Cyprus Economic Policy Review, Vol. 3, No. 1, pp. 51-84 (2009) 1450-4561

The Impact of Immigration on Unemployment, Labour Force Participation and Part-time Employment in Cyprus†

Louis N. Christofides[a], Sofronis Clerides[a], Costas Hadjiyiannis[a], Michael S. Michael[a]* and Marios Stephanides[b]

[a] *Department of Economics, University of Cyprus and* [b] *Ministry of Finance, Cyprus*

Abstract

The number of foreign workers in Cyprus has been increasing sharply in the last 15 years. This paper investigates the impact of foreign workers on unemployment, labour force participation and part-time employment in Cyprus, using data from the EU Labour Force Surveys for the period 1999-2005. This is examined overall, and by age group, or education, level. The study finds that the presence of foreign workers has not affected total unemployment or total labour force participation in Cyprus. Part-time employment seems to be marginally affected overall. On the other hand, the presence of foreign workers affects the probability of unemployment, labour force participation and part-time employment of some age and education groups.

Keywords: unemployment, labour force participation, part-time employment, immigration, foreign workers.

1. Introduction

The number of legal foreign workers in Cyprus was 80.000 in 2007 as opposed to 15.000 in 1995 and 8.000 in 1991. It is estimated that another 20-30.000 are working in Cyprus illegally. The percentage of legal foreign workers in Cyprus has reached 21,6% of the gainfully employed population. In the last eleven years (1997-2007) the average annual growth rate of legal foreign workers was 15,4%. Today, it is estimated that legal and illegal foreign workers account for more than 25% of the working population.

The increasing number of foreign workers in Cyprus lowers labour costs for enterprises. However, it is often claimed that it increases

† The opinions presented in the paper are those of the authors.

* Corresponding author. Address: Department of Economics University of Cyprus P.O Box 20537, 1678 Nicosia, Cyprus. E-mail: M.S.Michael@ucy.ac.cy

unemployment for domestic workers, especially those with similar skills to the immigrants. On the other hand, the use of low-cost labour might increase employment for high skilled workers, or promote domestic workers to higher positions (e.g. from simple worker to supervisor).

The main purpose of this project is to examine whether the increase of foreign workers in Cyprus has affected unemployment, labour force participation and part-time employment of Cypriots. This is examined, both overall, and by age, or education, level.

The current paper is organized as follows. Section 2 presents the theoretical background regarding the impact of foreign workers on domestic factors of production under various alternatives, as well as the empirical findings resulting from similar studies in other countries. Section 3 provides descriptive statistics related to the labour market in Cyprus and the number of foreign workers over time. It also summarizes the structural problems of the Cypriot labour market related to the presence of foreign workers, while some of the characteristics of foreign-worker employment are mentioned as well. Finally, the section presents recent developments in the Cypriot labour market such as the gradual re-integration of Turkish-Cypriots into the labour market since April 2003 and the new standards set by the accession of Cyprus in the European Union, on May 1st 2004. In Section 4, the econometric analysis is presented. The various estimation models aim at evaluating the impact of foreign workers on unemployment, labour force participation and part-time employment by age group and education level. Section 5 summarizes the main findings of the study.

2. The economic impact of immigration on domestic factors of production

2.1. Theoretical predictions

According to economic theory, any change in wages caused by the presence of immigrants in the labour market will lead to changes in domestic employment, or hours worked. For instance, when the immigrants are mainly low-skilled and we have a closed economy, the resulting increase in the total number of low-skilled workers in the domestic market will lead to lower wages for the low skilled and therefore some of the domestic low-skilled workers will exit the labour force or reduce their hours worked. This might reduce the employment rate (or the labour force participation rate) of the domestic workers. On the other hand, domestic workers, who are considered as complements to the immigrants in the production process, might get higher wages as a result

of the participation of immigrants in the labour market. As a consequence, the employment rate might increase. In a recent theoretical paper, Kemnitz (2003) concludes that low-skilled immigrants lead to increased total unemployment for the country, harm domestic low-skilled workers and make domestic high-skilled workers better off.

In general, theoretical models examining the impact of immigration on domestic wages, do not predict a direct unemployment increase in the receiving country, but they expect a substitution effect among factors of production across the various sectors of the economy. Consequently, since capital and labour movements across sectors cannot happen immediately, the introduction of immigrant workers in the market may lead to frictional unemployment. However, the problem of finding a job will possibly be more difficult for immigrants.

In a closed economy model, which predicts wage adjustment under any new conditions in the labour market, the unemployment caused is considered to be a result of wage stickiness, for example due to collective bargaining agreements. In this case, since wages cannot be reduced so that the market returns to equilibrium, adjustment in the labour market occurs through an increase in unemployment instead of a reduction in wages.

Finally, the "efficient wages model" by Shapiro and Stiglitz (1984) is also among the models that allow the existence of unemployment in equilibrium. According to this model, an increase in immigration increases the size of the labour force, and as a result firms can reduce wages and increase employment. At the same time unemployment will rise because wages are not reduced enough. If employment levels were maintained through a sufficient lowering of wages, workers would be less productive than before through the "shirking" effect (workers will not exert enough effort). As a consequence, wages do not fall enough, because firms want to avoid excessive shirking by their workers. In equilibrium, wages are negatively correlated with unemployment. The share of this unemployment increase borne by domestic workers can be determined through empirical studies.

2.2. Empirical Studies

In general, it is difficult to estimate the size and the nature of the immigration impact on domestic employment. Except for differences in skills and the education level of the immigrants, the resulting impact depends on other factors, such as the total number of immigrants in the country, differences in immigration waves, and some other personal

immigrant characteristics like gender, age, country of origin, and whether they are legally in the country or not.

Furthermore, the results might vary over time, since immigrants develop new skills and gain experience in the domestic labour market. As well, as relative wages change, human capital investments by domestic workers are affected. Existing empirical studies in the US do not provide evidence for a negative impact of immigration on total employment [Simon (1989), Borjas (1990, 1993), Friedberg and Hunt (1995)]. Card (2001) found that immigration resulted in increases in unemployment for unskilled workers in Miami and Los Angeles.

In Europe, some empirical studies find that there are some small negative effects of immigration on employment (Winkelman and Zimmerman (1993)). Dustmann, Fabbri and Preston (2003), used data from the UK Labour Force Survey and, according to their estimates, there is a small negative effect of immigration on domestic employment which is statistically significant. Venturini and Villosio (2002) used the Italian Labour Force Survey, for the period 1994-97, and found that the employment of foreign workers in the country had a negative impact on the employment of youth domestic workers in 1993 and on employment in the manufacturing sector in 1996. For the remaining categories the effects are very small and sometimes positive.

Other empirical studies analyse the separate impacts, in the short run and in the long run. They conclude that, while unemployment might initially increase, in the long run the overall unemployment rate will be lower (Gross, 1999). Jean and Jimenez (2007) used data for 17 OECD (Organisation for Economic Cooperation and Development) countries and found that immigration increases unemployment in the short run, but in the long run unemployment is unaffected. Pope and Withers (1993) also examined the long-run relationship between immigration and unemployment for the Australian economy. They tried to answer the following: (i) whether immigrants take away jobs from domestic workers, and (ii) whether the unemployment rate of the country, would have been lower than the current rate without the presence of immigrants. According to the main findings of the study, the increasing unemployment in Australia, historically, prevented the migration of more people to the country. Moreover, immigration led to an increase in unemployment for domestic workers during the period 1861-1981.

Chang (2003) used data for Australia, as well, and through a structural dynamic model showed that skilled foreign workers, in contrast with the unskilled, do not displace domestic workers. In Australia, immigrants did not displace the domestic workers due to the fact that, during 1990-2002,

the number of skilled foreign workers in Australia was much higher than the unskilled. In addition, the policy followed by the Australian government, which aimed at promoting the migration of skilled workers to the country, led to economic growth.

Finally, from the Cypriot literature, Pashardes, Christofides and Nearchou (2001) estimated the impact of foreign workers (and other factors) on the probability of employment in each sector of the Cypriot economy (including non employment). According to their estimates, an increase in the number of foreign workers increases the probability of employment in the Services sector, while it reduces the probability of employment in other sectors, especially the secondary sector (manufacturing and construction). Moreover, the impact of foreign workers on the probability of someone being unemployed is estimated to be null. Based on the above, the authors concluded that the presence of immigrant workers in Cyprus had no effect on the employment level, but on the structure of employment instead (the distribution of workers across sectors).

To sum up, empirical studies agree that immigration does not increase total unemployment and, in cases where there is an increase, this is small. However, immigration may increase unemployment for some labour force groups, such as unskilled workers.

3. The Cypriot labour market

3.1. Labour force statistics

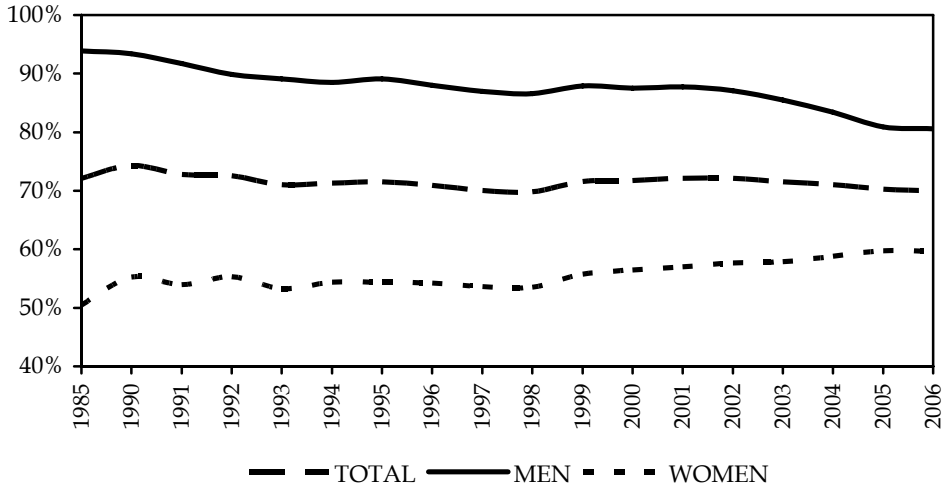
In 2006, total working age population (15 to 64 years old) was 543.400, which was around 69,8% of total population in Cyprus. The working age population in Cyprus increased by 197.900 during the period 1985-2006, while the total population increased by 234.100.

Data on labour force participation rates by gender is provided in Figure 1 following, for the period 1985-2006.[1] As shown in Figure 1, total labour force participation for this period remained constant on average, at around 70-75%. The male labour force participation rate was reduced from 93,9% in 1985, to 80,6% in 2006. In contrast, the female labour force participation increased from 50,5% in 1985, to 59,6% in 2006.

[1] The labour force participation rate is defined as the labour force divided by the working age population.

FIGURE 1

Labour force participation rate by gender (1985-2006)



Source: Labour Statistics 1999, 2001-2006, Statistical Service of the Republic of Cyprus.

3.2. Employment

In Table 1 below, we present statistics for gainful employment (in thousands) by sector of economic activity, for the years 1975, 1980, 1985 and the period 1990-2006. In 1975, employment for domestic workers in Cyprus was 135.000, while in 2006 employment for both domestic and foreign workers reached 358.900.

From the data, we observe a change in the structure of employment over time. Total employment in the primary sector falls over time, whereas employment in the tertiary sector rises. Moreover, secondary sector employment increased for the years after the Turkish invasion because of government support for the sector, and started falling during the more recent years. It should be noted that, after 2000, there is an increase in employment in the construction sector, because of the sudden growth in the sector during that period (mainly due to increasing exogenous demand).

The main conclusion derived from the observed data on employment, is that changes in employment structure over the last years reflect the turn of the Cypriot economy, at first from the primary sector towards the secondary and tertiary sectors, and afterwards (after 1990) from the primary and secondary sectors towards the tertiary sector. The important increase in total employment, over the period 1995-2006, was mainly due

to an increase in employment of foreign workers (Table 1 last column) which grew faster than domestic employment.

TABLE 1

Employment by sector of economic activity, in thousands (1975, 1980, 1985, 1990-2006)

Year	Primary Sector	Secondary Sector		Tertiary (Service) Sector				
		Manufacturing and Electricity	Construction	Hotels, Restaurants and Trade	Transport and communication	Other Services	Total	Total Domestic Workers
1975	37,1	25,7	8,9	22,3	7,4	33,6	135,0	-
1980	38,6	41,4	22,0	33,7	9,5	42,8	188,0	-
1985	37,3	46,3	21,4	47,3	12,6	52,9	217,8	-
1990	35,5	49,8	23,2	61,1	15,3	68,5	253,4	-
1991	32,8	49,4	24,5	61,0	15,4	71,1	254,2	-
1992	33,0	49,5	25,5	66,6	16,2	74,8	265,6	-
1993	32,2	46,3	25,0	67,4	16,8	77,6	265,3	-
1994	30,8	45,9	24,8	70,8	17,8	82,7	272,8	-
1995	32,7	45,4	27,7	79,6	17,9	83,3	286,6	271,6
1996	31,9	43,6	27,3	79,8	18,4	87,1	288,1	271,4
1997	31,5	42,2	26,9	80,6	19,1	90,6	290,9	271,6
1998	32,5	41,1	26,1	82,6	19,7	93,9	295,9	275,2
1999	33,6	39,5	26,2	84,6	20,4	98,4	302,7	278,6
2000	33,1	38,5	26,2	87,2	21,4	102,9	309,3	282,9
2001	32,5	37,2	27,5	90,7	22,2	108,0	318,1	287,9
2002	32,0	36,7	29,0	91,4	22,5	112,2	323,8	288,7
2003	32,9	36,9	31,0	92,2	22,5	116,0	331,5	290,8
2004	32,8	37,5	32,6	95,1	23,3	120,8	342,1	294,8
2005	30,9	37,4	34,0	97,5	24,0	125,7	349,5	293,7
2006	30,4	37,7	35,5	100,5	24,3	130,5	358,9	298,0

Note: Total employment values include foreign workers from Europe and other countries.
Source: Labour Statistics 1999, 2002-2006, Statistical Service of the Republic of Cyprus.

3.3. Unemployment

Table 2 shows unemployment rates by gender, for the years 1975, 1980, 1985 and the period 1990-2006. The unemployment rate in Cyprus is relatively low for all years, except for the period right after the Turkish invasion, when the registered unemployment rate reached extremely high levels.

More specifically, during the first semester of 1974, the unemployment rate in Cyprus was on average 1,5%, whereas in the second semester, it increased to 29,6%. In 1975 this rate was reduced to 16,9%. The high

growth rate of the Cypriot economy that followed, in combination with migration or temporary employment of Cypriots abroad (mainly in Arabic countries), led to a reduction in the unemployment rate, which was only 3,1% in 1977 and even lower by 1980; around 2%.

TABLE 2

Unemployment rate by gender (1975, 1980, 1985, 1990 -2006)

Year	Total	Men	Women
1975	16,9	-	-
1980	2,0	1,6	2,6
1985	3,3	2,9	4,2
1990	1,8	1,4	2,5
1991	3,0	2,2	4,4
1992	1,8	1,3	2,6
1993	2,7	1,8	4,1
1994	2,7	2,0	3,8
1995	2,6	1,9	3,7
1996	3,1	2,3	4,3
1997	3,3	2,6	4,6
1998	3,3	2,8	4,0
1999	3,5	2,7	4,5
2000	5,0	3,2	7,3
2001	4,0	2,6	5,7
2002	3,3	2,6	4,2
2003	4,1	3,8	4,6
2004	4,7	3,5	6,2
2005	5,3	4,4	6,5
2006	4,5	3,9	5,4

Note: Until 1999 the number of unemployed is mentioned as "registered unemployed", while these numbers after 2000 come from the Labour Force Survey.
Source: Labour Statistics 2006, Statistical Service of the Republic of Cyprus.

From 1980 to 1999, registered unemployment in Cyprus fluctuates around 3,0%. For the years 2000–2006 data comes from the Labour Force Survey (LFS), and total unemployment is on average 4,5%, except for 2002 (3,3%) and 2005 (5,3%).[2] The unemployment rate in Cyprus compares favorably to most European Union countries. This can be attributed to the high growth rate achieved by the Cypriot economy, as well as the composition of the production process in the economy, which was based on labour-intensive

[2] The unemployment rate is usually higher according to LFS data. This is possibly due to the fact that a lot of young people choose not to register as unemployed.

economic activities. It is worth noting that the unemployment rate is usually higher for women. In 2000 the unemployment rate for women reached 7,3%.

TABLE 3

Percentage of registered unemployed, by economic activity (1991-2006)

	91	92	93	95	96	97	99	00	01	02	04	05	06
Newcomers	11,0	13,4	9,9	8,3	8,0	7,5	5,1	6,5	8,4	7,3	7,3	7,2	7,7
Agriculture, Hunting, Forestry and Fishing	1,8	2,3	2,0	1,3	1,2	1,2	1,4	1,4	0,8	0,7	0,6	0,6	0,7
Mining and Quarrying	0,4	0,3	0,2	0,2	0,2	0,2	0,1	0,1	0,3	0,3	0,3	0,4	0,2
Manufacturing	15,5	14,1	26,4	22,9	23,0	22,9	23,4	20,5	16,1	15,7	12,5	12,2	13,2
Electricity, Gas and Water Supply	0,5	0,8	0,7	0,5	0,6	0,6	0,4	0,3	0,1	0,1	0,1	0,4	0,5
Construction	6,9	6,6	6,8	8,2	8,5	11,9	15,0	12,1	7,9	6,2	6,2	8,1	8,7
Wholesale and Retail Trade, Hotels and Restaurants	39,2	26,4	26,3	28,6	28,7	27,7	27,1	29,0	31,6	34,6	38,7	35,9	33,0
Transport, Storage and Communication	5,5	6,2	4,8	6,2	5,4	5,2	4,2	4,9	5,8	5,4	5,1	5,0	5,6
Financial Intermediation, Insurance, Real Estate, Renting and Business Activities	3,9	5,1	4,6	4,4	4,5	5,1	4,7	4,1	5,1	6,5	5,5	5,8	6,8
Other Community, Social and Personal Service Activities	15,4	24,9	18,3	19,5	20,0	17,7	18,5	21,0	23,8	23,2	23,7	24,3	23,7
Total	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Labour Statistics 2002-2006, Statistical Service of the Republic of Cyprus.

Table 3 presents the registered unemployed persons in the broader sectors of the economy, as a percentage of total unemployment, as well as the percentage of newcomers for the period 1991-2006. "Agriculture, forestry and fishing" has relatively low unemployment for the period 1991-2006. In contrast, "Hotels and Restaurants" seems to have the highest contribution to total unemployment for the period under consideration. The largest percentage, 39,2%, was noted in 1991 and it was a result of the negative impact of the Gulf war on tourism in Cyprus.

The share of unemployed in the manufacturing sector increased sharply after 1992, and remained relatively high until 1999. This is related to the gradual elimination of tariffs during 1988-1997 with the implementation of the Customs Union Agreement of Cyprus with the EU which led to the demise of the sector thereafter.

The share of newcomers in unemployment was relatively low and gradually decreasing in the period under review, except for the years 1992, 2000 and 2001, when it slightly increased. After 2001, the newcomers' share is relatively constant and on average around 7,5%.

To get a better picture for unemployment in Cyprus, we calculate the share of unemployed in each sector of the economy, as a percentage of total employment in the corresponding sector, shown in Table 4.

Unemployment as a percentage of gainful employment seems to be increasing, over the period 1991-2006, in sectors related to the provision of services (see e.g. Wholesale and Retail Trade, Hotels and Restaurants and Other Community, Social and Personal Service activities). This possibly reflects seasonal effects for some professions in these sectors. Manufacturing also seems to have rising unemployment as a percentage of employment after 1992, reflecting the serious problems faced by the industry after the implementation of the customs union agreement in 1988, which resulted in the shrinking of the industry at the end. Regarding the primary sector, unemployment in "Agriculture, Forestry and Fisheries" was quite low over the period under consideration, while higher levels of unemployment were observed in the "Mining and Quarrying" sector.

TABLE 4

Percentage of registered unemployed over gainful employment by economic activity for the period 1991-2006

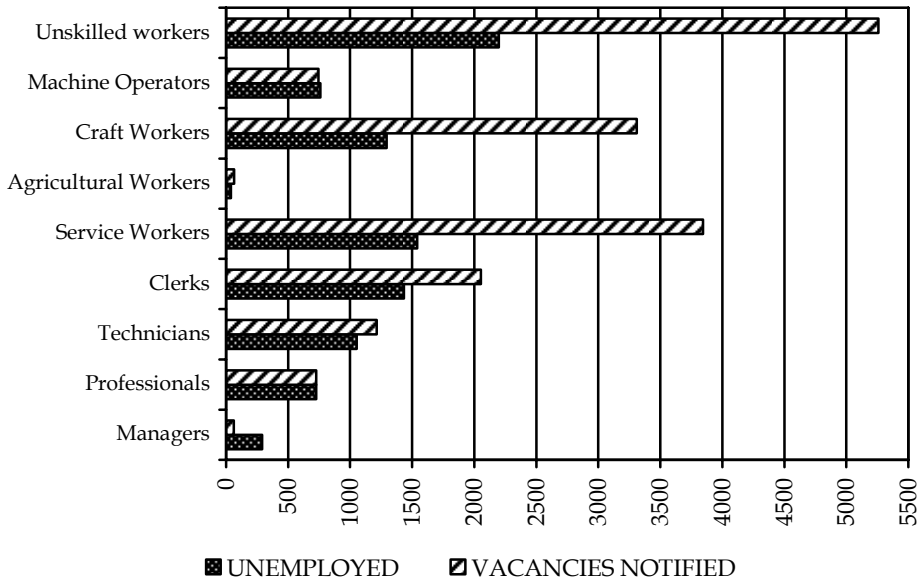
	91	92	93	95	96	97	99	00	01	02	04	05	06
Agriculture, Hunting, Forestry and Fishing	0,5	0,4	0,5	0,3	0,4	0,4	0,5	0,5	0,3	0,2	0,2	0,3	0,3
Mining and Quarrying	4,6	2,0	2,0	1,7	2,3	3,2	2,2	2,7	4,5	5,3	6,2	9,6	5,6
Manufacturing	2,7	1,5	4,5	4,1	5,1	5,9	7,0	6,1	4,3	4,7	4,4	4,5	4,7
Electricity, Gas and Water Supply	3,1	3,1	3,8	2,8	3,7	4,3	3,2	2,5	0,4	0,5	0,8	3,5	3,9
Construction	2,4	1,3	2,1	2,3	2,9	4,6	6,5	5,1	2,8	2,3	2,4	3,1	3,1
Wholesale and Retail Trade, Hotels and Restaurants	5,3	2,1	3,0	2,8	3,4	3,6	3,6	3,6	3,3	4,0	5,1	4,8	4,2
Transport, Storage and Communication	3,0	2,0	2,2	2,7	2,8	2,8	2,4	2,5	2,5	2,5	2,8	2,8	2,9
Financial Intermediation, Insurance, Real Estate, Renting and Business Activities	1,9	1,4	1,8	1,4	1,6	2,0	1,8	1,4	1,5	2,1	2,0	2,1	2,3
Other Community, Social and Personal Service Activities	2,4	2,3	2,4	2,6	3,1	2,9	3,1	3,2	3,0	3,1	3,5	3,6	3,3

Source: Labour Statistics 1999, 2002-2006, Statistical Service of the Republic of Cyprus.

In the Construction industry, the unemployment rate increased during the period 1996-2000, whereas during 2001-2006 it declined significantly. This was possibly a result of the transferring of funds into the stock market that took place up until 1999. After the crash of 2000, the funds were transferred back to the construction industry, which experienced an enormous growth during the more recent years.

FIGURE 2

Average number of persons unemployed and average number of vacancies per occupational category (1992-2006)



Note: The numbers indicate period averages (for the period 1992-2006). The number of vacancies and persons referred to annual averages.
Source: Labour Statistics, 2002-2006, Statistical Service of the Republic of Cyprus.

All in all, given that unemployment rates in Cyprus have not changed significantly during the period 1991-2006, the observed structural changes reflect the increasing dominance of services in the economy. However, we observe higher frictional unemployment in this sector, especially in "Hotels and Restaurants".

Moreover, occupational categories such as unskilled workers and service and shop sales workers have the highest difference between number of vacancies and unemployed persons, as shown in Figure 2, which implies excess supply of job openings, compared to the number of people demanding work in these professions.

Labour supply for professionals and clerks seems to satisfy demand to a large extent, taking into account the fact that unemployment among these occupations declined gradually in recent years. This is expected, since these professions belong to the tertiary sector, which grew significantly over the period after 1990.

3.4. Foreign workers

The share of foreign workers over total employment in Cyprus, for the period 1991-2006, has an increasing trend in all sectors of the economy. The increase is especially high for sectors that do not require high skills such as employment in private households (domestic housemaids) and tourist services.

The improvement in the standard of living of Cypriots, accompanied by a change in their preferences towards more leisure, led to increased demand for domestic housemaids. Moreover, because of an increase in the number of women who continue their studies in higher education, wages received by women are higher, which makes them able to afford the cost of hiring a domestic housemaid. In Table 5, we observe that the need for domestic housemaids was mainly satisfied by foreign women workers, since that could not be satisfied by Cypriots. The percentage of foreign domestic housemaids over the total number of domestic housemaids employed in Cyprus, increased sharply over the last decade reaching 100% in 2000, compared to 60,1% in 1991.

TABLE 5

Number and percentage of legal foreign workers (EU and other) by sector

Sector	1991		1996		2000		2005		2006	
		%		%		%		%		%
Primary Sector	720	2,2	1508	4,7	2130	6,4	4082	13,2	3800	12,5
Manufacturing	1181	2,5	2084	4,9	2220	6,0	4696	13,2	5065	14,1
Construction	579	2,4	1334	4,9	1516	5,8	5613	16,5	5974	16,8
Trade	925	2,5	1827	3,6	3735	6,9	6071	9,7	6555	10,2
Hotels and Restaurants	1652	7,0	2799	9,5	4395	13,3	11502	32,9	12870	35,8
Transport-Communication	317	2,2	503	2,7	1204	5,6	1631	6,8	1860	7,7
Financial Sectors	483	2,8	801	3,1	1688	5,4	3078	8,5	3948	10,4
Public Administration	8	0,0	27	0,1	55	0,2	93	0,3	967	3,4
Education- Health	542	1,6	1190	3,2	1718	4,1	3314	6,9	3863	7,8
Households	1490	60,1	4648	93,0	7737	100	15749	99,7	15952	95,5
Total	7897	3,1	16721	5,8	26398	8,5	55829	16,0	60854	17,0

Note: Data for 1991 is based on estimations of Pashardes et al. (2001).
Source: Labour Statistics, 2002-2006, Statistical Service of the Republic of Cyprus.

The increase in the number of Cypriots who continue their studies in higher education, resulted in shortages for unskilled workers, which was

satisfied by the introduction of foreign workers into the market. The Hotels and Restaurants sector has the second highest share of foreign workers in total employment; reaching 35,8% in 2006. Construction follows, for the period 2003–2006, with the third highest share (16,8% in 2006). These developments can also be attributed to the accession of Cyprus into the European Union, which resulted in a rapid increase in the number of EU immigrant workers in Cyprus.

The lowest share of foreigners in total employment, for the whole period 1991-2006, is observed in the sectors of Public Administration and Electricity and Water Supply.

3.5. Recent developments in the Cypriot labour market

The accession of Cyprus to the European Union on May 1st 2004 and the gradual re-integration of Turkish-Cypriots into the Cypriot labour market, since April 2003, have set new standards in the market.

3.5.1. Turkish-Cypriots

A large number of Turkish-Cypriots have been seeking work in the Cypriot economy since the abolishment of transportation restrictions across the "Green line" in April 2003.[3] According to data provided by the department of Social Insurance Services, before the abolition of the restrictions on free movement, only approximately 600 Turkish-Cypriots were employed in the free areas (mainly in the British Bases areas in Cyprus and in the construction sector). After 2003 the number of registered Turkish-Cypriot workers increased. In particular, in 2005, 3.772 were registered, while in 2006 this number decreased slightly to 3.470. Moreover, accounting for the fact that, there is a large number of Turkish-Cypriots who work in the free area without being registered in the Social Security Fund, the total number of Turkish-Cypriot workers must be around four to five thousands. It is worth noting that Turkish-Cypriot workers have all the rights related to social insurance and medical care, since they are considered Cypriot citizens.[4]

---

[3] The term "Cypriot economy" does not include the occupied part of Cyprus.

[4] According to the Department of Social Insurance Services of the Republic of Cyprus, over the period January 2003 to August 2004, 5,8 million Cypriot pounds were paid as pensions to 4.400 Turkish-Cypriots, from which 900 were external recipients (abroad). Moreover, in August 2004, 1.400 Turkish-Cypriots received medical care, compared to only 200 in April

According to data provided by the Social Insurance Services, Turkish-Cypriot workers are usually employed in sectors which do not require high skills, such as construction and manufacturing. Approximately 60% of the registered Turkish-Cypriot workers are employed in construction, 10% in manufacturing and a lower percentage, around 7%, in the trade sector. However, Turkish-Cypriots are substitutes for unskilled foreign workers, which results in reducing the needs of the Cypriot economy for importing workers from abroad.

Given the small number of Turkish-Cypriots employed, compared to the total number of foreign workers, the employment of Turkish-Cypriots is not expected to affect significantly the size of the labour market.

3.5.2. EU workers

The accession of Cyprus to the EU resulted in an increase in the number of workers coming from EU countries. Based on data provided by the Social Insurance Services, in 2006, EU workers were about 31% of the total number of foreign workers in Cyprus, while the remaining 69% were workers from other countries. EU workers numbered approximately 20.000 in 2006, while only 12.500 in 2005; an increase of 60%. Most of the EU workers originate from Greece, Poland, and the UK, and are mainly employed in the construction and tourism sectors. In 2006, EU workers constituted 5,2% of the Cypriot labour force, compared to 3,3% in 2005.

All things considered, the migration of EU workers to Cyprus covers part of the needs of the Cypriot economy for unskilled workers and substitutes workers from third countries. This trend is expected to continue in the rear future, as well. The number of EU immigrants in Cyprus is expected to decrease, after the gradual increase in living standards in Eastern Europe countries.

4. Econometric analysis and results

In the current section we present the econometric results in order to evaluate the effects of the presence of foreign workers in Cyprus, on unemployment, labour force participation and part-time employment.[5]

2003 ("Cyprus: Selected issues and Statistical Appendix", IMF, 2005). Of course the above rights were formed before 1974.

[5] The results are based on probit models.

The models include variables such as personal characteristics of the individual, as well as a variable describing the number of foreign workers in the employment sector of the individual. In the last 3 models, we include interaction terms, allowing for the impact of foreign workers to vary by age group and education level; all estimation results are presented in detail, in the Appendix.

For the estimation, we use data from the *EU Labour Force Survey (LFS)* and publications of the Statistical Service of the Republic of Cyprus such as the *Statistical Abstract* and *Labour Statistics*. Detailed information on the data is provided in the Appendix, as well.

4.1. The impact of foreign workers on total unemployment

Table 6 provides estimates for the determinants of the probability of unemployment in Cyprus (see also Table A1).[6] In this estimation, we assume that the probability of being unemployed depends on individual characteristics and the percentage of foreign workers in the employment sector of the individual.

We find that individual characteristics are important in determining the probability of being unemployed. On the other hand, the percentage of foreign workers in the relevant employment sector, is not statistically significant.[7] This implies that under this specification, total unemployment is not affected by the presence of foreign workers.

Younger groups seem to have a higher probability of being unemployed. In particular, being in the 20-24 age group increases the probability of being unemployed by 0,91% relative to the reference age group 40-49.[8] A person belonging to the 25-29 age group seems to have the highest probability of being unemployed among all age groups, that is 0,98% higher than the reference group. The probability of unemployment is 0,51% higher for the age group 30-39, while for people older than 50 years old, age does not have a statistically significant impact on unemployment.

---

[6] An unemployed person is defined as someone who wants to work (participates in the labour force) but is unable to find a job.

[7] For exposition purpose, we assume that the maximum accepted statistical significance level is at 10%.

[8] Since most variables are dummies, the interpretation of the estimated coefficients is done compared to a reference group, which here is a woman of age 40-49, with primary education, non-married and belonging to the financial sector.

TABLE 6

Impact of foreign workers and other factors on total unemployment

Variable	Model 1(a), Table A1 Appendix	
	Estimated impact[1]	p-value
Age 20-24	0,91	0,005
Age 25-29	0,98	0,001
Age 30-39	0,51	0,019
Age 50-59	0,27	0,244
Age 60-64	0,25	0,535
Secondary education	-1,21	0,000
Upper Secondary-non tertiary	-1,87	0,000
Tertiary education	-2,40	0,000
% Sector Growth	-0,11	0,001
Male	-2,20	0,000
Married	-2,10	0,000
% Foreign Workers	0,09	0,259
2000	-0,50	0,156
2001	-1,20	0,000
2002	-1,60	0,000
2003	-1,20	0,004
2004	-0,70	0,218
2005	-0,90	0,197
1º quarter	0,20	0,498
3º quarter	-0,30	0,212
4º quarter	-0,20	0,393
Primary Sector	-2,10	0,000
Manufacturing	1,60	0,010
Construction	1,80	0,035
Trade/Hotels/Restaurants	1,60	0,008
Services	-1,10	0,254
Pseudo-R squared	0,047	
Number of observations	50.596	

Note: [1] The estimated impact is expressed in percentage units. For all variables, this is the estimated coefficient multiplied by 100. For the variables "% Sector Growth" and "% foreign workers" we do not multiply the estimated coefficient by 100 since the variables are already pre-multiplied. For example, a 5% rate is measured as 5 instead of 0,05.

Source: Estimates based on EU LFS data for the period 1999-2005. More information on the estimation can be found in the Appendix.

We also find that the higher the education level, the lower the probability of being unemployed. More specifically, a tertiary-educated individual has 2,4% lower probability of being unemployed, compared to someone with primary education. The same holds for secondary-educated people with 1,21% lower probability of unemployment.

Moreover, men have a 2,2% lower probability of being unemployed. Married people also have a 2,1% lower probability of being unemployed.

The year dummies in the regression capture possible time effects. We find a negative trend between 1999 and 2003, while for 2004 and 2005 the probability of unemployment is not statistically different from 1999. Also, according to the estimates there are no seasonal effects, since quarters are not statistically significant.

Sectoral growth seems to have a very significant negative impact on the probability of unemployment. Specifically, if the growth in the sector increases by 1 percentage unit, then the probability of unemployment for the individual employed in that sector is reduced by 0,11%.

Finally, a person belonging to one of the sectors of manufacturing, construction, and trade/ hotels/restaurants, has a higher probability of being unemployed compared to someone in the financial sector. On the other hand, individuals in the primary sector (agriculture, forestry and fishing), have a lower probability of becoming unemployed, compared to the financial sector. The services sector (education, health, social services) does not seem to have a statistically significant difference from the financial sector.

4.2. The impact of foreign workers on labour force participation

To examine the determinants of labour force participation in Cyprus we include the share of foreign workers in the relevant employment sector for each individual (see Table A1).

According to the estimation results, an increase in the share of foreign workers does not affect the probability of labour force participation in Cyprus; that is, the presence of foreign workers does not affect the decision of Cypriots to remain inactive. This is because the effect of foreign workers, though positive, is not statistically significant. The estimated coefficients for the remaining parameters which refer to personal characteristics of the individual are not presented analytically here, since the variable of interest is the foreign workers variable.

4.3. The impact of foreign workers on part-time employment

The impact of the presence of foreign workers on part-time employment in Cyprus is also examined (Table A1). It is assumed that the probability that someone is employed part-time is determined by personal characteristics such as age, education, gender, marital status; the employment sector to

which the individual belongs, and the share of foreign workers employed in the relevant employment sector of each individual.

According to EU LFS data, the percentage of part-time employment in Cyprus was 8,5% in 2004, 8,9% in 2005 and 7,7% in 2006.

The estimation results indicate that if the percentage of foreign workers in the relevant sector increases by one percentage unit (e.g. from 5% to 6%) over the period 1999-2005, the probability of part-time employment for a Cypriot increases by 0,16% on average.[9]

4.4. The impact of foreign workers on unemployment by age and educational attainment

Since, according to our previous estimates, the presence of foreign workers has no significant impact on total unemployment, we now want to examine whether there is an impact on unemployment for specific labour force groups. For example, the presence of foreign workers might affect positively the young mother but negatively unskilled workers, which will result in a null overall impact.

As shown in Table 7 below (see also Table A2), an increase in the share of foreign workers affects differently each group. According to the estimated coefficients, if the individual is between 20 and 24 years old, then for any educational attainment he has, a one percentage unit increase in the share of foreign workers in the relevant employment sector increases the probability that the person is unemployed by 0,28%.[10]

Moreover, an increase in the share of foreign workers by one percentage unit increases the probability of unemployment for young people of age 25-29 years old by 0,35% if they have primary education, 0,26% if they have secondary education and 0,39% if they are tertiary education graduates. Young people of age 20-29 years old with upper secondary, non tertiary education are not influenced by the presence of foreign workers.

---

[9] This result, however, is marginally statistically significant.

[10] This result is not statistically significant for the upper secondary –non tertiary education group.

TABLE 7

Impact of foreign workers on unemployment by age and educational attainment

Variable	Model 1(b)	
	Estimated impact	p-value
% Foreign workers: Age 20-24		
Primary Education	0,28	0,004
Secondary Education	0,28	0,003
Tertiary Education	0,28	0,007
% Foreign workers: Age 25-29		
Primary Education	0,35	0,000
Secondary Education	0,26	0,005
Tertiary Education	0,39	0,000
% Foreign workers: Age 30-39		
Secondary Education	0,15	0,072
% Foreign workers: Age 60-64		
Tertiary Education	0,25	0,075
Pseudo-R squared	0,053	
Number of observations	50.596	

Note: This Table presents only statistically significant effects regarding the impact of foreign workers. The estimated impact corresponds to an increase in the share of foreign workers in the relevant employment sector by one percentage unit (e.g. from 5% to 6%).

Source: Estimates based on EU LFS data for the period 1999-2005. More information on the estimation can be found in the Appendix.

Regarding the rest of the labour force age groups (30-39, 40-49, 50-59, 60-64), the presence of foreign workers in Cyprus over the period 1999–2005 did not affect their probability of unemployment. The only exceptions are people aged from 30-39 years with secondary education attained, as well as tertiary-educated individuals 60-64 years of age. In particular, an increase in the share of foreign workers by one percentage unit increases the probability of unemployment by 0,15% for the first group and, 0,25% for the latter.

In brief, the presence of foreign workers seems to increase the probability of unemployment for younger individuals aged 20-29 years old for any educational attainment. On the other hand, the probability of being unemployed is not influenced by the presence of foreign workers for older groups.

Among those aged 25-29 years old, the highest increase in the probability of unemployment is for tertiary-educated people (0,39%), which possibly indicates that domestic newcomers with higher education prefer to remain

unemployed for a while, rather than take a job with a lower wage. In other words, foreigners might accept job offers that domestic newcomers refuse to accept. However, this is quite an ambiguous conclusion, since the majority of foreign workers in Cyprus are unskilled with only primary education, which makes them complementary to domestic workers. The second highest probability increase is observed for primary educated individuals (0,35% increase in probability), which is expected. The fact that foreign workers do not have a significant impact on unemployment for upper secondary non tertiary-educated individuals also confirms our theoretical predictions. In the 20-24 age group, education level does not affect the probability of unemployment.

4.5. The impact of foreign workers on labour force inactivity by age and educational attainment

According to our previous estimates, the presence of foreign workers does not affect total labour force participation in Cyprus for the period 1999-2005. However, there might be a group-specific effect on the probability of being inactive, depending on age or education level. In this section, we examine whether there is a different impact on the probability of labour force participation, varying by age and level of education.

Specifically, we estimate the impact of foreign workers on the probability of being inactive (i.e. not participate in the labour force), allowing for a different impact of foreign workers depending on the age and education level of the individual.

According to the results presented in Table 8 (see also Table A2), foreign workers affect differently the various age and education level groups. An increase in the percentage of foreign workers in the sector by one percentage unit, increases the probability of being inactive for individuals with primary education, of age 20-24 by 0,58% (at a 5% significance level), for ages 25-29 by 0,68% (at 1% significance level) and for ages 30-39 by 0,32% (at a 10% significance level). The probability of inactivity also increases for older people aged from 60-64 years. In this age group, by increasing the share of foreign workers by one percentage unit, the probability of non-participation in the labour force increases by 1,03% for secondary-educated individuals, 1,51% for individuals with upper secondary– non tertiary education and 1,48% for tertiary-educated people.

TABLE 8

Impact of foreign workers on labour force inactivity by age and educational attainment

Variable	Model 2 (b)	
	Estimated impact	p-value
% Foreign workers: Age 20-24		
Primary Education	0,58	0,013
Secondary Education	-0,99	0,003
Tertiary Education	-1,10	0,000
% Foreign workers: Age 25-29		
Primary Education	0,68	0,001
Tertiary Education	-0,51	0,029
% Foreign workers: Age 30-39		
Primary Education	0,32	0,084
% Foreign workers: Age 40-49		
Secondary Education	-0,36	0,047
% Foreign workers: Age 60-64		
Secondary Education	1,03	0,000
Upper Secondary – Non tertiary	1,51	0,000
Tertiary Education	1,48	0,000
Pseudo-R squared	0,550	
Number of observations	62.394	

Note: This Table presents only statistically significant effects regarding the impact of foreign workers. The estimated impact corresponds to an increase in the share of foreign workers, in the relevant employment sector, by one percentage unit (e.g. from 5% to 6%).

Source: Estimates based on EU LFS data for the period 1999-2005. More information on the estimation can be found in the Appendix.

In contrast, an increase in the share of foreign workers by one percentage unit reduces the probability of being inactive for ages 20-24 with upper secondary non tertiary education by 0,99%, and tertiary education by 1,10% respectively. Moreover, tertiary-educated individuals of 25-29 years of age have a lower probability of being inactive (by 0,51%). In addition, individuals of age 40-49 years with secondary education, also have a lower probability of being inactive (an increase in the share of foreign workers by one percentage unit decreases the probability of inactivity by 0,36%).

Regarding the remaining age-education categories, foreign workers do not seem to have an impact on the decision to participate in the labour force for these groups.

Concluding, the presence of foreign workers in Cyprus, over the period 1999–2005, had a different impact on the various categories of the labour force. Young people with higher education were positively affected, while

youth with primary education had a higher probability of being inactive. This result is expected, since foreign workers are mainly unskilled or they are occupied in sectors with very low wages. Finally, the presence of foreign workers also seems to affect negatively older individuals aged 60-64, with the exception of those with primary education, who are not affected at all.

4.6. The impact of foreign workers on part-time employment by age and educational attainment

In this section we examine the impact of foreign workers on part-time employment, by age group and educational attainment.

According to our previous estimates, an increase in foreign workers increases the probability of part-time employment for all individuals less than 39 years of age, for any education level. These estimates are statistically significant, with the exception of the 25-29 age group with secondary education. As shown in Table 9 (see also Table A2), tertiary-educated individuals between 20 and 39 years of age (20-24, 25-29, 30-39), have a much higher increase in the probability of part-time employment than less-educated people, when the share of foreign workers is increased by one percentage unit. In particular, the probability of part-time employment increases by 0,84% for individuals in the 20-24 age group, 0,74% for ages 25-29 and 0,46% for the 30-39 group.

Moreover, an increase in the share of foreign workers increases the probability of part-time employment for tertiary-educated individuals, aged 40-49, as well as individuals in the 60-64 age group with higher education. A percentage unit increase in the share of foreign workers increases the probability of part-time employment for the 60-64 age group by 0,67% for tertiary graduates and 0,55% for upper secondary non tertiary educational attainment levels.

TABLE 9

Impact of foreign workers on part-time employment by age and educational attainment

Variable	Model 3 (b)	
	Estimated impact	P-value
% Foreign workers: Age 20-24		
Primary Education	0,50	0,000
Secondary Education	0,30	0,019
Upper Secondary – Non tertiary	0,39	0,005
Tertiary Education	0,84	0,000
% Foreign workers: Age 25-29		
Primary Education	0,49	0,000
Upper Secondary – Non tertiary	0,30	0,021
Tertiary Education	0,74	0,000
% Foreign workers: Age 30-39		
Primary Education	0,34	0,002
Secondary Education	0,22	0,040
Upper Secondary – Non tertiary	0,20	0,087
Tertiary Education	0,46	0,000
% Foreign workers: Age 40-49		
Tertiary Education	0,23	0,039
% Foreign workers: Age 60-64		
Primary Education	-0,23	0,075
Upper Secondary – Non tertiary	0,55	0,002
Tertiary Education	0,67	0,000
Pseudo-R squared	0,133	
Number of observations	48.669	

Note: This Table presents only statistically significant effects regarding the impact of foreign workers. The estimated impact corresponds to an increase in the share of foreign workers, in the relevant employment sector, by one percentage unit (e.g. from 5% to 6%).

Source: Estimates based on EU LFS data for the period 1999-2005. More information on the estimation can be found in the Appendix.

However, part-time employment is negatively affected for individuals aged 60-64 with primary education. The presence of foreign workers has no impact on the probability of part-time employment for the remaining groups.

It is also worth mentioning here, that according to our results (see Tables A1 and A2), male individuals have a lower probability of part-time employment than women. Moreover, men have a lower probability of being unemployed compared to women and higher probability of participating in the labour force. This gender effects are statistically significant in all estimations, which indicates that women in Cyprus still face some sort of

discrimination in the Cypriot labour market, despite the fact that female labour force participation has been increasing in recent years, due to an increase in the number of women proceeding to higher education.

5. Conclusions

The number of foreign workers in Cyprus has been increasing sharply during the past 15 years and the impact of the presence of foreign workers on domestic workers has been controversial. The purpose of this study is to examine and evaluate the impact of foreign workers on the labour market in Cyprus and especially on unemployment, labour force participation and part-time employment.

According to our estimates, foreign workers do not have a statistically significant impact on total unemployment in Cyprus. On the other hand, there is a statistically significant impact on unemployment for some age groups and education levels. We find that the presence of foreign workers increased the probability of unemployment for younger individuals in the 20-29 age group, while there is no significant impact on unemployment for older people. Educational attainment does not seem to play a very important role here. Among people aged 20-24 years, a percentage unit increase in the share of foreign workers increases the probability of unemployment by 0,28%. For individuals aged 25-29, there is a slightly different impact according to education level; 0,39% for tertiary-educated individuals, 0,35% for individuals with primary education and 0,26% for individuals with secondary education. There is no statistically significant impact for individuals with upper secondary- non tertiary education of any age.

Examining the impact of foreign workers on total labour force participation, over the period 1999-2005, we conclude that there is no significant overall impact. Once again, we find evidence that age and education are a significant factor. Youth of ages 20-29, as well as older people of ages 60-64 are influenced the most by the presence of foreign workers. A percentage unit increase in the share of foreign workers in the relevant employment sector, decreases the probability of labour force participation for primary educated people of ages 20-24, 25-29 and 30-39 by 0,58%, 0,68%, and 0,32% respectively. Individuals aged 60-64, are also negatively affected, since the probability of being inactive increases by 1,03% for individuals with secondary education, 1,51% for upper secondary- non tertiary education and 1,48% for tertiary education. On the other hand, more highly educated young people are positively affected. A percentage unit increase in the share of foreign workers, decreases the probability of being inactive for tertiary-educated young individuals by

1,10% for ages 20-24 and by 0,51% for ages 25-29. The remaining age and education categories are not particularly affected.

Finally, the presence of foreign workers seems to have a marginally significant overall impact on part-time employment. In particular an increase in the share of foreign workers in the relevant employment sector increases the probability of part-time employment for Cypriots by 0,16%. The probability of part-time employment increases mainly for people under 39 years of age, or above 60. In terms of education levels, there is a higher increase in the probability of part-time employment for tertiary-educated people in all age groups, compared to less-educated people.

This study finds that the increase in the number of foreign workers has increased the probability of unemployment of people (i) aged 20-29 at any educational level and (ii) aged 60-64 with tertiary education. Unskilled workers aged 20-29 are new in the labour market without work-specific skills and work experience. However, firms are able to employ foreign workers with similar skills at low wages. Domestic workers are not willing, for various reasons, to accept a job with low wages and so they continue to search while unemployed. The government can help to increase the employment of these people by subsidising their employment for a certain time period. Highly educated new entrants take longer to find satisfactory job matches and this time lag may have increased as the amount of activity in the labour market increases generally.

Increased immigration has also increased the unemployment of people aged 60-64. Many of these people are former employees of the general public sector, banking sector etc, who retired at the age of sixty or even before and are looking for a job for a few years. They were entitled to unemployment insurance benefits for six months and must register as unemployed in order to qualify. Some of these retirees may be genuinely looking for a job. Since these former public/banking sector employees may have skills, which are not suitable/ useful in the private sector, they compete with young foreign workers and are thus unable to finds a job at a decent wage.

The increase in foreign workers has decreased the labour force participation of people aged 20-39 with primary education. People in this group have the same skills as foreign workers and thus are competing with them. Foreign workers are willing to work for low wages while domestic workers are not. After they have spent some time looking for a job at a decent wage and have not found one, they are discouraged and the exit the labour force. The government can help by subsidising the training of these people to gain skills and become more competitive over foreign workers. In this way, they will be able to obtain a job with high wage and thus remain in the labour market.

Similarly, immigration has decreased the labour force participation of people aged 60-64. Since many individuals in this group are looking for low-skill job in the private sector, they may not find one at a decent wage due to competition with foreign workers. After a while, they may stop looking for a job and leave the labour force. The government can help by subsidising the employment of people in this age group.

Finally, increased immigration has decreased part-time employment among people aged 20-39 for almost all education levels. If the increase in part time employment is a voluntary choice, this is welfare enhancing. Individuals choose to work part-time for various reasons: for example, women who employ a foreign domestic worker may choose to work part-time. If however, the increase in part-time employment is not voluntary, this is a problem. For example, full-time jobs may be filled by foreign workers and part-time work needs are covered by domestic workers. This usually happens when domestic workers have low skills. The government can help by subsidising their training.

Appendix

Econometric analysis and estimation results

A.1. Econometric analysis

This section describes 6 econometric models used to estimate the impact of foreign workers on unemployment, labour force participation and part-time employment for the period 1999-2005. All models have a binary probit form which can be described as follows.

$$p = P(Y = 1/X) = \Phi(\beta_0 + \mathrm{X}'\beta)$$

Where Y is a binary random variable which takes values 0 or 1, Φ(z) is the standard Normal cumulative distribution N(0,1) and X is a vector with some characteristics that are believed to determine the probability of Y=1.

The model coefficients β are estimated using the Maximum Likelihood Method.

Model 1(a)

The purpose of this model is to estimate the impact of the presence of foreign workers in Cyprus, on total unemployment. We specifically estimate the impact of foreign workers on the probability of being unemployed, using a binary probit model described as follows:

$$p = P(Y = 1/X) = \Phi(\beta_0 + \mathrm{X}'\beta)$$

where p is the probability that a Cypriot person is unemployed[11], X is a vector of personal characteristics (such as age, education, gender, marital status, and employment sector), a variable describing the percentage of foreign workers over total labour force in the sector that the person belongs to and, a variable capturing the growth rate for the relevant employment sector. In the model we also include some year and quarter dummies to capture any time specific effects.

For the unemployed, the relevant sector is the sector that each individual reports as his employment sector in the survey.[12] Unemployed that do not report their employment sector are not included in the sample for model 1. The estimation results for model 1 (a) are shown in Table A1 below.

Model 2(a)

This model estimates the impact of foreign workers on the probability of labour force participation in Cyprus. This estimation aims at examining whether the presence of foreign workers discourages Cypriot labour force participation or not.

Model 2(a) is again a probit model with the same functional form as model 1(a), but now p represents the probability that someone is inactive, that is the probability that the person chooses not to participate in the labour force. Vector X includes all the variables included in model 1(a) such as personal characteristics, the growth rate for the relevant employment sector, the foreign worker variable and time dummies.

The construction of the foreign worker variable is done as in model 1(a). However, in model 2(a) we also include individuals with no employment sector reported in the survey. In cases where the unemployed do not report their employment sector- mainly newcomers (404 out of 2331) - the variable is set equal to the ratio of foreign workers over the labour force in the economy as a total. The same approach is followed for the inactive. The estimation results for model 2(a) are presented in Table A1, as well.

Model 3(a)

Model 3(a) examines the impact of foreign workers and other factors on the probability that a Cypriot is employed part-time.

The model takes the same form as in models 1(a) and 1(b) described above. Here, the dependent variable p is the probability that someone is employed part-time, while X is a vector with personal characteristics, the growth rate for the relevant employment sector, time dummies and the foreign worker variable as described above. The estimation results for model 3(a) are also presented in Table A1.

---

[11] In this model, we do not take into account the possibility of retirement.

[12] This is possibly the sector in which individuals were previously employed.

TABLE A1

Estimation results for models 1(a), 2 (a), 3 (a)

Variable	Model 1(a)		Model 2(a)		Model 3(a)	
	Coefficient	z-statistic	Coefficient	z-statistic	Coefficient	z-statistic
Age 20-24	0,009	2,790	-0,026	-3,910	-0,003	-0,880
Age 25-29	0,009	3,290	0,023	3,730	-0,007	-2,150
Age 30-39	0,005	2,340	0,007	1,560	0,001	0,660
Age 50-59	0,002	1,170	0,090	17,740	0,016	5,460
Age 60-64	0,002	0,620	0,472	51,130	0,098	15,530
Secondary education	-0,012	-6,700	0,001	0,290	-0,026	-11,060
Upper Second./ Non- tertiary ed.	-0,018	-8,040	-0,027	-5,290	-0,029	-10,080
Tertiary education	-0,024	-11,070	-0,063	-13,650	-0,026	-9,480
% Sector Growth	-0,117	-3,430	-0,020	-0,290	-0,076	-1,910
Male	-0,022	-12,880	-0,155	-43,300	-0,103	-40,600
Married	-0,021	-9,900	0,055	13,820	0,000	-0,340
% Foreign Workers	0,093	1,130	0,230	1,340	0,169	1,650
2000	-0,005	-1,420	-0,002	-0,270	0,026	4,340
2001	-0,012	-3,480	-0,008	-1,070	0,017	2,840
2002	-0,016	-4,350	-0,007	-0,790	0,003	0,610
2003	-0,012	-2,840	-0,018	-1,840	0,013	1,780
2004	-0,007	-1,230	-0,031	-2,610	0,010	1,300
2005	-0,009	-1,290	-0,034	-2,190	0,007	0,770
1º quarter	0,002	0,680	0,021	2,940	0,003	0,740
3º quarter	-0,003	-1,250	0,006	1,100	-0,003	-1,150
4º quarter	-0,002	-0,850	0,015	2,570	0,000	-0,120
Primary Sector	-0,021	-3,580	-0,043	-3,130	0,062	4,920
Manufacturing	0,016	2,580	0,059	4,500	-0,018	-3,030
Construction	0,018	2,100	-0,024	-1,640	-0,030	-3,960
Trade/Hotels/ Restaurants	0,016	2,640	0,041	3,260	-0,004	-0,670
Services	-0,011	-1,140	0,020	0,870	-0,010	-0,800
NA	-	-	0,853	37,210	-	-
Pseudo R- Squared	0,047		0,536		0,122	
Number of obs.	50.596		62.394		48.669	

Notes: NA: Individuals that do not report their employment sector or inactive.
Model 1(a): Estimated impact on total unemployment.
Model 2(a): Estimated impact on non participation in the labour force.
Model 3(a): Estimated impact on part-time employment.

Models 1(b), 2(b) and 3(b)

Models 1(b), 2(b) and 3(b) are based on the corresponding models 1(a), 2(a) and 3(a) and examine the impact of foreign workers on unemployment, labour force participation and part-time employment respectively. The difference in the "b" version of the model is that we add interaction terms to examine whether there is a different impact of foreign workers on the above, depending on the age and education level of the individual. Therefore, vector X now includes all personal characteristics, with additional variables interacting foreign workers with individual age groups (20-24, 25-29, 30-39, 40-49, 60-64) and education levels (primary education, secondary, upper secondary non tertiary and tertiary). By using interactions, we want to capture the different effects, if any, of the presence of foreign workers on different groups of people. The estimation results for models 1(b), 2(b) and 3(b) are described in Table A2.

TABLE A2

Estimation results for the models 1(b), 2(b), 3(b)

Variable	Model 1(b)		Model 2(b)		Model 3(b)	
	Coefficient	z-statistic	Coefficient	z-statistic	Coefficient	z-statistic
Age 20-24	-0,017	-3,140	-0,028	-1,800	-0,037	-5,060
Age 25-29	-0,020	-3,950	-0,005	-0,420	-0,036	-5,310
Age 30-39	-0,008	-1,800	-0,007	-0,710	-0,023	-3,820
Age 50-59	0,005	0,940	0,055	4,440	0,017	2,300
Age 60-64	-0,003	-0,330	0,304	13,900	0,124	7,070
Secondary education	-0,011	-2,490	0,002	0,290	-0,019	-3,260
Upper Second./ Non-tertiary ed.	-0,004	-0,720	-0,020	-1,530	-0,027	-3,740
Tertiary education	-0,024	-4,590	-0,062	-5,200	-0,048	-7,900
% Sector Growth	-0,113	-3,420	-0,028	-0,420	-0,076	-1,970
Male	-0,021	-12,850	-0,160	-44,430	-0,101	-40,200
Married	-0,020	-9,460	0,048	12,070	0,000	0,130
2000	-0,005	-1,530	-0,001	-0,190	0,024	4,180
2001	-0,012	-3,600	-0,005	-0,730	0,016	2,720
2002	-0,016	-4,430	-0,002	-0,240	0,003	0,490
2003	-0,012	-2,970	-0,013	-1,290	0,012	1,670
2004	-0,007	-1,310	-0,023	-2,000	0,009	1,130
2005	-0,010	-1,430	-0,020	-1,320	0,005	0,560
1º quarter	0,002	0,680	0,020	2,850	0,004	0,930
3º quarter	-0,003	-1,330	0,009	1,690	-0,003	-1,120
4º quarter	-0,002	-0,092	0,019	3,260	0,000	-0,090

(Table A2 continues on next page)

TABLE A2 (Continued)

Variable	Model 1(b)		Model 2(b)		Model 3(b)	
	Coefficient	z-statistic	Coefficient	z-statistic	Coefficient	z-statistic
Primary Sector	-0,021	-3,620	-0,021	-1,470	0,052	4,310
Manufacturing	0,015	2,360	0,072	5,400	-0,023	-3,970
Construction	0,016	1,980	0,000	-0,030	-0,031	-4,320
Trade/Hotels/ Restaurants	0,015	2,510	0,052	4,120	-0,009	-1,400
Services	-0,012	-1,270	0,031	1,350	-0,017	-1,410
% Foreign Workers: Age 20-24						
Primary Education	0,287	2,850	0,588	2,470	0,503	3,560
Secondary Education	0,280	2,960	-0,019	-0,090	0,307	2,360
Upper Second./ Non-tertiary ed.	0,067	0,600	-0,993	-2,970	0,393	2,790
Tertiary Education	0,284	2,710	-1,105	-4,170	0,842	6,510
% Foreign Workers: Age 25-29						
Primary Education	0,357	3,560	0,685	3,210	0,497	3,670
Secondary Education	0,265	2,790	0,202	1,010	0,165	1,280
Upper Second./ Non-tertiary ed.	0,090	0,850	-0,218	-0,970	0,303	2,310
Tertiary Education	0,396	4,120	-0,518	-2,180	0,749	6,210
% Foreign Workers: Age 30-39						
Primary Education	0,104	1,130	0,328	1,730	0,348	3,040
Secondary Education	0,155	1,800	-0,060	-0,330	0,223	2,050
Upper Second./ Non-tertiary ed.	-0,016	-0,170	-0,179	-0,880	0,204	1,710
Tertiary Education	0,111	1,160	-0,019	-0,100	0,462	4,080
% Foreign Workers: Age 40-49						
Primary Education	0,022	0,250	0,119	0,640	0,027	0,240
Secondary Education	-0,004	-0,060	-0,366	-1,990	0,002	0,030
Upper Second./ Non-tertiary ed.	-0,072	-0,720	-0,094	-0,460	0,064	0,540
Tertiary Education	-0,079	-0,770	-0,033	-0,170	0,236	2,070

(Table A2 continues on next page)

TABLE A2 (Continued)

Variable	Model 1(b)		Model 2(b)		Model 3(b)	
	Coefficient	z-statistic	Coefficient	z-statistic	Coefficient	z-statistic
% Foreign Workers: Age 50-59						
Primary Education	-0,028	-0,310	0,020	0,110	0,032	0,290
Secondary Education	0,014	0,160	0,220	1,210	0,017	0,150
Upper Second./ Non-tertiary ed.	-0,182	-1,510	0,092	0,440	-0,030	-0,230
Tertiary Education	-0,026	-0,250	0,210	1,070	0,018	1,560
% Foreign Workers: Age 60-64						
Primary Education	0,056	0,500	0,044	0,230	-0,232	-1,780
Secondary Education	-0,032	-0,220	1,031	5,210	-0,001	-0,010
Upper Second./ Non-tertiary ed.	-0,050	-0,220	1,512	6,670	0,558	3,170
Tertiary Education	0,254	1,780	1,484	7,080	0,679	4,620
NA	-	-	0,869	38,000	-	-
Pseudo-R squared	0,053		0,55		0,133	
Number of obs	50.596		62.394		48.669	

Note: NA: Individuals that do not report their employment sector or inactive.
Model 1(b): Estimated impact on unemployment by age group and educational attainment.
Model 2(b): Estimated impact on non-participation in the labour force, by age group and educational attainment.
Model 3(b): Estimated impact on part-time employment by age group and educational attainment.

A.2. Data

For the estimation in all models we use quarterly data from the EU Labour Force Survey (LFS) which contains microeconomic data for all EU member states. In Cyprus, LFS took place for the first time in 1999. Until 2003, the survey was conducted once a year, in the spring quarter. Since the spring quarter of 2004, LFS is carried out in every quarter. Our sample contains all the surveys available for the period 1999-2005 and contains 3.600 Cypriot households. The survey includes information on employment status, economic activity, profession, professional status, education level, gender, age and other personal characteristics.

Data on GDP, total employment, employment of foreign workers[13] and unemployment by sector, were taken from annual and quarterly publications of the Statistical Service of the Republic of Cyprus (mainly Labour Statistics and Statistical Abstracts).

There are 50.596 observations in the sample used for model 1 (participants in the labour force), from which 48.669 are employed in some sector and 1.927 are unemployed over the period of the survey.[14] For model 2, the sample includes 62.394 observations (working age population), from which 11.394 state to be inactive and 51.000 participate in the labour force, i.e. they are either employed or unemployed. Here we also include in the sample unemployed persons that do not report their employment sector. The dataset used for model 3 contains 48.669 observations and includes people employed either full time (44.990), or part-time (3.679 or 7,6%), over the period of the survey.

Acknowledgements

The authors are thankful to Machi Michalopoulou for her invaluable help in data handling and the dataset creation, as well as Maria Michael (ERC) and Gay Christofides for writing the English version of the paper.

References

Borjas, G. (1990) 'Friends or Strangers: The Impact of Immigrants on the U.S Economy', Basic Books, New York.

Borjas, G. (1993) 'The Impact of Immigrants on Employment Opportunities of Natives in OECD', *The Changing Course of International Migration*, Paris.

Borjas, G. (1994) 'The Economics of Immigration', *Journal of Economic Literature*, 52, 1667-1717.

Card, D. (2001) 'Immigration Inflows, Native Outflows and the Local Market Impacts of Higher Immigration', *Journal of Labour Economics*, Vol. 19, No 1, pp.22-64.

---

[13] The number of foreign workers used in the estimation, does not include illegal foreign workers due to unavailable analytical data.

[14] We do not include in the sample persons that provide services in private households. Additionally, individuals under 20 years old, students, soldiers, handicap and foreigners that leave in Cyprus for less than 5 years, are excluded from the sample.

Chang, H.C. (2003) 'Do Immigrants Rob Jobs? A Case Study of Australia', The University of Melbourne Department of Economics, Research Paper Number 883.

De New, J.P. and Zimmerman, K.F. (1994) 'Native Wage Impacts of Foreign Labor: A Random Effects Panel Analysis', *Journal of Population Economics*, Vol. 7, No. 2.

Dustmann, C., Fabbri, F. and Preston, I. (2003) 'The Local Labor Market Effects of Immigration in the UK', Royal Economic Society Annual Conference, No 70.

Friedberg, R. and Hunt, J. (1995) 'The Impact of Immigrants of Host country Wages, Employment and Growth', *Journal of Economic Perspectives*, 9, 23-45.

Gross, D.M. (1999) 'Three Million Foreigners, Three Million Unemployed? Immigration and the French Labor Market', IMF, Working Paper, WP/99/124.

Jean, S. and Jimenez, M. (2007), 'The Unemployment Impact of Immigration in OECD Countries', OECD Economics Department Working Paper No. 563.

Kemnitz, A. (2001, 2003) 'Immigration, Unemployment and Pensions', *Scandinavian Journal of Economics*, (105) (1), pp.31-47.

Pashardes, P., Christofides, L.N. and Nearchou, P. (2001), 'The Labour Market in Cyprus: Foreign Workers and Structural Problems', Economic Research Center, University of Cyprus (in Greek).

Popes, D. and Withers, G. (1993) 'Do Migrants Rob jobs? Lessons of Australian History 1861-1991', *Journal of Economic History*, 53, 719-742.

Shapiro, C. and Stiglitz, J. (1984) 'Equilibrium Unemployment as a Discipline Device', *American Economic Review*, 74, 433-44.

Simon, J.L. (1989) 'The Economic Consequences of Immigration', Basil Blackwell, Oxford.

Winkelmann, R. and Zimmermann, K.F. (1993) 'Ageing, Migration and Labour Mobility', in: Jonhson, P. and K.F.Zimmermann (eds) *Labour Markets in an Ageing Europe*, Cambridge University Press: Cambridge, 255-283.

Venturini, A. and Villosio, C. (2002) 'Are Immigrants Competing with Natives in the Italian Labor Market? The employment effect', IZA Discussion Paper no. 467.