thousands of people to migrate from one to another country for short or long time[12]. These differences are related to the occurring types of migration. For instance, severe and prolonged economic recession in a country is more likely to result in labor migration while authoritarian and military-based political regimes are expected to cause asylum migration. Other types of migration are the ethnic, family (reunification, family formation) and the return migration.

There are various theories of adaptation which aim to explain the immigrant integration and their upward occupational mobility overtime. The assimilation theory positively relates the educational levels of immigrants with the degree of assimilation. The assimilationist perspective views the market in a host country as a single hierarchy which the majority of immigrants enters at the bottom and gradually moves into higher status jobs as they become acculturated and gain experience in the host country (Powers, Seltzer and Shi, 1998:1017).

Cultural pluralists criticized the assimilation approach and claim that immigrants retain their identities in both host and origin countries. The human capital theory, which is the most prominent theory in economic literature, emphasizes the positive relation of human capital characteristics with the selectivity and performance of immigrants in labor markets. Therefore, immigrants with greater human capital e.g. education or work-related skills, are expected to be more successful in a larger economy than those will less human capital (Powers and Seltzer, 1998:24). Nevertheless, this suggestion is questionable as the value of pre-migration human capital investments and their effects on post-migration occupational status is inversely related to a higher

[12] Approximately 100 million people in the world live in a country other than their own (Friedberg and Hunt, 1995:25).

degree of human capital transferability (Bauer and Zimmermann, 1999:7). Price (2001) concluded that human capital accumulation, through schooling and work experience, increases the employment probability for both white and non-white male immigrants in England. However, immigrants with pre-migration work experience and foreign educational background are less advantaged in employment opportunities.

Many researchers from the human capital perspective incorporate the host-country language proficiency (Chiswick, 1991), length of residence and other variables in the vector of human capital characteristics. More recent studies stress the importance of structural conditions in economy and society. Dual market theorists distinguish two market segments. The core segment consists of high prestige jobs with higher wages and better working conditions whereas the peripheral segment is characterized by informal sector and undesirable bad-paid jobs from the natives (Powers and Seltzer, 1998:24).

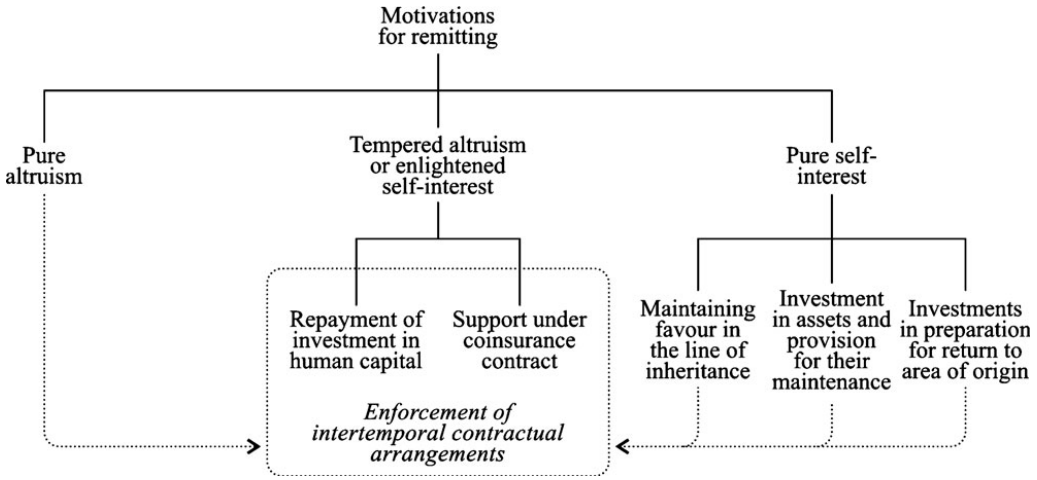
Other researchers highlighted the presence of labor market discrimination spurred by gender (Segura, 1989; Powers, Seltzer and Shi, 1998) racial (Segura, 1989; Barringer, Takeuchi and Xenos, 1990; Treiman, McKeever and Fodor, 1996) and ethnic (Haberfeld, Semyonov and Cohen, 2000) differentials linked with occupational status/mobility and earnings of immigrants. Darity and Mason (1998) provide a comprehensive review of these theories.

3.4 Remittances

The microeconomic literature on immigrant remittances has been influenced by the work of Lucas and Stark (1985) whose analytic framework is the backbone of the *new economics of labor migration*. Contrary to the neoclassical approach to labor migration which assumes that immigration is a personal investment to maximize lifetime earnings, the *new economics of labor migration* perceive immigration as linked decision with the remitting behavior and any interpretation of this decision should be based at the household level (Carling, 2008:583).

Lucas and Stark (1985) proposed that motivations to remit are driven by pure altruism, pure self-interest and tempered altruism (or enlightened self-interest). The relation of these motivation patterns is illustrated in figure 1.

Figure 1
Remittance motivations in the new economics of labor migration

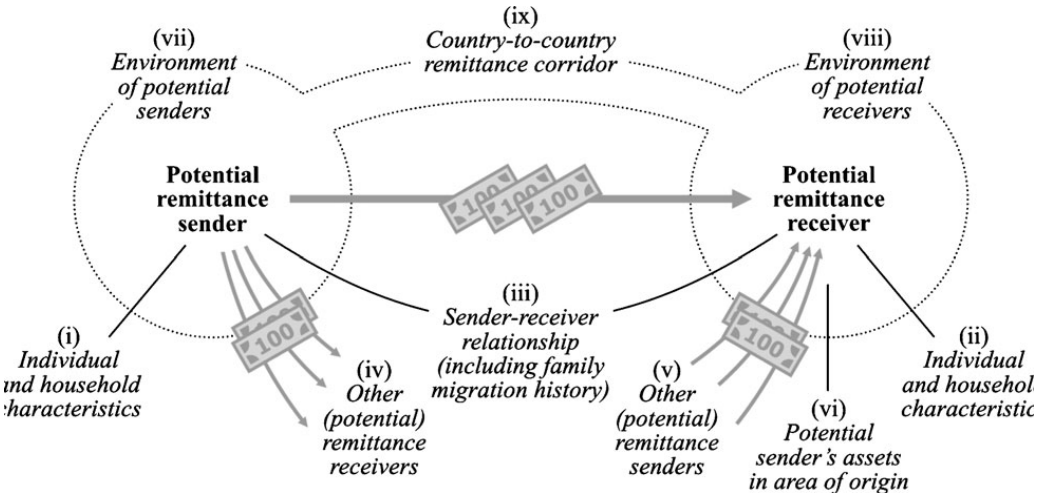


Source: Based on Lucas and Stark (1985)
Cited by Carling (2008)

Remittance-sending behavior can be deemed as altruistic if migrants yield utility from their families' well-being, and if such a relation holds, the amount of remittances are expected to be positively related to the migrants' income and negatively related to the families' non-remittance income. Pure self-interest remitters could remit money either to inherit in the future or purchase assets in the country of origin or to prepare their homecoming. In the case of moderate altruism motivation, remittances reflect intertemporal, mutually beneficial, contractual agreements between migrants and their families at home countries, and may form repayment of migration costs or a migration-based risk-reducing strategy at the household level (World Bank, 2006).

However, the approach of *new economics of labor migration* is not always sufficient to explain the variation in remittance flows as motivations to remit may differ with reference to migrant's characteristics (income, education, gender and ethnicity) the nature of families and households through time and across countries, the migration patterns, the institutional environment of both host and source countries and community-specific norms and values. The complexity of determining the remittance proclivity is illustrated in figure 2.

Figure 2
Location of determinants of remittances



Source: Carling (2008)

The existing literature from the field suggests that migrant's income has either a positive effect on remittance amount or null effect. The educational attainment does not affect remittances even though Lucas and Stark (1985) found empirical support for the hypothesis that migrants remit as repayment of educational costs which were incurred by their families. The legal status of immigrants and gender differences are not always statistically significant while remittance-sending patterns vary in great extend across different ethnic groups of immigrants (Carling, 2008:587).

Chapter 4: RESEARCH METHODOLOGY AND DATA

4.1 Study area and data

The prefecture of Kozani

The prefecture of Kozani is a mountainous region in the Northwest part of Greece with total population 153,939 (Census 2001). The administration structure of the prefecture comprises sixteen municipalities with my survey sample covering seven of them.

Before 1970s, Kozani was one of the poorest prefectures of the country. The majority of the population was engaged to agriculture and livestock farming but since 1970s the industrial sector has developed appreciably once rich lignite-bearing layers detected in the subsoil of the region. Currently, the three steam electric stations of Ptolemaida, Kardia and AgiosDimitrios exploit these layers and supply more than the half of the total electric power of Greece. The expansion of the industrial sector in the region arose employment opportunities for the local population and migrants with sound environmental repercussions (KEPE, 2009).
The main agricultural and livestock products of the area are cereals, tobacco, potato, apples, peaches, high quality pulses and cheese. In the municipal department of Elimia is also cultivated the tuber-rooted flower saffron crocus (Crocus sativus).

Data

The cross-sectional data was personally collected from seven municipalities[13] in the prefecture of Kozani between June and August 2008. More specifically, 69 Greek farm proprietors were interviewed with structured questionnaires with 41 of them being crop producers and 28 livestock farmers (many livestock farmers also produce crops but only for self-consumption). The production and economic data refer to the farm production period 2007-2008 and the sample was randomly selected. It includes techno-economic parameters such as gross value of output (Euros), land size (Ha), fixed capital (Euros), family and hired labor (man-days), access to credit (Euros), amount of subsidy (Euros), energy cost (Euros), livestock value (Euros); and socio-economic data like household size, number of family members involved in farm activities, education (years of schooling) and age. Some of these data were used to estimate the Cobb-Douglas (C-D) stochastic production frontier which is the basis for related efficiency measures.
The sample of immigrants consists of 87 randomly selected Albanian immigrant workers who were interviewed with semi-structured questionnaires with 22 of them being employed in non-agricultural sectors (most of them work in construction or they are self-employed) and 65 of them in agriculture.

4.2 Methodology

Farmer's decision on hiring extra labor, occupational choice of immigrants and remittance behavior

[13] The seven municipalities are Kozani, Elimia, Aiani, Servia, Velvento, Vermio and Askio.

The factors which affect the farmer's decision on hiring non-family labor, the occupational choice of immigrants and their remittance behavior were examined using a probit model. Probit model overcomes the difficulties associated with the linear probability model as it possible to translate the values of a variable which lie in an (0,1) interval to a probability which ranges in value from 0 to 1. This requires the use of the cumulative normal probability function assuming that a continuous index Z_i exists (in this case Z_i is the farmers decision on hiring extra labor, the occupational choice of immigrants and their remittance proclivity) and this index is determined by an explanatory variable X_i (in this case variables of tables 5.1 and 5.11).

$Z_i = \alpha + \beta X_i$

Probit analysis provides estimates for the parameters α and β and information about the index Z_i (Pindyck and Rubinfeld, 2000:304).

In this study, Probit regression was conducted in order to estimate the variables which influence the farmer's decision on hiring extra labor. The included variables are the household size, the fraction of family members involved in farm activities over the household size, the average age of family members involved in farm activities (including the age of the operator), the average education of family members involved in farm activities (including the operators education), a dummy variable for the production type of the farm (crop or livestock farming), a dummy variable for the type of cultivated crops aiming to capture the seasonal labor intensity, the total land size (in hectares), the value of total fixed capital (value of machinery and farm buildings in Euros) and the value of livestock (in Euros). Concerning the age and education variables I preferred not to induce in the model the operator's age and education separately, as the family structure of Greek farm households does not allow a distinct indication of the farm operator. In other households the official operator is distinguished but still older family members maintain the supervisory and managerial tasks.

Probit regression was also used in order to examine the variables which influence the occupational choice of immigrants. The variable vector includes the age of the immigrant, their gender, education, Greek language skills as a proxy variable for the assimilation level of the immigrant in the host country, the first year of entrance in Greece (indicator for immigrants' adaptation level and access to immigrants' market networks), their last occupation in the country of origin before immigration and the dummy variable for the labor market in which the immigrant was hired. The two specified markets are the spot market which indicates poor access to immigrant labor networks and the formal market which involves government organizations, state mediators and immigrant labor unions. This variable aims to reflect the institutional environment of the host country concerning immigration.

The amount of remitted labor returns was regressed (probit regression) on the immigrant's age, gender, education, year of first entrance in Greece, the residence of immigrant's family members, their household size, marital status and Greek language skills.

Technical efficiency and model specification

In this study, a stochastic production frontier is being used in order to avoid biased (in)efficiency measures derived by deterministic frontiers. As it is mentioned in the subchapter 3.2, efficiency estimates obtained by deterministic frontiers (Kopp and Diewert approach, 1982) suffer from statistical noise due to the assumption that the entire deviation from the frontier is a result of inefficiency.
The general stochastic production frontier model can be written as

$$Y=f(X_i;\beta)+\varepsilon \qquad (1)$$

$$\text{with}\varepsilon = v- u \qquad (2)$$

where Y is the output of each farm, $X_i$is the *i*th input used by a farm, β is a vector of unknown parameters and ε is a composed error term (Aigner, Lovell and Schmidt, 1977; Meeusen and van den Broeck, 1977). The error term is composed by two independent elements which are the two-sided normally distributed random error v_i and the one-sided component $u_i \geq 0$. The first element captures the random effects beyond the farmer's control while the second reflects the technical inefficiency of the farmer. According to the value of u_i we can measure the inefficiency degree of the farmer as the larger the value of $u_i$the larger the inefficiency is. Thus, $u_i=0$ implies that the farm's output lies on the frontier and the farmer is technically efficient whereas $u_i \geq 0$ means there is space for technical improvements.
The maximum likelihood estimation of equation (1) provides estimators for β lambda ($\lambda=\sigma_u/\sigma_v$) and σ_s square ($\sigma_s^2=\sigma_u^2+\sigma_v^2$) which are necessary to calculate the mean of *u* given the values of ε.

$$E(u/\varepsilon) = \sigma^2 [f^*(\lambda\varepsilon/\sigma_s)/1-F^*(\lambda\varepsilon/\sigma_s) - \lambda\varepsilon/\sigma_s] \qquad (3)$$

wheref^* and F^* are, respectively, the standard normal density and distribution functions, evaluated at $\lambda\varepsilon/\sigma_s$ and $\sigma^2=\sigma_u^2\sigma_v^2/\sigma_s^2$.
The solution of equations (1) and (3) gives estimates for *v* and *u* and the subtraction of *v* from both sides of equation (1) generates the stochastic production frontier

$$Y^*=f(X_i;\beta)-u=Y-v$$

with Y^* representing the farm's observed output adjusted for the statistical noise induced by *v* (Bravo-Ureta and Pinheiro, 1997: 51-54). Another way to measure the variation in output due to technical (in)efficiency was proposed by Battese and Corra (1977). The analysis of the ratio (γ) of variability of *u* to total variability (*u*+ *v*) estimates γ which reflects the divergence-percentage between farm output and frontier output (Rezitis*et al*, 2002:1348).

$\gamma = \sigma_u^2 / \sigma_s^2$ and $0 \leq \gamma \leq 1$

The specified stochastic production frontier derived by C-D function because the followed methodology requires self-dual production functions, its simplicity and compatibility with the available data for this study.

The C-D stochasticfrontiermodel can be written as

$$\ln Y_i = \ln\beta_0 + \beta_1 \ln K_i + \beta_2 \ln L_i + \beta_3 \ln A_i + \beta_4 \ln V_i + \beta_5 L_{hi}/ L_i + \Sigma\mu_j P_{ji} + \Sigma\xi_\kappa C_{\kappa i} + \varepsilon_\iota \quad , \quad i = 1, 2, \ldots\ldots, N$$

where*N* is the number of farms in the sample and $Y_i$is gross output (value in Euros) of the *i*th farm. The variable $K_i$corresponds to the value of fixed capital (in Euros), L_i the total farm labor input (family and hired labor in man-days), A_i the size of operated land (in ha), V_i the livestock value (in Euros), L_{hi}/ L_i the ratio of hired labor over total farm labor, P_{ji} a dummy variable for the direction of production (crop or livestock production) and $C_{\kappa i}$ another dummy variable for the type of cultivated crops. The last dummy variable ($C_{\kappa i}$) is included to capture seasonal labor-demand differences between types of cultivated crops.

Allocative efficiency of family and hired labor

According to neoclassical production theory, the measurement and analysis of allocative efficiency is based on the firm-specific production function that has the highest associated iso-profit line which implies that the value of marginal product (MVP_X) can be equal to its unit cost (input price, P_X). As far as MVP_X equals to P_X the farmer is allocative efficient and does not under utilizes ($MVP_X \geq P_X$) or over utilizes inputs X_i ($MVP_X \leq P_X$) (Ogundary, 2008:227).

The C-D production function is

$$Y = \beta_0 K^{\beta 1} L^{\beta 2} A^{\beta 3} V^{\beta 4} e^{\beta 5 \, Lhi/L}$$

The marginal product of hired labor is

$$\partial Y/\partial L_{hi} = \partial \left(\beta_0 K^{\beta 1} L^{\beta 2} A^{\beta 3} V^{\beta 4} e^{\beta 5 \, Lhi/L}\right)/ \partial L_{hi}$$

and the marginal product of family labor (L_{fa}) is

$$\partial Y/\partial L_{fa} = \partial (\beta_0 K^{\beta 1} L^{\beta 2} A^{\beta 3} V^{\beta 4} e^{\beta 5 Lhi/L})/ \partial L_{fa}$$

whereβ_1, β_2, β_3, β_4 are the elasticities of production factors and β_5 is the elasticity of the ratio of hired labor over total farm labor. The values of β's are obtained by the stochastic frontier production function.

In order to estimate the allocative efficiency of family and hired labor, their marginal products were divided by the average immigrant farm wage rate per day (26 Euros) and the actual wage rate of hired workers respectively. Allocative efficiency less than unity, indicates underutilization of labor (family or hired) implying that operators should use more labor. The opposite holds if allocative efficiency is larger than one.

Chapter 5: ESTIMATION AND EMPIRICAL RESULTS

5.1 Farmers' decision on hiring extra (non-family) labor

In order to indicate the factors and characteristics of Greek farm households which influence the decision of hiring extra (immigrant) labor, data on gross farm output, input quantities and social characteristics of the farm household was collected. In Table 5.1, the listed variables were examined for potential effects on the farmer's decision for hiring non-family labor and table 5.2 demonstrates the means of specific variables by four distinct farm groups (crop farmers, livestock farmers, farmers who hire non-family labor and farmers who do not hire non-family labor).

Table 5.1
Variable list for farmers

Variable	Symbol	Definition
Output	*Y*	Total value of farm production in Euros
Household size	*HOUSEHOLD*	Number of family members
Farm ratio	*FARMRATIO*	Ratio of family members

		involved in farm activities over total number of family members
Education	*EDUCATION*	Average years of schooling of family members involved in farm activities
Age	*AGE*	Average age of family members involved in farm activities in years
Land size	*A*	Total land size in hectares
Production type	*P*	=0 if the farm is specialized in crop/plant production and 1 if it is specialized in livestock production
Crop type	*C*	=0 if the cultivated crops are cereals and 1 if the farmer cultivates other than cereal crops
Livestock value	*V*	The value of livestock in Euros
Labor	*L*	The total farm labor by family members and hired workers in man-days
Hired labor	L_{Hi}	Labor input by hired workers in man-days
Capital	*K*	The gross value of fixed capital (machinery, farm buildings, bore, fence) in Euros

Table 5.2
Farmers Sample statistics

	Means (Std. deviation)						
	Whole	Crop	Livestock	t-test	Farmers	Farmers	t-test

	Sample	Farmers	Farmers		without extra laborers	with extra laborers	
Y	81681 (101867)	43879 (45776)	134925 (134471)	-3.8**	48251 (70552)	96307 (110352)	-1.83
HOUSEHOLD	2.9 (1.22)	2.8 (1.06)	3.2 (1.41)	-1.5	2.5 (1.03)	3.1 (1.26)	-1.91
FARMRATIO	0.72 (0.28)	0.73 (0.28)	0.72 (0.27)	0.5	0.8 (0.26)	0.69 (0.28)	1.41
EDUCATION	9.5 (2.65)	9.5 (2.73)	9.6 (2.6)	0.43	9.7 (2.97)	9.4 (2.53)	0.42
AGE	46 (9.2)	48 (10.4)	43 (8.35)	2.03*	46 (11.2)	46 (9.4)	0.25
A	36.3 (44.6)	25.5 (29.7)	52.1 (57)	-2.0*	30.8 (34.8)	38.7 (48.4)	-0.67
L	706 (607)	440.3 (534.8)	1095.4 (490.7)	-5.3**	179.7 (199.2)	936.4 (582.1)	-5.79**
L_{Hi}	314.9 (360.2)	222.3 (338.7)	450.4 (353.2)	-2.97**	_	452.6 (352.2)	-5.86**
K	162986 (182165)	104931 (91704)	254533 (239441)	-3.25**	114619 (131834)	185067 (198383)	-1.48

*Significant at 0.05 level
**Significant at 0.01 level

The Probit regression (ML) estimates (table 5.3) indicate that farm household size, age, livestock farming, non-cereal cultivated crops, land size and capital are positively associated with hiring extra (non-family) labor but only the crop and production type are statistically significant at 95% confidence level. The average education of farm members (including the farm operator), the fraction of farm members over household size and the value of livestock are negatively associated with the decision to hire extra labor but are not significant at 95% confidence level. Excluding the livestock value from the probit regression the coefficient signs do not change and the production alongside crop type are still the only statistically significant variables (at 5% level). Excluding capital and livestock value (because of suspected low-quality data), the coefficient of education becomes positive (but not significant at 5% level) and production type becomes significant at 99% confidence level.

The Probit regression results suggest that non-family labor demand is related to the seasonal labor intensity of crops and the production type. Livestock farmers and farmers who cultivate non-cereal crops are hiring extra labor.

Table 5.3
Maximum Likelihood (ML) parameter estimates of hiring extra labor

	ML Estimates (Asymp. Std. Error)		
Intercept	-1.846	-1.811	-2.275
	(2.251)	(2.23)	(2.146)
HOUSEHOLD	0.125	0.124	0.115
	(0.215)	(0.213)	(0.204)
FARMRATIO	-0.135	-0.148	-0.193
	(0.855)	(0.852)	(0.847)
AGE	0.017	0.017	0.023
	(0.028)	(0.028)	(0.027)
EDUCATION	-0.007	-0.001	0.022
	(0.093)	(0.093)	(0.086)
P	1.528*	1.472*	1.682**
	(0.681)	(0.64)	(0.595)
C	1.109*	1.108*	1.147*
	(0.534)	(0.53)	(0.528)
A	0.003	0.003	0.006
	(0.007)	(0.007)	(0.006)
K	1.51e-06	1.13e-06	
	(1.85e-06)	(1.73e-06)	
V	-5.40e-07		
	(1.88e-06)		
Log likelihood	-33.03		

*Significant at 0.05 level
**Significant at 0.01 level

5.2 Technical and allocative efficiency of farmers

Table 5.4 presents the maximum likelihood estimates of the stochastic production frontier. The parameter estimates of total labor and hired labor share

are statistically significant at 5% level and have positive sign. This implies that family labor and hired labor are heterogeneous. The most likely explanation for heterogeneity is the seasonality of family and hired labor use. Another reason for heterogeneity can be the fact that family labor is mainly used in managerial tasks while non-family labor is used for manual tasks during peak-production seasons.

Table 5.4
Estimates of the stochastic frontier production function

Variables	Parameters	Coefficient (Std. Error)
Frontiers estimates		
Constant	$\ln\beta_0$	4.27** (1.07)
$\ln K$	β_1	0.49** (0.10)
$\ln L$	β_2	0.20* (0.09)
$\ln A$	β_3	-0.04 (0.11)
$\ln V$	β_4	0.08 (0.06)
L_{hi}/ L	β_5	0.63* (0.30)
P	μ	-0.28 (0.74)
C	ξ	0.03 (0.29)
Variance parameters		
σ_v		0.38* (0.10)
σ_u		0.95* (0.18)
$\sigma_s^2= \sigma_u^2+ \sigma_v^2$		1.05* (0.29)
$\lambda=\sigma_u/\sigma_v$		2.47* (0.26)

$\gamma = \sigma_u^2 / \sigma_s^2$	0.86

*Significant at 0.05 level
**Significant at 0.01 level

In spite of being statistically insignificant, total land size has a negative sign. The only plausible explanation for this result is that during the production year 2007-2008, the farm-gate price of cereal products was between 0.18-0.22 Euros per ton. Bearing in mind that cereal production in Greece is positively related to land size, the low cereal price outweighed the revenue returns to land size.
Another rationale for the negative sign of land size can be the presence of collinearity among variables. A test for collinearity was conducted with the results illustrated in table 5.5.

Table 5.5
Collinearity diagnostics

Variables	VIF
ln*K*	2.26
ln*L*	2.80
ln*A*	3.12
ln*V*	13.67
L_{hi}/ L	1.48
P	12.78
C	3.03
Mean	5.59

The variance inflation factor (VIF) of the natural logarithm of land size equals to 3.12 which is not a large value to point out collinearity. The variables which are inspected for collinearity are the natural logarithm of livestock value and production type variable as the VIF values of these variables are greater than ten. The average VIF value is 5.59 which implies low collinearity between the inserted variables in the stochastic production frontier.

Concerning the returns to scale, the sum of the coefficients of capital, labor, land size and livestock value is 0.73 which is less than 1 and indicates that farms of the sample have decreasing returns to scale (DRT). In order to check the validity of this hypothesis a one-sided test for upper critical values was conducted.

Table 5.6
Test for RTS

Hypotheses	Type of test	X^2(1)-test statistic	Prob> X^2	X^2-critical value	Decision
H_0: RTS=1 H_1: RTS<1	One-sided test	6.25	0.012	3.84	H_0 is rejected

The X^2-test statistic has the value of 6.25 with probability value 0.012 so the null hypothesis is rejected and farms appear not to have constant returns to scale at 5% level.

Technical efficiency

The mean technical efficiency of the sample of farmers is 0.547 implying that the production of the farmers is 54.7% of its potential. In other words, farmers could have produced, on average, the same level of output using only 54.7% of inputs they actually used. The technical efficiency indices for crop farmers, livestock farmers, farmers who do not hire non-family labor and farmer who hire non-family labor are presented in table 5.7.

Table 5.7
Frequency distribution of technical efficiency

Efficiency (%)	Sample	Crop Farmers	Livestock Farmers	Farmers without extra laborers	Farmers with extra laborers
Mean (%)	54.7	54.2	53.8	53.1	54.6
Minimum (%)	7.0	7.0	12.7	20.1	7.0
Maximum (%)	86.8	86.8	84.0	86.8	84.0

All group combinations of farmers exhibit similar mean technical efficiency indices ranging from 0.53 to 0.54. The farmers who hire non-family labor are slightly more technically efficient. Furthermore, livestock farmers who do not hire non-family labor are 68.4% technically efficient with crop farmers who do not hire non-family labor being the most technically inefficient (50.3%). Crop and livestock farmers who utilize non-family labor are 58.3 and 51.5% technically efficient respectively (Table 5.8).

Table 5.8
Average technical efficiency (%) by farm groups

	Crop Farmers	Livestock Farmers
Farmers without extra laborers	50.3	68.4
Farmers with extra laborers	58.3	51.5

Allocative efficiency

The allocative efficiency of hired labor is very low for both crop farmers and livestock farmers. The mean allocative efficiency of crop farmers is 0.29 and 0.35 (Table 5.9) for livestock farmers. These levels of efficiency, which are much smaller than unity, indicate that farmers underutilize hired non-family labor. Under this scope, crop and livestock farmers should hire more workers.

Table 5.9
Allocative efficiency of hired labor by farm groups

	Farmers with extra laborers		
	Mean	Maximum	Minimum
Crop farmers	0.29	1.66	0.03
Livestock farmers	0.35	1.18	0.00

Crop and livestock farmers without non-family workers, do not allocate efficiently also the family labor (0.22 for crop farmers and 0.25 for livestock

farmers) while farmers who hire extra workers demonstrate zero and negative efficiency estimates. This means that the marginal product of family labor is zero and negative respectively. This peculiar outcome is possible to derive by the use of C-D production function but theoretically cannot be interpreted. Zero marginal product of labor can be expected during slack production periods but negative values are more likely to occur due to statistical noise.

Table 5.10
Allocative efficiency of family labor by farm groups

	Farmers without extra laborers			Farmers with extra laborers		
	Mean	Maximum	Minimum	**Mean**	Maximum	Minimum
Crop farmers	0.22	0.48	0.05	-0.30	0.09	-4.13
Livestock farmers	0.25	0.43	0.06	0.00	0.11	-0.21

5.3 Occupational choice of immigrants

Table 5.11 presents the list of immigrants' variables which were included in the probit model in order to regress the occupational choice of immigrants on them. The sample means of immigrants are portrayed in table 5.12.

Table 5.11
Variable list for immigrant workers

Variable	Symbol	Definition
Age	AGE	The age of immigrant worker in years
Gender	*GENDER*	=0 for males and 1 for females
Marital status	*MARITAL*	=0 if the immigrant is not married and 1 otherwise
Immigrant's family	*CHILDREN*	The number of children

Country of residence of the immigrant's family	*RESIDENCE*	=0 if the family of the immigrant resides in Greece and 1 elsewhere
Occupation	*OCCUP*	=0 for off-farm occupation and 1 for farm occupation
Immigrant's adaptation	*LANGUAGE*	=0 if the immigrant is able to speak in Greek and 1 if the immigrant is able to speak and write in Greek
Year of entry	*ENTRY_YEAR*	Year of first entrance in Greece as an economic immigrant
Institutional environment	*LAB_MARKET*	=0 if the immigrant was hired in a spot market and 1 via mediator (consulate, immigrant networks and native networks)
Earnings	*EARNINGS*	Total returns of labor in Euros
Education	*EDU*	=0 if the highest attainment of the immigrant is at the primary level and 1 for secondary level
Prior occupation in source country	*SOURCE_OC*	=0 for off-farm occupation and 1 for farm occupation
Fraction of remitted money	*REMIT*	=0 if less than half of total labor earnings are remitted and 1 for more than half

Table 5.12
Immigrant's sample statistics

Means (Std.

	deviation)						
	Sample	*OCCUP*=0	*OCCUP*=1	t-test	*REMIT* =0	*REMIT*=1	t-test
AGE	34.6 (8.79)	34.4 (8.15)	34.7 (9.06)	0.1	32.7 (6.13)	35.4 (9.75)	-1.11
GENDER	0.15 (0.36)	0.05 (0.21)	0.18 (0.39)	-1.58	0.09 (0.28)	0.17 (0.36)	-0.88
MARITAL	0.79 (0.39)	0.79 (0.39)	0.8 (0.4)	0.18	0.68 (0.46)	0.84 (0.35)	-1.6
CHILDREN	1.6 (1.16)	1.5 (1.00)	1.6 (1.22)	0.07	1.45 (1.15)	1.67 (1.07)	-0.48
RESIDENCE	0.72 (0.46)	0.47 (0.5)	0.81 (0.4)	-3.04**	0.32 (0.47)	0.9 (0.28)	-7.34**
OCCUP	0.74 (0.43)	0 (0.00)	1 (0.00)	-	0.4 (0.49)	0.88 (0.33)	-5.34**
LANGUAGE	0.2 (0.41)	0.37 (0.5)	0.15 (0.36)	2.57*	0.4 (0.5)	0.11 (0.34)	3.52**
ENTRY_YEAR	1998 (4.86)	1997 (5.37)	1999 (4.61)	-1.68	1996 (4.5)	1999 (4.8)	-2.65**
LAB_MARKET	0.5 (0.5)	0.42 (0.5)	0.54 (0.49)	-1.13	0.45 (0.5)	0.53 (0.5)	-0.78
EARNINGS	8686.4 (4129)	13642 (2815)	6943 (2358)	12.39**	10759 (4575)	7792 (3472)	4.16**
EDU	0.45 (0.5)	0.89 (0.29)	0.3 (0.46)	5.9**	0.68 (0.46)	0.35 (0.48)	3.08**
SOURCE_OC	0.74 (0.49)	0.53 (0.5)	0.81 (0.48)	-1.97*	0.5 (0.37)	0.84 (0.45)	-2.98**
REMIT	0.7 (0.46)	0.31 (0.47)	0.83 (0.36)	-5.34	0 (0.00)	1 (0.00)	-

*Significant at 0.05 level
**Significant at 0.01 level

The maximum likelihood estimates for the occupational choice of immigrants between farm and off-farm employment sector indicate that age, Greek

language skills, year of entrance in Greece and higher educational level are positively associated with off-farm employment. From these variables, only education is statistically significant at 1 and 5 per cent level. Female immigrant workers, off-farm occupational experience gained in the country of origin and employment way via mediator (e.g. consulate, immigrant networks and native networks) increase the probability of farm employment but none of these variables are statistically significant at 1 and 5 per cent level.

Table 5.13
Maximum Likelihood (ML) parameter estimates for occupational choice of immigrants

	ML Estimates (Asymp. Std. Error)	
Intercept	33.855	15.77
	(94.98)	(88.3)
AGE	-0.036	-0.021
	(0.03)	(0.028)
GENDER	0.34	0.47
	(0.732)	(0.74)
LANGUAGE	-0.727	-0.52
	(0.523)	(0.44)
ENTRY_YEAR	-0.015	-0.007
	(0.047)	(0.044)
EDU	-1.596**	-1.66**
	(0.43)	(0.4)
SOURCE_OC	0.726	0.48
	(0.523)	(0.484)
LAB_MARKET	0.758	
	(0.432)	
Log likelihood	-29.49	

** Significant at 0.01 level

The exclusion of immigrants' employment due to suspected endogeneity does not change the outcome that education is the only variable playing significant role in the occupational choice of immigrants.
Concerning the legal status of immigrants none variable was included as all of them had social insurance (prerequisite for legal employment). Race and ethnicity considerations were relaxed as all the immigrants are coming from the same country (Albania).

5.4 Remittance behavior of immigrants

Marital status and country of residence of family members are positively related to increased remittance flow while education is negatively related to remittances. Bearing in mind the direct link between married immigrants whose family members reside in the country of origin and the positive association of educational level with the adaptation level which in turn is inversely related to remittance flows, these results are not surprising.
Excluding the marital status, Greek language skills and residence of family members, the entry year in Greece is becoming significant variable at 5 per cent statistical level. As years of residence in host country increase, the remittance flows decline. This also occurs through assimilation and adaptation processes

Table 5.14
Maximum Likelihood (ML) parameter estimates for remittance behavior

	ML Estimates (Asymp. Std. Error)		
Intercept	-87.54	-63.8	-191.705*
	(97.327)	(92.15)	(75.975)
AGE	0.027	0.016	0.043
	(0.038)	(0.035)	(0.022)
GENDER	1.014	0.84	0.113
	(0.771)	(0.75)	(0.525)
EDU	-1.514*	-1.12*	-0.862**
	(0.765)	(0.52)	(0.33)
ENTRY_YEAR	0.042	0.03	0.095*
	(0.048)	(0.05)	(0.037)
RESIDENCE	2.997**	2.4**	
	(0.915)	(0.56)	
CHILDREN	-0.285	-0.19	
	(0.378)	(0.34)	
MARITAL	2.33*	1.85*	
	(1.168)	(0.87)	
LANGUAGE	0.947		
	(0.903)		
Log likelihood	-22.99	-23.654556	-40.185

* Significant at 0.05 level
** Significant at 0.01 level

Chapter 6: CONCLUSIONS

In the present study, data from a sample of Greek farmers were collected in order to examine the factors which influence the decision of farmers on hiring non-family labor. The results of the analysis suggest that the type of farm production alongside the type of cultivated crops affect the non-family labor demand. More specifically, livestock farmers and non-cereal crops cultivators reveal higher probability to hire non-family labor. This result may signify that Greek farm household strategy fits more to the neoclassical profit maximizing concept as farmers decide to hire labor according to production characteristics of the farm.

According to efficiency estimates, farmers can increase their technically feasible output for more than 40 per cent and reallocate the labor input by hiring more non-family workers and eliminating family labor.

Concerning the occupational choice of immigrants, the results of this study are in line with the human capital theory and assimilationist perspective as higher educated immigrants are employed in non-agricultural sectors with higher wage rates. The results on remittance behavior of immigrants are also similar with those of other studies in migration literature as marital status, residence place of family members and education influence remittance flows in the same direction.

Alike the results of any empirical study, the research outcome of this report should be interpreted with caution. I acknowledge the limitations of the study stemming from possible low-data quality on the measurement of fixed capital and family labor (except operators labor). The interviewed farmers could not estimate the specific labor input by family members due to the informal character of family labor in any family business in Greece. This may be related to mean zero and negative values of allocative family labor efficiency of livestock and crop farmers respectively. Data on fixed capital value may also be inaccurate due to over- and underestimation error by farmers. Concerning the decision of farmers on hiring non-family (immigrant) labor, the used model did not incorporate variables related to agricultural extension, market imperfections, risk, access to credit, social status and xenophobic behavior. The study of factors which affect the occupational choice of immigrants can be enhanced by inserting a dummy variable in the model which indicates the country where immigrants studied. Then the effect of education on occupational status of immigrants would not suffer from compatibility concerns between skills acquired in source and host country. Furthermore, a larger sample of immigrants employed in non-agricultural sectors would be insightful. The relatively small number of farmers also does not allow for the examination

of variables which can be related with technical and allocative efficiency estimates. This limitation restrains policy-oriented recommendations. Intuitively driven, I would stress the positive association of agricultural extension services -which are limited and devaluated during the last decades in Greece- with improvements in technical and allocative efficiency. From a general equilibrium perspective, institutional modernization may also contribute to more efficient allocation of immigrant labor among economic sectors and shrink informal markets.

References

Abercrombie, K. (1985) Part-time Farming in the Rural Development of Industrialized Countries. Report on a seminar held in Scotland in 1983. The Arkleton Trust, Langholm.

Aigner, D.J., C.A.K. Lovell and P. Schmidt (1977) Formulation and Estimation of Stochastic Frontier Production Function Models. *Journal of Econometrics*, Vol. 6, No. 1, pp. 21-37

Baldwin-Edwards, M. (2004) Albanian Emigration and the Greek Labor Market: Economic Symbiosis and Social Ambiguity. *South-East Europe Review,* Vol. 7, pp. 51-65 [On web at www.ceeol.com]

Barringer, H.R., D.T. Takeuchi and P. Xenos (1990) Education, Occupational Prestige and Income of Asian Americans. *Sociology of Education*, Vol. 63, No. 1, pp. 27-43

Battese, G.E. and G.S. Corra (1977) Estimation of a Production Frontier Model: with Application to the Pastoral Zone of Eastern Australia. *Australian Journal of Agricultural Economics*, Vol. 21, pp. 167-179

Bauer, T. and K.F. Zimmermann (1999) Occupational Mobility of Ethnic Migrants.*Discussion Paper*, No. 58, Institute for the Study of Labor, Bonn: IZA

Benjamin, D. (1992) Household Composition, Labor Markets and Labor Demand: Testing for Separation in Agricultural Household Models. *Econometrica*, Vol. 60, No. 2, pp. 287-322

Borjas, G.J. (1989) Economic Theory and International Migration.*International Migration Review*, Vol. 23, No. 3, pp. 457-485

Bravo-Ureta, B.E, D. Solis, V H. M. Lopez, J.F. Maripani, A. Thiam and T. Rivas (2007) Technical Efficiency in Farming: A Meta-regression Analysis. *Journal of Productivity Analysis*, Vol. 27, No. 1, pp. 57-72

Bravo-Ureta, B.E. and A.E. Pinheiro (1997) Technical, Economic and Allocative Efficiency in Peasant Farming: Evidence from the Dominican Republic. *The Developing Economies*, Vol. 35, pp. 48-67

Bravo-Ureta, B.E. and L. Rieger (1991) Dairy Farm Efficiency Measurement Using Stochastic Frontiers and Neoclassical Duality.*American Journal of Agricultural Economics*, Vol. 73, No. 2, pp. 421-428

Cain, G.G. (1976) The Challenge of Segmented Labor Market Theories to Orthodox Theory: A Survey. *Journal of Economic Literature*, Vol. 14, No. 4, pp. 1215-1257

Carling, J. (2008) The Determinants of Migrant Remittances.*Oxford Review of Economic Policy*, Vol. 24, No. 3, pp. 581-598

Carlsson, M., S. Eriksson and N. Gottfries (2007) Testing Theories of Job Creation: Does Supply Create Its Own Demand? *Discussion Paper*, No. 2024, Institute for the Study of Labor, Bonn: IZA

Cavounidis, J. (2006) Labor Market Impact of Migration: Employment Structures and the Case of Greece. *International Migration Review*,Vol. 40, No. 3, pp. 635–660

Cavounidis, J. (2004) Migration to Greece from the Balkans. *South Eastern Europe Journal of Economics,* Vol. 2, pp. 35-59

Chiswick, B.R. (1991) Speaking, Reading and Earnings among Low-Skilled Immigrants. *Journal of Labor Economics*, Vol. 9, No. 2, pp. 149-170

Cholezas, I. and P. Tsakloglou (2008) The Economic Impact of Immigration in Greece: Taking Stock of the Existing Evidence. *Discussion Paper*, No. 3754, Institute for the Study of Labor, Bonn: IZA

Constant, A. and D.S. Massey (2002) Return Migration by German Guestworkers. *International Migration*, Vol. 40, No. 4, pp. 5-38

Damianos, D. and D. Skuras (1996) Farm Business and the Development of Alternative Farm Enterprises: An Empirical Analysis in Greece. *Journal of Rural Studies,* Vol. 12, No. 3, pp. 273-283

Darity, W.A., and P.L. Mason (1998) Evidence on Discrimination in Employment: Codes of Color, Codes of Gender. *The Journal of Economic Perspectives*, Vol. 12, No. 2, pp. 63-90

Deolalikar, A.B. and W.P.M. Vijverberg (1987) A Test of Heterogeneity of Family and Hired Labor in Asian Agriculture. *Oxford Bulletin of Economics and Statistics*, Vol. 49, No. 3, pp. 291-305

Fakiolas, R. (2003) Regularizing Undocumented Immigrants in Greece: Procedures and Effects. *Journal of Ethnic and Migration Studies,* Vol. 29, No. 3, pp. 535-561

Fakiolas, R. (1999) Socio-economic Effects of Immigration in Greece. *Journal of European Social Policy,* Vol. 9, No. 3, pp. 211-229

Forsund, F.R. and L. Hjalmarsson (1974) On the Measurement of Productive Efficiency. *The Swedish Journal of Economics*. Vol. 76, No. 2, pp. 141-154

Friedberg, R.M. and J. Hunt (1995) The Impact of Immigrants on Host Country Wages, Employment and Growth. *The Journal of Economic Perspectives*, Vol. 9, No. 2, pp. 23-44

Glytsos, N. (2005) Stepping from Illegality to Legality and Advancing towards Integration: The Case of Immigrants in Greece. *International Migration Review,* Vol. 39, No. 4, pp. 819-840

Glytsos, N. (1999) The Impact of Demographic Deterioration on Labor Balances in Greece. *Journal of Economic Studies,* Vol. 26, No. 2, pp. 130-158

Haberfeld, Y., M. Semyonov and Y. Cohen (2000) Ethnicity and Labor Market Performance among Recent Immigrants from the Former Soviet Union to Israel. *European Sociological Review*, Vol. 16, No. 3, pp. 287-299

Hajdinjak, M. (2005) Don't want to live with them, can't afford to live without them: Albanian labor migration in Greece. Paper presented at the international conference *Migrations, integration security and quality of life in Mediterranean cities* in Switzerland in 2005.

Hatziprokopiou, P. (2004) Balkan Immigrants in the Greek City of Thessaloniki: Local Processes of Incorporation in an International Perspective. *European Urban and Regional Studies*, Vol. 11, No. 4, pp. 321-338

Hellenic Migration Policy Institute (2004) *Statistical Data on Immigrants in Greece: An Analytic Study of Available Data and Recommendations for Conformity with EU Standards*, Athens: IMEPO.

Huffman, W.E. (1980) Farm and Off-farm Work Decisions: The Role of Human Capital. *The Review of Economics and Statistics*, Vol. 62, No. 1, pp. 14-23

Huffman, W.E. (1977) Allocative Efficiency: The Role of Human Capital. *The Quarterly Journal of Economics*, Vol. 91, No. 1, pp. 59-79

Iosifides, T., T. Kizos, E. Petracou, E. Malliotaki, K. Katsimantou and E. Sarri (2006) Socio-economic Characteristics of Immigrants in Western Greece Region: Urban-Rural Continuum or Divide? *Migration Letters*, Vol. 3, No. 2, pp: 91-105

Karagiannis, G. and A. Sarris (2005) Measuring and Explaining Scale Efficiency with the Parametric Approach: The Case of Greek Tobacco Growers. *Agricultural Economics*, Vol. 33, pp. 441-451

Karanikolas, P. and N. Martinos (2007) The Modernization Process in Greek Agriculture: The Case of Investment Aid. *Agricultural Economics Review,* Vol. 8, No. 1, pp. 37-49

Kasimis, C. and A.G. Papadopoulos (2005) The Multifunctional Role of Migrants in the Greek Countryside: Implications for the Rural Economy and Society. *Journal of Ethnic and Migration Studies*, Vol. 31, No.1, pp. 99-127

Kasimis, C., A.G. Papadopoulos and E. Zacopoulou (2003) Migrants in Rural Greece. *SociologiaRuralis,* Vol. 43, No. 2, pp. 167-184

Kazakopoulos, L. and I. Gidarakou (2003) Young Women Farm Heads in Greek Agriculture: Entering Farming through Policy Incentives. *Journal of Rural Studies,* Vol. 19, pp. 397-410

KEPE (2009) 'Kozani prefecture'.http://www.kepekozani.gr/ (Accessed 29/10/2009)

King, R. (2000) Southern Europe in the Changing Global Map of Migration. In: King, R., Lazaridis, G. and Tsardanidis, C. (eds.), *Eldorado or Fortress? Migration in Southern Europe*, London: Macmillan, pp. 3–26

Kopp, R.J. and W.E. Diewert (1982) The Decomposition of Frontier Cost Functions Deviations into Measures of Technical and Allocative Efficiency. *Journal of Econometrics*, Vol. 19, Nos. 2-3, pp. 319-331

Kumbhakar, S.C., S. Ghosh and J.T. McGuckin (1991) A Generalized Production Frontier Approach for Estimating Determinants of Inefficiency in U.S. Dairy Farms. *Journal of Business & Economic Statistics*, Vol. 9, No. 3, pp. 279-286

Labrianidis, L., A. Lyberaki, P. Tinios and P. Hatziprokopiou (2004) Inflow of Migrants and Outflow of Investment: Aspects of Interdependence between Greece and the Balkans. *Journal of Ethnic and Migration Studies,* Vol. 30, No. 6, pp. 1183-1208

Lawrence, C. (2005) Re-Bordering the Nation: Neoliberalism and Racism in Rural Greece. *Dialectical Anthropology,* Vol. 29, No. 3-4, pp. 315-334

Löfgren, H. and S. Robinson (1999) Nonseparable Farm Household Decisions in a Computable General Equilibrium Model. *American Journal of Agricultural Economics*, Vol. 81, No. 3, pp. 663-670

Lopez, R.E. (1984) Estimating Labor Supply and Production Decisions of Self-employed Farm Producers.*European Economic Review,* Vol. 24, pp. 61-82

Lucas, R.E.B., and O. Stark (1985) Motivations to Remit: Evidence from Botswana. *Journal of Political Economy*, Vol. 93, No. 5, pp. 901-918

Massey, D.S., J. Arango, G. Hugo, A. Kouaouci, A. Pellegrino and J.E. Taylor (1993) Theories of International Migration: A Review and Appraisal. *Population and Development Review*, Vol. 19, No. 3, pp. 431-466

Mc Govern, P. (2007) Immigration, Labour Markets and Employment Relations: Problems and Prospects. *British Journal of Industrial Relations*, Vol. 45, No. 2, pp. 217-235

Meeusen, W. and J. van den Broeck (1977) Efficiency Estimation from Cobb-Douglas Production Function with Composed Error. *International Economic Review*, Vol. 18, No. 2, pp. 435-444

Ogundari, K. (2008) Resource-productivity, Allocative Efficiency and Determinants of Technical Efficiency of Rain-fed Rice Farmers: A Guide for Food Security Policy in Nigeria. *AGRIC. ECON. – CZECH*, Vol. 54, No. 5, pp. 224-233

Pindyck, R.S. and D.L. Rubinfeld (2000) *Econometric Models and Economic Forecasts* (Fourth edition). McGraw-Hill Higher Education, 2000

Powers, M.G., W. Seltzer and J. Shi (1998) Gender Differences in the Occupational Status of Undocumented Immigrants in the United States: Experience Before and After Legalization. *International Migration Review*, Vol. 32, No. 4, pp. 1015-1046

Powers, M.G., and W. Seltzer (1998) Occupational Status and Mobility among Undocumented Immigrants by Gender. *International Migration Review*, Vol. 32, No. 1, pp. 21-55

Price, S.W. (2001) The Employment Adjustment of Male Immigrants in England. *Journal of Population Economics*. Vol. 14, pp. 193-220

Rezitis, A., K. Tsiboukas and S. Tsoukalas (2002) Measuring Technical Efficiency in the Greek Agricultural Sector.*Applied Economics,* Vol. 34, No.11, pp. 1345-1357

Segura, D.A. (1989) Chicana and Mexican Immigrant Women at Work: The Impact of Class, Race and Gender on Occupational Mobility. *Gender and Society*, Vol. 3, No. 1, pp. 37-52

Skoufias, E. (1993) Seasonal Labor Utilization in Agriculture: Theory and Evidence from Agrarian Households in India. *American Journal of Agricultural Economics*, Vol. 75, No. 1, pp. 20-32

Stark, O. and D.E. Bloom (1985) The New Economics of Labor Migration. *The American Economic Review*, Vol. 75, No. 2, pp. 173-178

Tegegne, F., S.P. Singh, E. Ekanem and S. Muhammad (2001) Labor Use by Small-Scale Conventional and Sustainable Farmers in Tennessee. *Southern Rural Sociology*, Vol. 17, pp. 66-80

Treiman, D.J., M. McKeever and E. Fodor (1996) Racial Differences in Occupational Status and Income in South Africa, 1980 and 1991. *Demography*, Vol. 33, No. 1, pp. 111-132

Wallace, T.D. and D.M. Hoover (1966) Income Effects of Innovation: The Case of Labor in Agriculture. *Journal of Farm Economics*. Vol. 48, No. 2, pp. 325-336

World Bank (2006) Migration and Remittances: Causes and Linkages. *World Bank Policy Research Working Paper*, No.4087, World Bank, Washington, DC.

Yang, D.T. (2004) Education and Allocative Efficiency: Household Income Growth during Rural Reforms in China. *Journal of Development Economics*, Vol. 74, No. 1, pp. 137-162

Appendices

Appendix 1:Abbreviations

Abbreviations	
AWU	Annual Work Unit
CAP	Common Agricultural Policy
C-D	Cobb-Douglas
DRT	Decreasing Returns to Scale
EEC	European Economic Community
EFTA	European Free Trade Association
EU	European Union
GDP	Gross Domestic Product
GNP	Gross National Product
Ha	Hectares
ML	Maximum likelihood
OECD	Organization for Economic Co-operation and Development
RTS	Returns to Scale
TE	Technical efficiency
US	United States
VIF	Variance Inflation factor

Appendix 2:Eurostat definitions

Agricultural labor input statistics were established in response to the specific needs of the European Union. The first and principal objective of calculating agricultural labor input statistics is to express trends in and levels of agricultural income (one of the basic objectives underlying the Economic Accounts for Agriculture) in relation to the trends in agricultural labor input. A second objective is general macroeconomic productivity analyses.
A system of harmonized agricultural labor input statistics within the European Union should provide an overview of the volume of labor in the agricultural industry that is systematic, comparable and as complete as possible, to serve as a basis for analyses, forecasts and political measures.

Agricultural employment covers all persons, both employees and self-employed, providing salaried and non-salaried labor input to the resident units performing characteristic activities (agricultural and inseparable non-agricultural secondary activities) of the agricultural industry of the Economic Accounts for Agriculture (EAA).
All persons of retiring age who continue to work on the holding are included in agricultural employment.
Persons having not reached school-leaving age are not included.

Total hours worked represent the aggregate number of hours actually worked as an employee or self-employed for resident agricultural units, during the accounting period.
A description of what 'total hours worked' include and exclude can be found in "European System of Accounts" (ESA) 95 (see 11.27 and 11.28) – available on this website in RAMON, Eurostat's classification server.
Total hours worked do not cover work for the private household of the holder or manager.
Annual work units (AWUs) are defined as full-time equivalent employment (corresponding to the number of full-time equivalent jobs), i.e. as total hours worked divided by the average annual number of hours worked in full-time jobs within the economic territory. One person cannot represent more than one AWU. This constraint holds even if someone is working in the agricultural industry for more than the number of hours defining full time.

Appendix 3: Greek legislation and the role of state

As it was mentioned before, the Greek state was unprepared to deal with the first mass entrance of immigrants (about half of them were coming from Albania and the rest from over hundred countries) in the beginning of 1990s because of weak legislation framework for non EU-immigrants. Ten years after, Greece had hosted about 600,000 of foreigners but only 78,000 of them had

official residence permits (Fakiolas, 1999:212). The immense number of undocumented immigrants can be attributed to the sluggish transformation process of the existed Immigration Law and to the possible reluctance of Greek government to diminish the informal economy radically. This might be correlated with the fact that most of the issued work permits were short-term (Hajdinjak, 2005:4).
According to Baldwin-Edwards (2004, also reported on Hatziprokopiou, 2004:324) Greek immigration policy since 1991 resulted from the interaction of three distinct factors. First, the traditional-bureaucratic institutional environment structured on exclusionary principles and xenophobic mentality; second, a factor of external relations in the arena of EU-Balkan politics; third, modernizing and technocratic market powers.

There are three major initiatives in the Greek immigration policy. The Immigration Law of 1991 (L. 1975/1991) under the title '*entrance-exit, sojourn, employment, expulsion of aliens, determination of refugee status and other provisions*'[14], the 1998 legislation procedures and the Law 2910/2001 under the title '*Entry and residence of aliens on Greek territory. Acquisition of Greek citizenship by naturalization and other provisions*'.

The Immigration Law of 1991 set police-oriented rules as one of the main goals of the concurrent Greek government and EU-migration policies was the strict control of immigrant flows via natural borders. Apparently this law was inadequate to promote any integration policies or practices for the immigrants which would facilitate their incorporation to the economic, social and cultural life in Greece. Despite its restrictive philosophy the Law 1975/1991 did not attain to encumber the irregular entry of immigrants to the country. At the end of 1990s, around 600,000 irregular immigrants were residing in Greece with most of them recorded as '*irregular'* because of expired documents.
In 1997, the Greek government launched a regularization programme based on two Presidential Decrees (358/1997 and 359/1997) in order to reduce the number of undocumented immigrants. This programme gave the opportunity to unregistered immigrants who had lived at least one year in Greece to obtain the *White Card* of temporary residence and the one-year (occasionally two years) duration *Green Card* of work permit. At the end of the procedure, there were 371,641 applicants for the *White Card* and 201,882 for the *Green Card* (Kasimis and Papadopoulos, 2005:104; Baldwin-Edwards, 2004:57). Evidently, the first regularization programme had limited success because of excessive required documentation, administrative deficiency and the distrust among immigrants towards Greek authorities (Hajdinjak, 2005:3).
In 2001, the Aliens Law 2910/2001 replaced the Immigration Law of 1991. The goal of the new law was to legalize as many unregistered immigrants as possible and reinforce state controls for irregular immigrant flows. According to this law, local government bodies were also authorized to grant one-year

[14] Until 1991, the legislation status of immigrants was defined by the Law 4310/1929 on 'settlement and movement of foreigners in Greece, police passport control and expulsion'.

work and residence permits with the extra prerequisite of submitting the official contract by the employer which ensures the employment and the social insurance of the migrant employee for a specific period of time. The comparison between the regularization methods of the new law and the 1997 legislation programme indicates that the two methods somewhat differ[15]but still the same plethora of documents had to be submitted by the applicant in order to gain the residence and work permit. Once again state rigidities and bureaucracy generated delays in the processing of applications which lasted for over two years. The one third of the immigrant population did not participate in the new regularization process and about 350,000 migrant submitted all the documents (Hajdinjak, 2005:3).

[15] A period of six months was given to the immigrants in order to submit the necessary documents for work and residence permit.