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The Dynamics of Unemployment among the Arabs in Israel: Evidence from Panel Data

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In the present article I will examine unemployment among the Arabs in Israel and the reasons it has increased since 1996. The probabilities that individuals will change their labor-market situation, computed on the basis of the micro-panel data of the labor force surveys conducted by the Central Bureau of Statistics for 1990–2004,[1] provide important insights into why unemployment rose more among Arabs than Jews in the second half of the 1990s. The study reaches two important conclusions. First, based on calculations of the annual probabilities that an individual will move between the three labor-market states—employment, unemployment, and non-participation—unemployment was found to be higher among Arabs than among Jews. This is because of the greater likelihood that Arabs will become unemployed and the lower likelihood that they will escape that situation. These trends became stronger over time. The second conclusion is that young uneducated Arabs employed in traditional sectors are more likely to lose their jobs than are older persons, or those with an education or working in advanced sectors. This is because of the change in the sectoral composition of the economy in the mid-1990s, when the traditional sectors shrank and the demand for uneducated workers decreased; the massive entry of foreign laborers into traditional sectors also reduced the demand for Arab workers.

The sharp rise in unemployment in Israel between 1996 and 2004 has sparked serious interest among economists. The importance of studying unemployment stems on the one hand from its consequences, in terms of economic losses and social damage, and on the other from the fact that it is an indicator of the quantity and nature of unexploited economic resources. The information obtained from such research is used by decision-makers who set the economic policies needed to eliminate unemployment. Many studies of the topic have indicated that extremely high unemployment rates in Israel are found mainly in development towns, in the Arab sector, and among women and new immigrants. This situation, in which unemployment is higher among certain sectors of the population, indicates that the problem involves not only the individual characteristics of unemployed persons within each group, but also demand and other factors (see, for example, Achdut et al. 2000; Zeira 2004).

The present article describes and explains the sharp rise in unemployment among Israeli Arabs over the last decade. The causes of unemployment in this sector

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1. The labor-force survey panel data for 1980–2004 were taken from the chained file of the labor-force survey. This file was prepared by the database for Dr. Shmuel Amir and Prof. Ruth Klinov. I would like to thank them for allowing me to make use of it.

have been analyzed on the basis of the probabilities that individuals will switch between the three possible labor-market states: unemployment, employment, and non-participation (Appendix A). This information about the movement of individuals in the labor market is of critical importance to the understanding of the causes of unemployment among Arabs (Achdut et al. 2000; Beenstock and Klinov 1998). Research into unemployment aims to identify the populations and regions that are most exposed to and harmed by unemployment; this is done by learning the distribution of the unemployed by social and geographical parameters. The data available to me have made it possible to study the unemployment burden by gender, age, education, and district of residence. Understanding the distribution of the unemployment burden could be useful in planning appropriate policies to eliminate joblessness and selecting mechanisms to implement these policies. [2]

To gain a better understanding of Arab unemployment in Israel we must focus on the number of persons who move from employment to unemployment, and those who move in the opposite direction, because these numbers reflect a situation of employment instability, and then compare these figures to the situation among the Jews. My analysis of changes in unemployment is also based on changes in the probabilities of movement between the three labor-market situations—unemployment, employment, and non-participation—and in particular the sectoral behavior of the employment categories typical of the Arab population, since this makes it possible to determine whether Arab unemployment is structural or of some other type.

The unemployment crisis of 1997–2004, like earlier ones, demonstrated the vulnerability of the Arabs in periods of economic slowdown or structural changes in the Israeli economy. The Arab unemployment rate reached 12% in 2004, a rise of 230% over 1996. The average duration of unemployment in 2004 was 35 weeks; 55% of unemployed Arabs belonged to the hardcore; that is, they had been jobless for a year or more. By contrast, unemployment in the Jewish sector was 10.3%, the average duration of unemployment was 25 weeks, and only 31% of the unemployed belonged to the hardcore. It is important to note that when unemployment is protracted beyond a certain threshold there are severe social implications, both at the individual level (poverty, depression) and at the national level (increased economic inequality between Arabs and Jews). It must also be remembered that prolonged unemployment reduces the chances of the individual concerned of returning to the employment pool.

During the 1997–2004 crisis, unemployment among Jews was caused less by the structural composition of the workforce than by the slowdown in economic activity (Achdut et al. 2000); among Israeli Arabs, by contrast, it was caused not only by the economic slowdown but also by a change in the structural composition of the labor force. Until 1997, roughly half of all employed Arabs were unskilled workers in construction, light industry, and services. Following the severe recession in the construction industry and the introduction of new technologies, unemployment among Israeli Arabs rose until it exceeded that among Jews (structural unemployment). The decline of agriculture, in which some 20% of the Arab labor force was employed during the 1970s, and the lack of emergence of alternative sectors exacerbated Arab unemployment. In addition, the concentration of Arabs in small and medium-sized

2. The basic terms used in economic research to categorize unemployment are: frictional unemployment, structural unemployment, cyclical unemployment, seasonal unemployment, natural unemployment, and full employment (for definitions, see Appendix B).

localities produced a shortage of employment opportunities in their communities and left them dependent on nearby larger towns.

Central Bureau of Statistics figures on the number of foreign workers and Arab workers in construction and agriculture indicate an inverse correlation between the two: the more foreign workers, the fewer Arabs are employed in these sectors. Thus, the high level of unemployment among Arabs in general, and among uneducated Arabs in particular, is to be explained by the continuing rise in the number of foreign workers. The increased importation of foreign workers from the mid-1990s caused Arabs to be shunted from employment to unemployment and to be displaced from the labor force, especially in sectors like construction, where employers were attracted by the lower wages they could pay to foreign workers.[3]

Despite the difficulties associated with defining unemployment, in the present study I have used the definition of the Central Bureau of Statistics: unemployed persons are those who have not worked at all but were actively looking for a job during the month before the survey was conducted and who, had they been offered a suitable job, would have been willing to begin work during the week when the survey was conducted. This definition covers persons who want to work but are not working, rather than all those who are unemployed. It does not include persons who have given up looking for a job or those who are involuntarily working only part time; hence it underestimates the true scale of unemployment among Arabs.

The first section of this article deals with methodology and presents the labor-force survey data. The second section deals with trends in specific unemployment and labor-force participation rates. Section three considers the reasons for and implications of protracted unemployment. The fourth section presents the probabilities of moving between the three labor-market states. Finally, section five considers the influence of foreign workers. The article ends with a summary and conclusions.

1. Methodology

When we try to identify the causes of unemployment among the Arabs in Israel we must distinguish between the parameters of movement among the different labor-market states and analyze unemployment as a complex function of these movements (Appendix A). This will help us refine our understanding of the relative weight of the probability data according to six indices (ibid.), which reflect different causes of unemployment.

For example, did unemployment increase because the number of workers who lost their jobs increased (high **Peu**[4]) or because the duration of their joblessness increased (low **Pue**)? Similarly, we attribute major importance to precise distinctions in data about movement among the labor-market categories by age, education, and sector. For example, the specific data about uneducated Arabs employed in traditional sectors are very important: the failure of such persons to find jobs or hold on to their

3. Zussman and Romanov 2003; Amir and Gottlieb 2005; Card 2001; Friedberg 2001.
4. For a definition of these terms, see n. 7 below.

jobs contributes to a rise in total Arab unemployment. Finally, we must remember the importance of the time axis, and especially the period covered by the research: the 1990s began with an economic boom, which was succeeded by a recession. Studying the specific data against the general picture of the economy in a period of transition from growth to crisis provides additional information that can help us understand the true causes of unemployment.

The research is based on micro-panel data from the labor force surveys conducted by the Central Bureau of Statistics for 1990–2004. The data are derived from repeat interviews with individuals in the survey samples. In its labor-force surveys, the CBS rechecks every household four times over a period of six quarters: interviews are held in two successive quarters and then, after a lapse of two quarters, there are two more quarterly interviews. The household is then dropped from the sample. The use of data from repeated interviews makes it possible to track changes in an individual's labor-force status at four points in time over a period of 15 months.

The rates of movement have been derived from tracking changes in the interviewees' employment status over time and are based on surveys taken in consecutive years. To select the sample for computing the annual probability of a change in status, subjects who appeared in two interviews within twelve months (that is, in the first and third or second and fourth interviews) were identified among all those sampled in 1990–2004. This panel sample of annual changes in individuals' employment status makes it possible to estimate the annual rates of movement among the different employment states (Beenstock and Klinov 1998).

The research population included almost all Arabs and Jews of working age in Israel. "Arabs" includes Christians born in Israel, Muslims, and Druze. In 2001 the CBS began to distinguish Arab Christians from other Christians; consequently it is important to note that this study leaves out data on non-Arab Christians and interviewees of unidentified religion, whom the CBS had classed as "Arabs" before 2001. The sample of Arabs did not include Palestinians from east Jerusalem, because of the differences between them and the general population of Arab workers in Israel: the supply of Arab workers in Israel depends on the size of the working-age population, the influence of welfare policy, and changes in wage structure; by contrast, the supply of Palestinian workers from east Jerusalem depends on the size of the population and the demand for their labor in markets that are alternatives to the Israeli market, such as the West Bank and Arab countries (Amir and Gottlieb 2005).

2. Unemployment Trends

Figure 1 shows the quarterly unemployment trends for Arabs and Jews in Israel. In 1990–1993 and 1996–2004 there were sharp increases in unemployment in both groups. During the intervening period, 1993–1996, unemployment fell sharply, thanks to the increase in aggregate demand that followed the mass immigration of the early 1990s and the growth in the demand for workers. During the second down period, 1996–2004, there was a 225% increase in Arab unemployment—from 4% in the third quarter of 1996 to 13% in the third quarter of 2004. For Jews the increase during the same period was 57%, from 7% to 11%. That is, the difference between the low and high unemployment rates was much greater for Arabs than for Jews. There is a similar

picture of gaps between Jews and Arabs in 1990–1993. It should be emphasized that the increase in unemployment in the early 1990s does not resemble that of the late 1990s: the former was the direct result of the growth in the supply of workers produced by the mass immigration of those years, while the second derived from the slowdown in economic activity and structural changes in the composition of the labor force, against the background of the introduction of new technologies and the sharp rise in the number of foreign workers.

<Figure 1 around here.>

As can be seen from Figure 1, for both Arabs and Jews the gap between the unemployment highs and lows was greater in 1996–2004 than in 1990–1993, and much larger among Arabs than among Jews. Were the economic slowdown the full explanation for the rise in unemployment, we would expect a similar unemployment trend for both periods. But the data indicate that the unemployment crisis of recent years among Arabs is not merely the outcome of the economic slowdown (that is, a drop in aggregate demand), but also of structural changes in the economy, which produced a larger increase in structural unemployment among the Arabs. There is no doubt that the crisis in the construction industry and traditional sectors of the economy, which employ many Arabs who could not find work in advanced sectors (see Table 1), along with the rise in the number of foreign workers employed in these sectors, caused the structural growth in unemployment and pushed many Arabs from employment to unemployment.

Table 1: Distribution of Employed Persons, by Sector[5]

	1990	1993	1996	1999	2002	2003	2004
Arabs							
Agriculture	0.08	0.08	0.04	0.04	0.02	0.02	0.02
Traditional industries	0.17	0.16	0.14	0.13	0.08	0.07	0.07
Construction	0.20	0.23	0.30	0.21	0.20	0.22	0.21
Advanced industries, business services, banking	0.05	0.06	0.06	0.07	0.08	0.08	0.09
Trade	0.10	0.08	0.12	0.15	0.17	0.16	0.17
Education	0.10	0.09	0.09	0.12	0.15	0.15	0.15
Public and community services	0.14	0.14	0.10	0.10	0.15	0.15	0.14
Services and miscellaneous	0.17	0.16	0.15	0.19	0.15	0.15	0.15
Jews							
Agriculture	0.09	0.08	0.02	0.02	0.01	0.01	0.01
Traditional industries	0.08	0.08	0.07	0.06	0.03	0.03	0.03
Construction	0.03	0.05	0.05	0.04	0.04	0.04	0.04
Advanced industries, business services, banking	0.18	0.18	0.21	0.24	0.23	0.24	0.24
Trade	0.11	0.11	0.13	0.14	0.15	0.15	0.15
Education	0.13	0.13	0.13	0.14	0.15	0.15	0.15
Public and community services	0.20	0.20	0.20	0.16	0.23	0.23	0.22
Services and miscellaneous	0.17	0.17	0.19	0.20	0.16	0.16	0.16

Source: Processing of labor-force survey micro data, 1990—2004

5. For the definitions of the sectors see Appendix B.

In addition to the differences in the two groups' unemployment rates at any given time, there is also a change in the link between their unemployment rates and the business cycle. Arab vulnerability to the instability in aggregate demand (see Figure 1) stands out.[6] This could provide a partial explanation of the fact that in slow periods Arab workers (most of them in traditional sectors) are the first to be fired and face the greatest difficulties in finding work. The figures also indicate that Arab men are more vulnerable to changes in aggregate demand than are Jewish men and both Arab and Jewish women (see Figures 2 and 3).

<Figures 2 and 3 around here.>

A close look at the unemployment data reveals that unemployment is severe not only in the Arab and Jewish sectors overall but also in all the gender, age, education, and geographical groups. In groups that generally show high unemployment, the structural component of increased joblessness can be explained; but for Arabs the data were just the opposite of what would be expected according to this argument: that is, despite the decline in the labor-force participation rate of groups with high unemployment, during the same period the average total unemployment rate increased. In recent years there has been a dramatic change in the sectoral (Jewish-Arab), gender, age, and education composition of the Israeli labor force.

In 2004 only 39% of all Arabs aged 15 and over participated in the labor force, as against 58% of the Jews (see Figure 4). As can be seen, the Arab labor-force participation rate declined between 1994 and 2004, while it rose for Jews. This drop was reflected mainly in a decline in the labor-force participation rate of men (from 67% in 1995 to 58% in 2004; see Figure 5). An increase in the relative participation rate of Arab women failed to offset the decline in participation by men (see Figure 6), whereas a rise in the labor-force participation rate of Jewish women, although smaller, did balance the decline in the labor-force participation rate of Jewish men, so that the overall Jewish participation rate showed a rising trend.

<Figures 4 and 5 around here.>

Since 1990, the participation rate of Arab women in the labor force has increased. In 1990, the labor-force participation rate of Arab women was 10.3%; by 2004 the figure was 20% (see Figure 6). The significance of these numbers is apparent against the background of the corresponding figures for Jewish women—46.3% in 1990 and 55% in 2004. The impressive increase in Arab female labor-force participation is associated with a rise in their level of education (more conspicuous than the rise in Arab male education). However, Arab women are a less stable and more vulnerable group when it comes to unemployment; consequently the increase in their labor-force participation rate since 1990 has fueled the rise in overall unemployment among Arabs. The higher unemployment rates of women, as compared to men, and the steady rise in the women's labor-force participation rate, along with a decline in the share of men in the labor force (see Figure 7), produced an increase in the average overall unemployment rate. Between 1990 and 2004, the women's share of the labor force increased by 12%, while the men's declined by 12%

6. It is clear that the deviations from the trend lines are greater among Arabs than among Jews.

(ibid.). During the same period women's specific unemployment rose by 10% and men's by only 1% (see Figures 2 and 3 and Table 3).

<Figures 6 and 7 around here.>

Table 2: Specific Unemployment Rates among Arabs, by Demographic Cross-Section

	1990	1993	1996	1999	2002	2003	2004
Sex							
Male	10.50	12.15	5.16	10.87	13.50	12.85	11.36
Female	4.18	18.98	5.27	9.36	10.25	9.88	13.88
Age							
15-24	12.08	18.89	5.84	10.77	18.03	16.15	11.99
25-34	9.39	11.26	4.81	10.17	12.27	10.47	10.46
35-44	9.19	8.05	3.20	9.97	10.84	12.05	12.93
45-54	10.43	12.58	7.88	11.39	9.46	10.55	16.85
55+	6.63	12.06	7.78	15.21	8.98	12.76	7.70
Family status							
Married	8.46	9.90	4.61	10.39	11.58	10.86	10.26
Other	11.26	17.77	5.96	10.92	15.00	14.86	15.45
Education							
0-8	9.88	12.88	7.08	15.75	17.08	18.74	15.64
9-12	10.52	14.92	4.82	10.08	15.13	13.68	14.82
13-15	3.15	12.57	3.82	7.73	7.61	7.47	5.91
16+	8.59	3.04	1.18	2.43	2.88	2.65	1.65
District							
Northern	10.80	12.14	5.25	9.33	12.06	11.22	12.54
Haifa	7.44	15.91	4.71	13.00	8.67	9.07	11.17
Central	7.80	15.47	3.49	9.18	10.46	10.10	8.21
Tel Aviv	18.06	13.18	12.92	17.30	16.00	17.21	10.66
Southern	8.38	11.85	7.85	13.21	28.71	26.06	16.17

Source: Processing of labor-force survey micro data, 1990–2004

When we look at unemployment among Arabs by age group (Figure 8) we see that the 15–24 age cohort, which accounted for 23% of all unemployed Arabs in 2004, was the worst hit. Its unemployment rate rose from 5.8% in 1996 to 12% in 2004 (see Table 3). A partial explanation for the higher unemployment rates among young adults may be the low wages offered them when they first enter the labor market, as well as their lack of experience and instability (meaning their propensity to enter and leave the labor force frequently). By contrast, the approximately 8% decline in the relative share of young adults in the labor force between 1996 and 2004—from 30% to 22% (see Figure 9 below)—was not translated into a decline in overall unemployment. Consequently the influence of the high unemployment level among young adults on the rise in the overall unemployment rate was dominant. We can also see that the 25–34 and 35–44 age cohorts came to be the largest segments of the labor force.

<Figures 8 and 9 around here.>

An analysis of unemployment by educational group reveals that unemployment is the lot mainly of those with 0–8 years of schooling (see Figure 10 below); they account for 35% of all the jobless. In 1996 the unemployment rate for this group was 7.1%; in 2003 it was 18.7% (see Table 3 above). This group's vulnerability to unemployment is explained by the decrease in jobs in traditional sectors and the rise in advanced sectors (see Table 1 above). The group's relatively inferior qualifications and training make them unsuited to the new jobs available after the alterations in the structure of the labor market in Israel (structural unemployment). To this can be added the influence of the employment of foreign workers in Israel: they resemble the members of the uneducated group but are willing to accept lower wages. As with the influence of age on unemployment trends, the structural change in the education of the workforce (which exerts a greater influence on unemployment rates than other structural changes [see below, Figure 11]) did not produce a decline in total unemployment: the high unemployment level among the uneducated was dominant and made a major contribution to the increase in total unemployment, despite the decline in the share of the uneducated in the labor force (12%) and the increase in the share of those with 13 or more years of education (10%) between 1993 and 2003. By contrast, the increase in the share of those with 9–12 years of schooling in the workforce did contribute to the rise in total unemployment.

<Figures 10 and 11 around here.>

The unemployment rate among educated Arabs is very low because educated workers invest more in their professional training. Such professional training produces a rapid fit between job seekers and employers. In addition, during a recession, companies and employers are less likely to lay off educated workers. Finally, most educated Arabs are employed in their home localities, whereas the less educated are forced to seek unskilled jobs in the labor market of the Jewish sector.

To this we should add that the unemployment differential among educational categories has increased during the past decade. For example, in 1996 unemployment among those with 0–12 years of schooling was 7% higher than it was among those with 13 years or more of education; in 2004 the difference was 23%. This unemployment gap indicates that the decline in the importance of traditional labor sectors and the inability of uneducated Arabs to find work in advanced sectors caused total unemployment among them to increase even further.

The contribution of the changes in the sectoral structure of the workforce (see Figure 12) resembles that of the structural component of education. The decline in the proportion of workers employed in traditional sectors corresponds to the decline in the proportion of uneducated Arabs in the labor force. Consequently it has not yielded any improvement in total unemployment. The expectation was that the declining share of the traditional sectors that are marked by large fluctuations in employment, such as construction, traditional industry, and agriculture, would bring down unemployment rates. Here too, though, the result was just the opposite: the decline in employment in these sectors did not translate into a significant rise in employment in advanced sectors.

<Figure 12 around here.>

With regard to geography, it is not surprising that the highest Arab unemployment rates are found in the south (see Figure 13). Unemployment there increased from 8% in 1996 to 26% in 2003; among Jews in that region it increased only from 11% to 13% (see Table 3 above and Table 4 below). The higher level of unemployment in the south stemmed in part from the limited education of workers there, which made it more difficult for them to find jobs in advanced and high-tech sectors. The neglect of economic development in the regions where Bedouin live also played a part in the deterioration of the situation. Here the structural change in the geographical composition of the labor force did contribute to a rise in unemployment (see Figure 14): because of the natural population increase, the proportion of the labor force living in southern and northern Israel, far from industrial centers, grew by some 4%, while that of residents of central Israel—Haifa and Tel Aviv—declined by a similar figure.

Table 3: Specific Unemployment Rates among Jews, by Demographic Categories

	1990	1993	1996	1999	2002	2003	2004
Sex							
Male	7.76	7.65	5.75	7.81	9.13	9.91	9.31
Female	11.49	11.74	7.89	9.23	10.51	11.38	11.35
Age							
15–24	24.38	21.32	14.94	17.21	21.54	23.45	18.98
25–34	10.12	9.52	6.87	8.85	10.50	11.24	10.45
35–44	7.33	7.38	5.36	6.91	7.38	8.37	8.14
45–54	5.01	6.38	4.42	6.14	7.47	8.07	8.70
55+	3.65	5.68	4.07	5.52	5.76	5.83	7.52
Family status							
Married	6.69	6.98	4.92	6.37	6.89	7.49	7.33
Other	17.37	16.37	11.23	13.37	15.93	17.10	16.37
Education							
0–8	10.62	11.55	6.89	11.65	13.17	16.75	5.94
9–12	12.04	11.78	8.76	11.10	12.56	14.11	15.40
13–15	7.08	7.63	5.70	7.41	9.01	8.81	9.18
16+	3.51	4.83	3.73	4.30	5.45	6.00	5.75
District							
Jerusalem	8.19	7.29	5.50	6.17	6.93	7.63	8.49
Northern	8.18	9.85	6.24	8.65	10.63	10.97	12.39
Haifa	11.10	10.91	7.24	10.43	10.69	11.87	10.87
Central	9.57	9.82	6.10	7.85	9.16	10.57	10.03
Tel Aviv	8.67	8.24	5.51	7.79	9.35	9.97	8.78
Southern	12.01	12.24	11.03	11.10	13.02	12.81	12.88

Source: Processing of labor-force survey micro data, 1990–2004

<Figures 13 and 14 around here.>

We can thus summarize the specific unemployment rates and labor-force participation rates as follows: the changes in the gender composition of the Arab labor force since the mid-1990s contributed to an increase in Arab unemployment. During the same period there were dramatic changes in this population with regard to age, education, and economic sector; it was expected that these changes would reduce

unemployment, since had there been no worsening of unemployment among the uneducated and young, the decline in the proportion of these two groups should have reduced overall unemployment. But the result was just the opposite. The changes in education and age distribution did not bring down unemployment significantly.

The conclusion is that changes in the composition of the Arab labor force cannot explain a significant part of the rise in unemployment during the last decade; that is, the dominant role of the specific unemployment rates of particular groups, such as the uneducated, and young adults, contributed to the rise in the total unemployment rate. What is more, the fact that the structural change in the labor force—the proportion of the uneducated and young adults—did not translate into a decline in unemployment may point to hidden unemployment that cannot be measured; the increase in the number of the unemployed and the decline in the number of those participating in the labor force among the uneducated and young adults suggests that formerly employed persons have shifted to non-participation in the labor market (see the next section).

The structural change in the age and education composition of the labor force took place between 1991 and 2004—a period that includes both 1993–1996, when Arab unemployment declined, as well as 1997–2004, when it increased. This indicates that it was not the structural effect of age and education that brought down unemployment in 1993–1996; the main cause was the expansion of economic activity, especially in sectors that had previously relied on the basic knowledge of uneducated Arabs. By contrast, the rise in unemployment between 1997 and 2004 can be explained both by the slowdown in economic activity and by the decline of traditional industry and rise of advanced industry.

3. Duration of Unemployment: Causes and Implications

One reason why the unemployed do not find a new position quickly is the time it takes for workers to match their qualifications to the demands and needs of available jobs. When this process is protracted, the probability of a change in the employment status of unemployed persons declines and job-seekers remain out of work longer; this means an increased unemployment rate.

Table 2 breaks down unemployment by the length of time persons looked for work. As can be seen, the increase in unemployment in the last decade is in large measure a result of the longer duration of joblessness. Similarly, of the 6.8% rise in the Arab unemployment rate in 1996–2004, 4.8% can be attributed to the increase in the “hardcore” unemployed, those out of work for 50 weeks or longer. Such long-term unemployment among Arabs increased from 1.7% in 1996 to 6.5% in 2004.

Table 4: Breakdown of Unemployment by Duration of Joblessness

Year	50+ weeks	40–49 weeks	30–39 weeks	20–29 weeks	10–19 weeks	0–9 weeks	Average time out of work (weeks)	**Unemployment rate**
Arabs								
1990	0.54	0.19	0.32	2.66	3.82	1.97	19	**9.68**
1993	3.45	0.14	0.81	3.05	3.25	2.56	26	**13.37**
1996	1.70	0.00	0.17	0.78	1.29	1.22	26	**5.18**
1999	3.19	0.38	0.48	1.69	2.24	2.20	27	**10.58**
2002	2.73	1.80	0.68	2.25	2.81	2.09	28	**12.74**
2003	3.81	1.50	0.42	1.16	3.04	1.96	30	**12.15**
2004	6.48	0.22	0.44	0.88	1.71	1.94	35	**11.98**
Jews								
1990	1.93	0.18	0.44	1.60	1.67	3.37	22	**9.41**
1993	2.44	0.17	0.38	1.39	1.52	3.50	23	**9.50**
1996	0.90	0.14	0.19	0.87	0.96	3.37	17	**6.75**
1999	1.54	0.22	0.33	1.25	1.42	3.43	20	**8.50**
2002	1.89	0.40	0.40	1.43	1.78	3.63	21	**9.81**
2003	2.63	0.50	0.45	1.65	1.58	3.60	24	**10.64**
2004	3.15	0.27	0.39	1.49	1.51	3.27	25	**10.32**

Source: Processing of labor-force survey micro data, 1990—2004

Much of the increase in unemployment rates reflects the longer time that people remained without a job. Since 1996, refractory unemployment has increased relative to transient unemployment. The figure is higher among Arabs than among Jews; for example, in 2004 the average duration of unemployment was 35 weeks in the Arab sector and 25 weeks in the Jewish sector. Here we should note not only the longer duration of unemployment in Arab localities but also the proportion of the hard-core jobless: in 2004, more than 55% of unemployed Arabs remained out of work for 50 weeks or more, compared to 31% of Jews (see Figure 15). Extended unemployment has severe social impacts both at the personal level (poverty and emotional depression)[7] and at the national level (increased economic inequality between Arabs and Jews). What is more, protracted unemployment reduces unemployed Arabs' chances of returning to work, and this further increases total unemployment rates.

<Figure 15 around here.>

The greater duration of unemployment among Arabs than among Jews, and especially among those with little education, is further evidence that structural unemployment, in addition to demand unemployment, explains a large part of the rise in unemployment since the mid-1990s. Both the Israeli and international markets have been affected by the declining share of the traditional industry and other sectors and the expanded share of new industries and the new economy (the introduction of new technologies that require fewer workers). Because of the inferior status of the Arab labor force—whose professional and sectoral composition show over-representation of trades that do not require extensive knowledge or personal capital—and the poor

7. Noam Zussman and Dimitri Romanov found a negative correlation between unemployment and Israelis' satisfaction with their lives (Zussman and Romanov 2004).

match between its qualifications and the available jobs, unemployment rose significantly among the Arabs. By contrast, Jewish unemployment was caused less by the structural composition of the workforce and more by the economic slowdown (Achdut et al. 2000).

Foes of the unemployment compensation system maintain that unemployment compensation reduces the marginal cost of an individual's joblessness and consequently raises the minimum wage demanded as a condition of returning to work, and thus may prompt unemployed persons to reject job offers. Were this the case, the job-search period would increase and the probability of an individual's returning to work would decline. On the other hand, economists who support the unemployment compensation system argue that these payments were instituted to provide unemployed persons with the time needed to find a job suited to their qualifications. Most empirical studies of the effect of unemployment compensation on the duration of unemployment have found that an increase in the replacement rate of the unemployed (that is, an increase in the ratio between unemployment compensation and an individual's income when employed) increases with the length of time the jobless look for work.

Figure 16 shows the distribution of unemployed persons who worked during the 12 months before they lost their job according to the reasons they found themselves out of work. It can be seen that an overwhelming majority of unemployed Arabs, some 90%, were laid off (due to cutbacks, the end of a contract, or other reasons); that is, layoffs are the overwhelming factor in unemployment. Among Jews, the share of those laid off was about 70%. The proportion of Arabs who were unemployed on account of layoffs rose from 70% in 1996 to 93% at 2004; among Jews the figure increased from 56% to 76% during the same interval. By contrast, during those years the proportion of unemployed Arabs who had quit their jobs voluntarily declined from 19% to 5.6%. These figures suggest that the unemployment crisis is associated with a decline in the demand for labor.

<Figure 16 around here.>

4. Probabilities of Movement between Labor Market States

Unemployment rates among a particular group may be high for several reasons: (1) because its members have difficulty finding jobs and escaping unemployment; (2) because they cannot keep a job after being hired; (3) because they tend to enter and exit the workforce frequently. To understand the causes of a high unemployment rate one must accordingly focus on why individuals choose to be (or find themselves) in one of the three labor-market states: unemployment, employment, and non-participation. Because the movements associated with high unemployment are easy to identify, this information can be used to select policy tools that will reduce unemployment among a disadvantaged group, taking into account the relative size and weight of the transitions between the different market states and their impact on the employment rate.

Equation 8 in Appendix A makes it possible to break down unemployment rates and identify how the various factors contribute to it. It can be seen that the

unemployment rate is a function of the probabilities of individuals' moving among the three labor-market possibilities. That is, an increase in the probability that employed persons will lose their job and become unemployed (**Peu**)[8] or drop out of the job market (**Pen**), or an increase in the probability that individuals who are outside the job market will re-enter it but remain unemployed (**Pnu**), will lead to an increase in the total unemployment rate. By contrast, an increase in the probability that individuals move from unemployment to employment (**Pue**) or leave the labor force (**Pun**), or a rise in the probability that individuals currently outside the labor force will find a job (**Pne**), will lead to a drop in the unemployment rate. Equation 8 can also tell us why the rates at which individuals move between different labor-market states vary in accordance with length of unemployment, district, age, gender, and nationality.

We can also find out which of these six probabilities are key factors in the rise in unemployment. For example, is unemployment greater because more workers are losing their jobs (high **Peu**), or because the jobless are remaining unemployed for a longer period (low **Pue**)? Consequently, in order to assess the influence of a particular policy tool on the unemployment rate one must know the initial values of the six probabilities and how the policy tools affect them.

The important information derived from the labor-force survey panels for 1990–2004 allows us to investigate the probabilities of transitions between the different labor-market states as a function of demographic parameters.[9] Tables 5–8, Figures 17–20, and Equation 7 in Appendix A allow us to estimate the relative extent to which high unemployment rates are caused by the values of each of the state-change probabilities.

The findings presented in Figures 17 and 18 confirm the results indicated above. The probability that an employed person would become unemployed (**Peu**) was greater among Arabs than among Jews, increased over time, and peaked in 2002. As noted, the greater the probability that an employed person will become unemployed, with all other factors remaining unchanged, the higher the total unemployment rate; this offers a partial explanation for the higher Arab unemployment rates. As we have seen, this difference, to the detriment of the Arabs, stems from the fact that the proportion of unemployed persons (who had worked during the 12 months before losing their jobs) who were laid off is higher among Arabs than among Jews.

<Figures 17 and 18 around here.>

8. To facilitate comprehension of the text, here are capsule definitions of the various probabilities:
   Peu: probability of transition from employment to unemployment;
   Pen: probability of transition from employment to non-participation in labor market;
   Pue: probability of transition from unemployment to employment;
   Pun: probability of transition from unemployment to non-participation in labor market;
   Pne: probability of transition from non-participation in labor market to employment;
   Pnu: probability of transition from non-participation in labor market to unemployment;
   Puu: probability or remaining unemployed

9. The probability of a transition from state **i** to state **j** in time **t** is obtained by dividing the number of individuals who entered state **i** by the number of individuals in state **i** at time **t-1**.

The odds that an unemployed Arab will find a job (**Pue**) are significantly lower than those for an unemployed Jew, and declined by 19 percentage points, from 62% in 1996 to 33% in 2004 (Figure 17). Among Jews, this probability declined by only 5 percentage points, from 46% in 1996 to 41% in 2004 (Figure 18). The decline among Arabs can explain a large part of the rise in the total unemployment rate. What is more, the difference in **Pue** between Arabs and Jews can also explain the fact that Arabs remain jobless longer than Jews do. This is corroborated by the fact that **Pun** is higher among Arabs than among Jews. That is, even though this probability refers to a decline in total unemployment, it also means a longer period of unemployment, because the chances of finding work are smaller for individuals who frequently switch back and forth from unemployment to non-participation, so that when they return to the labor market they will remain unemployed.

Note that a large proportion of both unemployed and employed persons leave the job market (drop out of the labor force). It is interesting that in 1994–2004 **Pen** increased among Arabs by 6 percentage points but remained stable among Jews, whereas **Pun** rose by 8.5% among Arabs and declined by 4.5% among Jews. This means that 14.5% of Arab workers (employed or unemployed) left the labor force, while 5% of those who had left the labor force reentered it but only 1.5% became unemployed. The net result is that 8% of those who were part of the workforce during that period dropped out of the labor market, which means that some of those who left the labor force represent concealed unemployment that could not be calculated previously. The Arabs' high probability of non-participation reflects their weaker link to the labor market in Arab localities as well as in the Israeli market.

The probabilities of entering the labor market as a job seeker (**Pnu**) or as an employed person (**Pne**) have opposite effects on the unemployment rate. A rise in **Pnu** increases the unemployment rate, whereas a rise in **Pne** reduces it. I find that both **Pnu** and **Pne** are higher among Jews than among Arabs. I will return to this below, when I break down the probabilities by age in order to understand the influence on the total unemployment rate of the entry of new workers (young persons aged 15–25) to the job market.

According to the findings, several key factors account for the higher unemployment rates among Arabs as compared to Jews: (1) Arabs show a high probability of moving from employment to unemployment (**Peu**) or from employment to non-participation in the labor force (**Pen**). (2) The probability that unemployed Arabs will find a job (**Pue**) is relatively low. The main reason that Arabs, especially young and uneducated Arabs, find it harder to get a job than Jews do is that the number of jobs in Arab localities is limited and growth is concentrated in the cities. In addition, advanced industries, for which Arabs lack the qualifications, are supplanting the traditional sectors in which a large percentage of Arabs were employed. (3) The group aged 15 and over, whose minimum wage demands are higher, is increasing. (4) More women are available for jobs, but there is a limited demand for workers, especially in Arab areas; this creates competition for jobs and lowers wages.

We can obtain a picture of the situation of Arab jobholders and unemployed persons by studying their stability in the labor market. As can be seen from Figure 19, in 1995–2004 the probability that an Arab would remain employed declined by some 8 percentage points, while the probability that he or she would remain unemployed

increased by 19 percentage points. On the other hand, among Jews, the probability of remaining employed dropped by only 2 percentage points and the probability of remaining unemployed increased by only 11 percentage points (see Figure 20).

<Figures 19 and 20 around here.>

Table 5 displays the probabilities of movement among the labor-market states by age cohort for the period 1990–2004. It can be seen, for example, that the probability that Arabs aged 15–24 would go from employment to unemployment (**Peu**) in 2002 was 0.09; i.e. 9% of Arabs aged 15–24 who were employed in 2002 were unemployed in 2003. That same year, the figure for Jews aged 15–24 was the same: 9% of these young persons employed in a particular year could expect to be unemployed the next year.

The higher unemployment rate among young Arabs as opposed to older Arabs stems chiefly from the higher probability that young people will shift from employment to non-participation in the labor force (**Pen**) and also from a higher probability that they will move from employment to unemployment (**Peu**) or from non-participation to unemployment (**Pnu**) (see Table 5). In addition, young people lose their jobs more frequently than older persons do, because they have less experience and are more likely to be laid off—but also because they do not know how to behave on the job. The greater chance of younger people losing their job also reflects their choice of sectors that do not require particular expertise.

Table 5: Probabilities of Transition between Labor-Market States, by age

	From employment to:			From unemployment to:			From nonparticipation to:		
	Employ.	Unemploy.	Non-part.	Employ.	Unemploy.	Non-part.	Employ.	Unemploy.	Non-part.
	P_{ee}	P_{eu}	P_{en}	P_{ue}	P_{uu}	P_{un}	P_{ne}	P_{nu}	P_{nn}
	1990								
Arabs									
15–24	0.70	0.09	0.21	0.21	0.48	0.30	0.06	0.01	0.92
25–34	0.88	0.07	0.05	0.45	0.41	0.14	0.03	0.01	0.96
35–44	0.90	0.06	0.04	0.60	0.32	0.07	0.02	0.01	0.97
45–54	0.91	0.07	0.02	0.42	0.34	0.25	0.02	0.00	0.97
55+	0.80	0.00	0.20	0.28	0.56	0.16	0.00	0.00	0.99
Jews									
15–24	0.31	0.06	0.63	0.10	0.26	0.63	0.05	0.03	0.92
25–34	0.89	0.05	0.06	0.42	0.25	0.32	0.19	0.08	0.73
35–44	0.93	0.03	0.04	0.43	0.26	0.31	0.15	0.08	0.77
45–54	0.93	0.02	0.05	0.44	0.19	0.37	0.12	0.03	0.86
55+	0.82	0.01	0.17	0.34	0.19	0.47	0.03	0.00	0.97
	1996								
Arabs									
15–24	0.84	0.04	0.12	0.57	0.18	0.25	0.12	0.02	0.86
25–34	0.92	0.03	0.05	0.49	0.16	0.35	0.07	0.01	0.92
35–44	0.93	0.02	0.05	0.71	0.12	0.17	0.07	0.01	0.92
45–54	0.83	0.06	0.11	0.21	0.43	0.36	0.03	0.01	0.96
55+	0.74	0.02	0.24	0.36	0.11	0.53	0.02	0.00	0.98
Jews									
15–24	0.66	0.06	0.28	0.43	0.21	0.37	0.20	0.04	0.75
25–34	0.91	0.03	0.06	0.48	0.20	0.32	0.25	0.06	0.68
35–44	0.93	0.03	0.04	0.52	0.18	0.30	0.19	0.06	0.76
45–54	0.93	0.02	0.05	0.48	0.17	0.35	0.17	0.05	0.78
55+	0.82	0.01	0.16	0.29	0.10	0.61	0.03	0.00	0.96
	2002								
Arabs									
15–24	0.72	0.09	0.19	0.46	0.18	0.36	0.12	0.05	0.84
25–34	0.88	0.06	0.06	0.35	0.39	0.26	0.07	0.05	0.88
35–44	0.88	0.05	0.07	0.25	0.31	0.44	0.07	0.04	0.89
45–54	0.86	0.03	0.11	0.25	0.25	0.50	0.03	0.02	0.95
55+	0.70	0.01	0.29	0.15	0.00	0.85	0.02	0.00	0.98
Jews									
15–24	0.63	0.09	0.28	0.35	0.22	0.43	0.16	0.06	0.78
25–34	0.88	0.05	0.07	0.54	0.23	0.23	0.22	0.09	0.69
35–44	0.92	0.04	0.04	0.41	0.24	0.34	0.15	0.09	0.76
45–54	0.92	0.04	0.04	0.46	0.26	0.28	0.14	0.06	0.80
55+	0.81	0.03	0.16	0.28	0.21	0.51	0.03	0.01	0.96
	2004								
Arabs									
15–24	0.74	0.04	0.22	0.35	0.20	0.45	0.12	0.03	0.86
25–34	0.88	0.03	0.08	0.37	0.24	0.40	0.09	0.04	0.87
35–44	0.90	0.03	0.07	0.36	0.36	0.29	0.06	0.05	0.90
45–54	0.91	0.03	0.06	0.22	0.50	0.28	0.03	0.04	0.93
55+	0.71	0.02	0.28	0.12	0.10	0.79	0.01	0.00	0.98
Jews									
15–24	0.69	0.07	0.23	0.37	0.24	0.39	0.15	0.07	0.78
25–34	0.90	0.04	0.06	0.48	0.29	0.23	0.22	0.11	0.67
35–44	0.92	0.04	0.04	0.41	0.33	0.26	0.14	0.12	0.74
45–54	0.93	0.03	0.04	0.44	0.30	0.26	0.12	0.09	0.79
55+	0.83	0.02	0.15	0.28	0.18	0.54	0.03	0.01	0.96

Source: Processing of labor-force survey micro data, 1990–2004

To demonstrate that Arab unemployment since 1996 is also associated with the structural change manifested in the contraction of traditional industries and the expansion of advanced industries based on high technology, we will look at the probabilities of transition by sector focusing on high-tech as against traditional

industries, which have always employed a large percentage of Arabs (see below, Table 6).

As can be seen, in traditional industries that were unable to maintain the employment stability of Arab workers, **Peu** has increased since 1996 (ibid.). On the other hand, the decline in **Pue** among Arabs reflects the inability of Arabs laid off by traditional sectors to find new jobs in that sector, because of the decrease in the number of jobs that accompanies the switch to high-tech industry and their difficulty in finding jobs in high-tech; that is, the number of those employed in traditional industries declines, but the unemployed cannot find jobs in high-tech because they are not qualified. On the other hand, workers with more education who can find jobs in high tech enjoy employment stability. In 1996–2004 the probability that an Arab employed in high-tech would become unemployed followed a declining trend; the increase in **Pue** expressed the ability of educated Arabs who were out of work to find new jobs in advanced sectors. The decline in **Puu** among those who had lost their jobs in advanced industry reflects the speed with which educated Arabs were able to find new jobs, thanks to their rapid adaptability to market conditions. On the other hand, the same years saw an increase in the probability that unemployed persons in traditional industries would remain unemployed and sometimes even drop out of the labor force; this reflects the poor match between existing jobs, which require special skills, and the training of the poorly educated. It can also be seen from Table 6 that education and commerce are the sectors in which workers have the most employment stability, especially as compared to traditional industries.

Table 6: Probabilities of Transition between Labor-Market States, by Economic Sector

	From employment to:			From unemployment to:			From nonparticipation to:		
	Employ.	Unemploy.	Non-part.	Employ.	Unemploy.	Non-part.	Employ.	Unemploy.	Non-part.
	P_{ee}	P_{eu}	P_{en}	P_{ue}	P_{uu}	P_{un}	P_{ne}	P_{nu}	P_{nn}
	1990								
Arabs									
Traditional sectors	0.83	0.09	0.08	0.56	0.34	0.10	0.42	0.58	0.00
Advanced sectors	0.89	0.07	0.04	0.00	1.00	0.00	0.00	0.00	0.00
Trade	0.90	0.04	0.06	0.34	0.50	0.16	0.00	0.00	0.00
Education	0.95	0.00	0.05	0.59	0.41	0.00	0.00	0.00	0.00
Public / community services	0.94	0.04	0.02	0.52	0.00	0.48	0.00	0.00	1.00
Services and misc.	0.86	0.09	0.04	0.44	0.35	0.21	0.00	0.00	1.00
Jews									
Traditional sectors	0.89	0.03	0.08	0.50	0.26	0.24	0.24	0.07	0.69
Advanced sectors	0.93	0.03	0.04	0.55	0.15	0.30	0.45	0.06	0.49
Trade	0.87	0.03	0.09	0.52	0.24	0.24	0.31	0.09	0.60
Education	0.92	0.02	0.07	0.51	0.20	0.29	0.26	0.06	0.68
Public / community services	0.88	0.02	0.10	0.42	0.21	0.37	0.26	0.07	0.67
Services and misc.	0.90	0.04	0.06	0.44	0.32	0.24	0.28	0.07	0.65
	1996								
Arabs									
Traditional sectors	0.88	0.03	0.09	0.50	0.15	0.34	0.34	0.12	0.54
Advanced sectors	0.82	0.06	0.13	0.44	0.38	0.17	0.00	0.00	1.00
Trade	0.89	0.05	0.05	0.45	0.55	0.00	0.40	0.00	0.60
Education	0.93	0.01	0.06	1.00	0.00	0.00	0.66	0.00	0.34
Public / community services	0.89	0.01	0.10	0.34	0.40	0.26	0.00	0.00	1.00
Services and misc.	0.89	0.04	0.07	0.93	0.07	0.00	0.12	0.15	0.73
Jews									
Traditional sectors	0.88	0.04	0.08	0.58	0.18	0.24	0.39	0.06	0.55
Advanced sectors	0.91	0.02	0.06	0.52	0.18	0.29	0.40	0.06	0.54
Trade	0.86	0.04	0.10	0.57	0.15	0.28	0.25	0.07	0.67
Education	0.91	0.01	0.07	0.59	0.20	0.21	0.39	0.05	0.55
Public / community services	0.90	0.02	0.08	0.57	0.14	0.28	0.33	0.08	0.59
Services and misc.	0.83	0.04	0.13	0.51	0.18	0.31	0.29	0.06	0.66
	2002								
Arabs									
Traditional sectors	0.79	0.11	0.11	0.45	0.23	0.32	0.52	0.11	0.37
Advanced sectors	0.83	0.06	0.11	0.52	0.24	0.24	0.27	0.00	0.73
Trade	0.86	0.06	0.09	0.68	0.12	0.20	0.08	0.19	0.73
Education	0.90	0.02	0.08	0.00	0.42	0.58	0.48	0.00	0.52
Public / community services	0.81	0.04	0.15	0.41	0.25	0.33	0.00	0.26	0.74
Services and misc.	0.86	0.05	0.09	0.50	0.24	0.26	0.42	0.23	0.36
Jews									
Traditional sectors	0.85	0.07	0.08	0.47	0.24	0.29	0.33	0.12	0.55
Advanced sectors	0.88	0.05	0.07	0.62	0.21	0.17	0.40	0.11	0.48
Trade	0.84	0.06	0.11	0.57	0.20	0.23	0.32	0.13	0.56
Education	0.90	0.03	0.07	0.54	0.16	0.30	0.37	0.09	0.54
Public / community services	0.90	0.02	0.08	0.51	0.19	0.30	0.28	0.07	0.65
Services and misc.	0.82	0.05	0.13	0.40	0.26	0.33	0.27	0.07	0.66
	2004								
Arabs									
Traditional sectors	0.82	0.07	0.12	0.62	0.24	0.15	0.44	0.00	0.56
Advanced sectors	0.94	0.02	0.04	0.66	0.17	0.17	0.81	0.00	0.19
Trade	0.85	0.03	0.13	0.55	0.08	0.37	0.58	0.00	0.42
Education	0.95	0.00	0.05	0.57	0.00	0.43	0.20	0.11	0.69
Public / community services	0.84	0.03	0.13	1.00	0.00	0.00	0.27	0.00	0.73
Services and misc.	0.88	0.03	0.09	0.40	0.17	0.44	0.26	0.09	0.65
Jews									
Traditional sectors	0.88	0.05	0.08	0.57	0.21	0.22	0.34	0.13	0.53
Advanced sectors	0.90	0.04	0.06	0.62	0.22	0.16	0.34	0.13	0.52
Trade	0.85	0.06	0.09	0.62	0.19	0.19	0.33	0.11	0.56
Education	0.91	0.02	0.07	0.53	0.13	0.34	0.34	0.15	0.51
Public / community services	0.89	0.02	0.08	0.45	0.32	0.23	0.33	0.09	0.57
Services and misc.	0.84	0.05	0.11	0.46	0.25	0.29	0.21	0.11	0.68

Source: Processing of labor-force survey micro data, 1990–2004

Additional proof is provided by Table 7, which shows the probabilities of a transition between labor-market states by education category for the period 1990–2004. It can be seen that poorly educated Arabs, most of them employed in traditional industries, faced a high probability of moving from employment to unemployment and a low probability of shifting from unemployment to employment—compared to educated Arabs, but also compared to uneducated Jews. It can further be seen that uneducated Arabs had a high probability of moving from unemployment or employment to non-participation in the labor force, and that this probability rose between 1996 and 2004. A decline in the probability of shifting from unemployment to employment or a significant increase in the probability of remaining unemployed reflects the longer period in which poorly educated Arabs remain without a job as compared to educated Arabs and poorly educated Jews. The longer duration of unemployment reflects the difficulty faced by the poorly educated when they look for a job, because of the structural change in the employment market and the fact that most jobs in traditional sectors have been taken by foreign workers, as will be discussed in the next section.

Figure 7: Probabilities of Transition between Labor-Market States, by Education Categories

	From employment to:			From unemployment to:			From nonparticipation to:		
	Employ.	Unemploy.	Non-part.	Employ.	Unemploy.	Non-part.	Employ.	Unemploy.	Non-part.
	P_{ee}	P_{eu}	P_{en}	P_{ue}	P_{uu}	P_{un}	P_{ne}	P_{nu}	P_{nn}
	1990								
Arabs									
0–8	0.84	0.08	0.08	0.55	0.35	0.10	0.02	0.01	0.97
9–12	0.88	0.07	0.05	0.40	0.37	0.23	0.05	0.01	0.94
13–15	0.99	0.00	0.01	0.00	0.00	1.00	0.07	0.04	0.89
16+	0.95	0.05	0.00	0.00	1.00	0.00	0.35	0.21	0.43
Jews									
0–8	0.84	0.03	0.13	0.41	0.23	0.37	0.05	0.02	0.94
9–12	0.89	0.04	0.07	0.37	0.27	0.37	0.08	0.04	0.87
13–15	0.92	0.03	0.05	0.47	0.23	0.29	0.12	0.03	0.84
16+	0.95	0.01	0.04	0.58	0.09	0.33	0.14	0.02	0.84
	1996								
Arabs									
0–8	0.84	0.05	0.11	0.41	0.28	0.30	0.04	0.01	0.95
9–12	0.89	0.03	0.08	0.58	0.13	0.29	0.10	0.02	0.88
13–15	0.92	0.02	0.06	0.61	0.00	0.39	0.19	0.00	0.81
16+	0.97	0.00	0.03	1.00	0.00	0.00	0.20	0.03	0.77
Jews									
0–8	0.82	0.04	0.15	0.37	0.11	0.52	0.04	0.01	0.95
9–12	0.85	0.04	0.11	0.42	0.21	0.37	0.16	0.04	0.79
13–15	0.91	0.02	0.07	0.52	0.17	0.31	0.20	0.04	0.76
16+	0.94	0.01	0.04	0.64	0.13	0.23	0.17	0.03	0.81
	2002								
Arabs									
0–8	0.79	0.07	0.14	0.28	0.26	0.46	0.04	0.02	0.94
9–12	0.83	0.07	0.10	0.39	0.25	0.36	0.08	0.04	0.88
13–15	0.84	0.05	0.10	0.29	0.47	0.24	0.19	0.06	0.75
16+	0.92	0.03	0.06	0.11	0.51	0.38	0.24	0.11	0.65
Jews									
0–8	0.78	0.04	0.19	0.38	0.25	0.37	0.03	0.02	0.95
9–12	0.84	0.06	0.10	0.37	0.26	0.37	0.12	0.05	0.83
13–15	0.87	0.04	0.08	0.51	0.20	0.30	0.14	0.05	0.81
16+	0.92	0.03	0.05	0.58	0.16	0.26	0.13	0.03	0.84
	2004								
Arabs									
0–8	0.83	0.04	0.13	0.21	0.37	0.42	0.04	0.03	0.93
9–12	0.83	0.05	0.13	0.37	0.28	0.35	0.09	0.03	0.88
13–15	0.93	0.01	0.06	0.30	0.33	0.37	0.10	0.03	0.87
16+	0.95	0.01	0.04	0.51	0.06	0.42	0.18	0.04	0.78
Jews									
0–8	0.79	0.05	0.16	0.27	0.33	0.40	0.03	0.02	0.95
9–12	0.85	0.05	0.10	0.38	0.28	0.34	0.12	0.07	0.82
13–15	0.90	0.03	0.06	0.48	0.23	0.29	0.12	0.05	0.83
16+	0.93	0.02	0.05	0.48	0.28	0.23	0.12	0.04	0.83

Source: Processing of labor-force survey micro data, 1990–2004

Table 8 shows the probabilities of transition between labor-market states by district, for the period 1990–2004. The high probability that Arabs living in northern and southern Israel will move from employment to unemployment and the lower probability of their moving from unemployment to employment, as compared to Jews who live in the same districts, and compared to Arabs who live elsewhere, are evident. These findings again demonstrate the vulnerability of the Arabs who live in the north and south, far from the industrial centers of Israel.

Table 8. Probabilities of Transition among Labor-Market States, by District

	From employment to:			From unemployment to:			From nonparticipation to:		
	Employ.	Unemploy.	Non-part.	Employ.	Unemploy.	Non-part	Employ.	Unemploy.	Non-part
	P_{ee}	P_{eu}	P_{en}	P_{ue}	P_{uu}	P_{un}	P_{ne}	P_{nu}	P_{nn}
					1990				
Arabs									
Northern	0.86	0.07	0.07	0.58	0.29	0.13	0.04	0.01	0.95
Haifa	0.87	0.05	0.08	0.70	0.24	0.05	0.03	0.00	0.97
Central	0.86	0.07	0.07	0.24	0.36	0.40	0.03	0.02	0.95
Tel Aviv	0.94	0.00	0.06	0.49	0.00	0.51	0.00	0.06	0.94
Southern	0.85	0.15	0.00	0.35	0.56	0.09	0.00	0.00	1.00
Jews									
Jerusalem	0.89	0.03	0.08	0.47	0.20	0.33	0.08	0.02	0.89
Northern	0.90	0.02	0.08	0.35	0.34	0.32	0.08	0.04	0.88
Haifa	0.91	0.02	0.06	0.41	0.27	0.33	0.06	0.03	0.91
Central	0.89	0.04	0.07	0.38	0.24	0.38	0.08	0.03	0.89
Tel Aviv	0.90	0.03	0.08	0.43	0.22	0.35	0.07	0.02	0.90
Southern	0.89	0.03	0.08	0.39	0.22	0.39	0.07	0.03	0.91
					1996				
Arabs									
Northern	0.88	0.03	0.08	0.54	0.15	0.31	0.09	0.01	0.91
Haifa	0.91	0.02	0.07	0.63	0.13	0.24	0.09	0.02	0.88
Central	0.89	0.01	0.10	0.37	0.12	0.50	0.10	0.01	0.89
Tel Aviv	0.78	0.12	0.10	0.46	0.30	0.25	0.00	0.11	0.89
Southern	0.97	0.03	0.00	0.51	0.28	0.21	0.00	0.01	0.99
Jews									
Jerusalem	0.89	0.02	0.09	0.53	0.14	0.32	0.12	0.03	0.85
Northern	0.89	0.03	0.08	0.42	0.16	0.41	0.15	0.03	0.82
Haifa	0.89	0.02	0.09	0.43	0.19	0.37	0.13	0.04	0.83
Central	0.88	0.03	0.09	0.46	0.16	0.37	0.17	0.03	0.80
Tel Aviv	0.88	0.03	0.09	0.47	0.18	0.35	0.14	0.03	0.83
Southern	0.87	0.04	0.09	0.42	0.24	0.34	0.11	0.05	0.84
					2002				
Arabs									
Northern	0.85	0.06	0.09	0.29	0.27	0.44	0.07	0.03	0.90
Haifa	0.81	0.04	0.15	0.36	0.37	0.28	0.08	0.02	0.90
Central	0.78	0.08	0.14	0.41	0.20	0.40	0.09	0.03	0.89
Tel Aviv	0.87	0.08	0.04	0.36	0.27	0.37	0.14	0.07	0.79
Southern	0.84	0.12	0.04	0.40	0.32	0.28	0.05	0.10	0.85
Jews									
Jerusalem	0.85	0.03	0.12	0.44	0.15	0.41	0.07	0.03	0.90
Northern	0.87	0.05	0.09	0.35	0.29	0.36	0.10	0.04	0.86
Haifa	0.87	0.05	0.09	0.41	0.23	0.37	0.09	0.04	0.86
Central	0.88	0.05	0.08	0.44	0.22	0.34	0.14	0.04	0.82
Tel Aviv	0.86	0.04	0.09	0.45	0.24	0.31	0.10	0.04	0.87
Southern	0.85	0.06	0.09	0.38	0.28	0.34	0.10	0.05	0.86
					2004				
Arabs									
Northern	0.87	0.03	0.09	0.33	0.35	0.31	0.07	0.04	0.89
Haifa	0.83	0.03	0.14	0.27	0.28	0.45	0.10	0.03	0.87
Central	0.91	0.02	0.07	0.21	0.16	0.62	0.12	0.03	0.85
Tel Aviv	0.83	0.02	0.14	0.55	0.45	0.00	0.14	0.00	0.86
Southern	0.80	0.08	0.12	0.16	0.25	0.59	0.05	0.04	0.92
Jews									
Jerusalem	0.87	0.03	0.09	0.41	0.23	0.36	0.08	0.03	0.89
Northern	0.87	0.05	0.08	0.38	0.33	0.29	0.11	0.06	0.83
Haifa	0.88	0.04	0.08	0.41	0.25	0.34	0.08	0.04	0.87
Central	0.89	0.04	0.07	0.42	0.27	0.31	0.11	0.06	0.82
Tel Aviv	0.89	0.03	0.08	0.44	0.25	0.31	0.10	0.04	0.85
Southern	0.87	0.05	0.08	0.36	0.33	0.32	0.10	0.07	0.83

Source: Processing of labor-force survey micro data, 1990–2004

The data presented here can be summarized as follows. First, the demand for Arab workers is extremely limited. Second, workers who could find relatively unskilled positions in traditional industries before 1996 found it harder to do so later, for a number of reasons:

1. The demand for unskilled workers plummeted because of developments in the Israeli and world markets, characterized by a decline in the share of traditional industries and a rise in the share of high-tech and new economy industries.
2. Approximately 50% of all Arab workers are employed in sectors strongly influenced by cyclical fluctuations, such as industry, construction, and tourism, and are concentrated in jobs that are relatively vulnerable to unemployment, such as skilled and unskilled labor, service work, and clerical work.
3. Arabs tend to be concentrated in jobs that do not require expertise and a high level of human capital and that pay low wages; this makes it easier to replace them with others, such as foreign workers.

5. The Impact of Foreign Workers

The second half of the 1990s saw a rise in unemployment in Israel, paralleling an increase in the number of foreign workers and of Palestinian workers from the West Bank and Gaza District. Most labor migrants from developing to developed countries are job-seekers whose wage threshold is much lower than that of local workers. In Israel they are employed in simple manual tasks that require no expertise whatsoever, such as construction, agriculture, and services (Amir and Gottlieb 2005); their wages are substantially lower than those of locals and even of Palestinians employed in the same jobs. The assumption is that foreign workers in Israel serve as cheap substitutes for local workers, especially those from disadvantaged and poorly educated sectors.

Note that most of the professional literature on the impact of labor migrants on local workers has not found that they exert a significant influence on the employment and wages of locals.[10] This is generally attributed to problems in defining the competing groups of migrants and locals: locals respond to migration by transferring their capital and labor force to other regions; migrants are positioned in a growing local economy and display a high interregional replacement flexibility (Borjas 2003). Another problem is endogeny, caused by the non-random migration of foreign workers. Here, I will not conduct an empirical study into the influence of foreign workers on the employment of local Arabs; instead, I will offer an analysis based on previous studies, which indicate that foreign workers have a significant negative impact on the unskilled Arab labor force.

According to CBS estimates, there were relatively few foreign workers in Israel before 1994, because Israel imposed strict limits on their importation. In 1991 there were only 8,000 foreign workers in Israel. With the reversal of foreign-labor policy, which began in 1994, their number skyrocketed to 55,000; by the end of 1995 there were approximately 120,000 foreign workers in Israel. In addition to the change

10. See, for example, Card 2001; Altonji and Card 1997; Card 1990; Borjas 1987; Friedberg 2001.

in employment policy, the sharp rise was due to the lack of appropriate government oversight and surrender to employers in the construction and agricultural sectors. At the end of 2002 there were 240,000 foreign workers in Israel (legal and illegal). In 2004 the number declined to 180,000. Between 1995 and 2004, the annual average figure was 176,000, including 105,000 illegals and only 71,000 with valid work permits. According to the Ministry of Labor and Social Affairs, the average number of work permits issued in 1995–2004 was 82,698, a figure somewhat higher than the average number of foreign workers in practice. The relatively large number of foreign workers in the Israeli labor market results from the higher wages offered them compared to in their countries of origin and the low risk of deportation after their visas have expired. Visa-holders become illegal workers when they do not renew their visas (work permits are generally valid for two years) but do not leave the country, or when they transfer to a new employer other than the one for whom the permit was issued.

The increase in the number of foreign workers in Israel was accompanied by an increase in nationwide unemployment, especially in disadvantaged sectors such as uneducated Arabs, most of whom work at unskilled jobs in construction and agriculture. Between 1996 and 2004 the unemployment rate among poorly educated Arabs rose by 121% (see Figure 10 above). Drawing on the labor-force survey panel data, Amir and Gottlieb (2004) showed that non-Israeli worker penetration of the labor market in the 1990s pushed Israeli men out of the business sector but not the public sector. In response to the entry of non-Israeli workers in 1994–2000, some 18,500 Israeli men lost their jobs; another 13,500 found themselves out of work as a result of changes in the wages offered to jobholders. But Amir and Gottlieb's study does not distinguish between Jews and Arabs. Zussman and Romanov (2003), who studied the displacement of Israeli blue-collar workers from construction as result of the entry of foreign workers to that sector, found that the replacement rate of Israeli blue-collar workers by foreign workers was 1.25; they showed that a reduction of 30,000 illegal foreign workers in the construction industry could lead to the addition of 38,000 Israeli workers and a wage increase of approximately 16%.

Table 9 shows the distribution by economic sector of Arab, Palestinian, and foreign workers in Israel. The conspicuous characteristic of all the workers in this table is their concentration in sectors that do not require special skills. The top third of the table, which shows the distribution of Arab workers in Israel, indicates that they are found chiefly in construction, traditional industries, and commerce and services—but especially in construction. The middle third of the table shows the distribution of foreign workers in Israel; they are seen to be concentrated in construction, agriculture, and domestic services. The bottom third shows that Palestinian workers in Israel are concentrated in construction, agriculture, and commerce. A significant overlap of the employment sectors of Arab workers, Palestinian workers, and foreign workers is evident. Table 9 paints a clear picture of competition in three sectors, especially construction. Given the significant rise in unemployment among poorly educated Arabs (Figure 10), and the similarity of the occupational and demographic parameters of Arab construction and agricultural workers to those of foreign workers and Palestinian workers, we will focus on the data for Arab, Palestinian, and foreign workers in construction and agriculture to analyze the influence of labor migrants on uneducated Arab workers.

Table 9: Distribution of Israeli Arab, Palestinian, and Foreign Workers, by Economic Sector

	Advanced industries, education, banking	Public and community services	Traditional industries	Services and misc.	Business services	Trade	Agriculture	Construction
				Arabs				
1995	0.12	0.10	0.16	0.17	0.04	0.11	0.05	0.25
1996	0.11	0.10	0.14	0.15	0.04	0.12	0.04	0.30
1997	0.11	0.11	0.13	0.15	0.04	0.14	0.04	0.29
1998	0.12	0.10	0.12	0.17	0.04	0.14	0.06	0.25
1999	0.14	0.10	0.13	0.19	0.04	0.15	0.04	0.21
2000	0.15	0.10	0.12	0.18	0.04	0.18	0.04	0.19
2001	0.17	0.15	0.08	0.15	0.06	0.19	0.02	0.18
2002	0.18	0.15	0.08	0.15	0.06	0.17	0.02	0.20
2003	0.18	0.15	0.07	0.15	0.05	0.16	0.02	0.22
2004	0.17	0.14	0.07	0.15	0.07	0.17	0.02	0.21
				Foreigners				
1995	0.00	0.03	0.02	0.16	0.13	0.02	0.14	0.50
1996	0.00	0.03	0.02	0.20	0.14	0.02	0.13	0.47
1997	0.00	0.03	0.02	0.22	0.14	0.03	0.12	0.45
1998	0.00	0.02	0.01	0.26	0.16	0.04	0.12	0.38
1999	0.00	0.02	0.01	0.28	0.20	0.04	0.11	0.33
2000	0.00	0.03	0.01	0.29	0.20	0.06	0.11	0.31
2001	0.00	0.03	0.01	0.28	0.19	0.06	0.10	0.34
2002	0.00	0.03	0.01	0.30	0.19	0.06	0.10	0.32
2003	0.00	0.02	0.01	0.33	0.20	0.06	0.11	0.27
2004	0.00	0.03	0.01	0.31	0.19	0.06	0.13	0.27
				Palestinians				
1995	0.00	0.00	0.14	0.13	0.00	0.13	0.10	0.51
1996	0.00	0.00	0.15	0.08	0.00	0.13	0.11	0.53
1997	0.00	0.00	0.14	0.07	0.00	0.13	0.11	0.55
1998	0.00	0.00	0.12	0.09	0.00	0.13	0.11	0.56
1999	0.00	0.00	0.13	0.09	0.00	0.13	0.09	0.56
2000	0.00	0.00	0.13	0.08	0.00	0.15	0.09	0.55
2001	0.00	0.00	0.16	0.10	0.00	0.18	0.07	0.49
2002	0.00	0.00	0.18	0.13	0.00	0.20	0.09	0.41
2003	0.00	0.00	0.17	0.11	0.00	0.18	0.08	0.46
2004	0.00	0.00	0.17	0.13	0.00	0.21	0.08	0.41

Source: Arabs and foreigners—Israel CBS; Palestinians in Israel, Palestinian CBS.

As can be seen from Figure 21, there was a significant decline in the number of Arabs employed in construction and agriculture in Israel, which was parallel to the increase in the number of foreign workers: between 1995 and 2002 the employment of foreign workers in these sectors rose by 65%, from 59,000 to 98,000. Over the same period, the number of Arab workers in construction and agriculture declined from 51,000 to 39,000; concomitantly, the unemployment rate of uneducated Arabs rose from 7.5% to 17%. Between 1995 and 2002, the number of workers from the West Bank and Gaza District employed in construction and agriculture in Israel fell from 44,000 to 17,000. The increase in the number of foreign workers in construction between 1995 and 2002 was the consequence of several factors, beginning with the mass immigration that began in 1990 and produced a significant rise in investment in construction, along with the closure of the Israeli labor market to Palestinian workers (approximately half of whom worked in construction before 1990) following the Gulf War. In 2002, in view of the persistent rise in total unemployment in Israel, the government adopted a policy of curtailing the number of foreign workers in Israel, especially illegal workers. The consequence was a drop in the number of foreign workers in construction and agriculture, from 98,000 in 2002 to 73,000 in 2003; in response, the number of Arab workers in these sectors grew from 39,000 to 47,000

and the unemployment rate of uneducated Arabs declined from 17% to 15% (see Figure 10). During this period, approximately 2,000 Palestinians workers were added to these sectors. The negative correlation coefficient between the number of Arab workers in construction and agriculture and the number of foreign workers in these sectors in Israel between 1995 and 2004 (-0.41) indicates that the mass influx of low-paid foreign workers who competed with unskilled Arabs and Palestinians employed in Israel dislodged uneducated Arab and Palestinian workers from the Israeli labor market. Consequently the penetration of the Israeli labor market by foreign workers, especially the construction and agriculture sectors, increased the probability that uneducated Arabs would shift from employment to unemployment or be forced out of the labor force entirely. In other words, the high unemployment rates among the Arabs in general, and among uneducated Arabs in particular, stems in part from their replacement by foreign workers.

<Figure 21 around here.>

The high rate of replacement of Arab workers by foreign workers in construction and agriculture can be attributed to the significant decrease in the incentives to Arabs to actively seek employment in construction and agriculture in the wake of the massive entry of foreign workers and consequent decline in wages in those circles.[11] Another explanation is the high economic return that accrues to Israeli employers who import foreign workers (Miaari and Sauer 2006).

Summary and Conclusions

An examination of the data from the labor-force survey micro panel has shown that the Arab sector's participation in the Israeli labor force is less than that of the Jewish sector. Whereas the participation rate of Arab men has fallen over the years, that of Arab women has increased, although it remains lower than that of Jewish women. Given the Arabs' low labor-force participation rate and high unemployment, it is incumbent on decision-makers to introduce programs that will increase the Arabs' participation rate and reduce their unemployment.

The rise in Arab unemployment, from 6% in 1996 to 12% in 2004, reflects both structural changes and fluctuations in economic activity. Whereas the increase in Jewish unemployment during these years was caused chiefly by the downturn in economic activity and less by the structural composition of the labor force, that among Arabs was influenced by both factors equally. The crisis in construction and traditional industries, along with the expansion of employment of foreign workers in these sectors, produced a structural rise in unemployment rates and pushed many Arabs out of the job market.

Structural changes in the Israeli labor market have had a strong impact on the Arab population, contributing to a rise in unemployment in that sector. When there is structural unemployment, there is little likelihood of a shift from unemployment to employment (low **Pue**). The Arabs are stuck with human capital that has lost its value;

11. A position paper published by the Bank of Israel Research Department in 2002 demonstrated that the employer's costs for foreign labor inputs in construction and agriculture are only 60% of those for an Israeli worker and 80% for a Palestinian worker.

hence any social policy that offers them the chance to study and acquire special skills would reduce unemployment rates. Here are several proposals that could help: (1) subsidizing vocational training to improve the integration of Arabs in the labor market in places where their skills have lost their value; (2) providing information about jobs in other regions and developing the necessary infrastructure to improve access from peripheral localities with high unemployment (most of them Arab) to the industrial centers of the country; and (3) substantially improving the educational system in the Arab sector—the most efficient way to wipe out this type of unemployment in the long term, because, as we have seen education is the best bulwark against unemployment for both Arabs and Jews.

Much of the rise in unemployment over the last decade results from increased joblessness among those with little education who previously worked in traditional sectors, along with high unemployment among young men aged 15–24. The figures reflect the longer period that the unemployed remain without work. Over the years this period has doubled; the number of unemployed Arabs suffering from long-term unemployment—the hardcore jobless—continues to rise. What is more, people in this group have used up their eligibility for unemployment compensation and many are not eligible for vocational training either; this means that their prospects of finding a new job are negligible.

Unemployment among Israeli Arabs is much higher than is normally believed according to the formal definition of the term. The odds of being forced out of the labor force are much greater for Arabs, whether employed or unemployed, than for Jews, and are rising. This reflects hidden unemployment among Arabs.

The Unemployment Compensation Law is important as a mechanism for increasing employment over the long term, because it provides unemployed persons with time to look for a new job compatible with their skills. Hence the government's plans to further restrict eligibility for unemployment compensation would seem to be misguided, especially in the light of the current situation in the Israeli labor market. To drive the point home, in the second half of 2002, when the eligibility criteria were tightened as part of the emergency economic program, the number of recipients of unemployment compensation declined—but the number of the unemployed did not.

In regions with a high concentration of Arabs, the government must adopt an expansive fiscal policy to decrease unemployment. For example, an alternative industrial infrastructure should be developed to replace the traditional industries and to hire workers who have received vocational training; factories that offer jobs to disadvantaged sectors should be subsidized; resources should be allocated to develop industry and economic entrepreneurship in Arab localities so as to broaden the job base; Arab localities should be defined as national priority areas, and so on. All of these measures would serve as incentives to encourage entrepreneurship in the Arab sector.

Opening jobs in the public sector and government companies to Arab workers could also help reduce the Arab unemployment rate. In 1999, the Ministerial Committee on Arab Affairs decided to increase the proportion of Arab workers in the civil service from 5% to 10%, but this decision has not been implemented; in 2003, for example, only 5.7% of all civil servants were Arabs (Haidar 2001).

Almost 70% of Arab job-seekers look for work through friends and relatives; only 25% avail themselves of the services of the labor bureaus. This indicates a burning need to increase the number of employment centers in the Arab sector, with a focus on technological education, expanded course offerings for vocational training, and on sectors with a substantial demand for workers.

Finally, the problem of foreign workers requires an immediate solution. The invasion by foreign workers has increased the economic and social gaps between Arabs and Jews in Israeli society. The number of permits issued to foreign workers must be reduced and employers must be prevented from employing illegal workers.

Appendix A: Correlation between the Unemployment Rate and the Probabilities of Movement between the Different Labor Market States

This appendix focuses on the correlation between the unemployment rate and the probabilities of movement within the three labor market states: employed (e), unemployed (u), and not part of the labor force (n). On the assumption that the number of individuals in each category at the start of each period of time is defined by **E**, **U**, and **N**, respectively, the probabilities of moving between different states in the labor market are as follows:

Peu: the probability of shifting from employment to unemployment
Pen: the probability of shifting from employment to non-participation in the labor force
Peu: the probability of shifting from unemployment to employment
Pun: the probability of shifting from unemployment to non-participation in the labor force
Pne: the probability of shifting from non-participation in the labor force to employment
Pnu: the probability of shifting from non-participation in the labor force to unemployment
Puu: the probability of remaining unemployed

The labor market is in a steady state when the numbers of the employed and the unemployed remain constant over time; that is, the number of the unemployed at the start of the period who found work, plus the number of individuals outside the labor market who also found work, equals the number of employed persons at the start of the period who either became unemployed or dropped out of the labor force. This can be described by the following equation:

$$P_{ue}U + P_{ne}N = (P_{eu} + P_{en})E. \quad (1)$$

The number of individuals who found work = the number of employed who lost their jobs.

Similarly, in a steady state the number of individuals who move from employment to unemployment, plus the number of individuals who move from non-participation in the labor force to unemployment, is equal to the number of individuals who move from unemployment to employment or to non-participation in the labor force. This can be described by the following equation:

$$P_{eu}E + P_{nu}N = (P_{ue} + P_{un})U. \quad (2)$$

The number of individuals who became unemployed = the number of individuals who stopped being unemployed.

Multiplying Equation 1 by **Pnu** and Equation 2 by **Pne** and then subtracting Equation 2 from Equation 1 yields:

$$P_{ue}P_{nu}U - P_{eu}P_{ne}E = (P_{eu} + P_{en})P_{nu}E - (P_{ue} + P_{un})P_{ne}U, \quad (3)$$

or

$$[P_{ue}P_{nu} + (P_{ue} + P_{un})P_{ne}]U = [P_{eu}P_{ne} + (P_{eu} + P_{en})P_{nu}]E. \quad (4)$$

Consequently, in a steady-state labor market the ratio between the number of unemployed persons and the number of employed persons is:

$$E = U\frac{[P_{ue}P_{nu} + (P_{ue} + P_{un})P_{ne}]}{[P_{eu}P_{ne} + (P_{eu} + P_{en})P_{nu}]}. \quad (5)$$

The unemployment rate is defined as the number of unemployed persons divided by the number of persons in the labor force, that is:

$$u = \frac{U}{(E+U)}. \quad (6)$$

Substituting Equation 5 into Equation 6 yields:

$$u = \frac{1}{\left[1 + \frac{P_{ue}P_{nu} + (P_{ue} + P_{un})P_{ne}}{P_{eu}P_{ne} + (P_{eu} + P_{en})P_{nu}}\right]}, \quad (7)$$

or

$$u = \frac{1}{\left[1 + \frac{P_{ne}P_{un} + (P_{ne} + P_{nu})P_{ue}}{P_{nu}P_{en} + (P_{ne} + P_{nu})P_{eu}}\right]}. \quad (8)$$

In other words, the unemployment rate is a function of the probabilities of the movement of individuals among the three labor-market states. An increase in **Peu**, **Pen**, and **Pnu** means an increase in the unemployment rate. On the other hand, an increase in **Pue**, **Pun**, and **Pne** means a reduction in unemployment.

Appendix B
Definitions of Terms used in this Paper

UNEMPLOYMENT

Frictional unemployment is temporary unemployment caused by normal job turnover and the imperfect flow of information between employers and potential employees, such as a change in place of residence, or a change in trade/profession, etc.

Structural unemployment is unemployment caused by modifications of labor structures and methods, such as automation, the replacement of outmoded production methods, etc., which lead to a reduced demand for workers because of the poor fit between the qualifications of job-seekers and the requirements of the market. If wages are flexible and the cost of switching occupations or regions is low, this type of unemployment disappears quickly.

Seasonal unemployment refers to the situation in which the number of those out of work increases during some months of the year. It resembles cyclical unemployment and is influenced by instability in economic activity. In this case, the instability and its regular behavior over the year can be predicted. For example, the demand for agricultural workers plummets after the harvest; similarly, the demand for construction workers falls in wintertime.

Cyclical unemployment is associated with fluctuations in economic activity. It emerges when there is a drop in aggregate demand, which in turn causes a drop in the aggregate demand for workers, although real wages are unaffected.

SECTORS

Mixed sectors include printing and publishing, plastics and rubber, basic metals, metal products, jewelry, and other products.

Traditional sectors include traditional industries, agriculture, and construction.

Advanced sectors include high-tech industries, banking, insurance and other financial institutions, and business services.

Services and others refers to mixed sectors in industry, electricity and water, hospitality and food services, transportation, storage and communications, personal domestic services, non-governmental organizations and agencies, and unknown.

Public and community service**s** are public services, health services, and welfare, and community, social, personal, and other services.

INDUSTRIES

Traditional industries include minerals, food products, alcoholic and non-alcoholic beverages, tobacco products, textiles, clothing, footwear, wood and wood

products, paper and paper products, non-metallic mineral products, furniture, and diamonds.

Advanced industries include petroleum refining and products and nuclear fuels, chemicals and chemical products, machinery and equipment, office equipment and computers, electric motors, electric generation accessories, electronic components and equipment for electronic communications, industrial, medical, and scientific equipment, and transport vehicles.

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