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THE COMPOSITION OF LABOR SUPPLY  
AND UNEMPLOYMENT IN TUNISIA

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## Abstract

This paper examines labor supply in Tunisia in relation to key demographic characteristics such as age, sex, educational attainment, and residence. It also reviews unemployment in Tunisia over time and examines its demographic and educational patterns. The analysis is primarily based on data from the first wave of the Tunisia Labor Market Panel Survey carried out in 2014 (TLMPS 2014), but also uses data from the Tunisian National Survey of Population and Employment (ENPE) and other sources to examine the evolution of labor supply and unemployment over time. We identify important developments in the labor market relating to the youth bulge and the explosive growth of educational attainment in Tunisia in recent years.

**JEL Classification:** J1

**Keywords:** Labor force participation, unemployment, employment, under-employment, education, population growth, Tunisia

## ملخص

تبحث هذه الورقة عرض العمالة في تونس فيما يتعلق بالخصائص الديموغرافية الرئيسية مثل العمر والنوع والتحصيل التعليمي والإقامة. كما تستعرض البطالة في تونس مع مرور الوقت، وتفحص أنماطها الديموغرافية والتعليمية. ويستند التحليل في المقام الأول إلى بيانات من الموجة الأولى من المسح التتبعي لسوق العمل التونسي الذي أجري في عام 2014، ولكنه يستخدم أيضا بيانات من المسح الوطني التونسي للسكان والعمالة ومصادر أخرى لدراسة التطور من عرض العمالة والبطالة مع مرور الوقت. نحدد التطورات الهامة في سوق العمل فيما يتعلق بطفرة الشباب والنمو الهائل للتحصيل العلمي في تونس في السنوات الأخيرة.

## 1. Introduction

Despite being at the later stages of its demographic transition where population growth is slowing substantially and where the growth of the youth population, which constitutes the majority of new entrants to the labor market, is in fact declining, Tunisia continues to experience strong supply pressures in its labor market. These pressures emanate primarily from the substantial shifts in the composition of labor supply that Tunisia has experienced in recent years, shifts that have generated substantial challenges for labor market insertion. The compositional shifts consist of dramatic increases in educational attainment, and particularly in the growth of higher education graduates in recent years. Among 146 countries for which data are available, Tunisia ranked 10<sup>th</sup> in the absolute increase in the mean years of schooling of its population from 1990 to 2010 (Barro & Lee, 2013). Further, we show the number of university graduates from public institutions alone has grown at a rate of 12 percent per annum from 1994 to 2004, a rate that is five times higher than the rate of growth of the working age population. While the growth of university graduates has continued apace until 2010, the trend has reversed since then, with the number declining by an average of 7.8 percent per annum from 2010 to 2015.

The rapid expansion of education in Tunisia was accompanied by a complete closing, if not reversal, of the gender gap in educational attainment and the spread of educational opportunities to all parts of the country. The labor market insertion problems posed by this rapid expansion of education are therefore most severe for women, and in particular young women in lagging inland regions and in rural areas. Young women in Tunisia are much more geographically constrained than young men and are simply not able to move as easily to where the economic opportunities are. Educated young women are therefore more likely to be “trapped” by the opportunities available in their local labor markets, which may not correspond to their educational qualifications. These challenges can be seen in the very high unemployment rates experienced by educated young women in rural areas and inland regions. Educated young men have also experienced serious labor market insertion challenges in recent years. Unemployment rates are higher among university graduates than among any other educational category, and more so in rural areas than in urban areas.

Besides the slowing of the growth of the working age population, the contraction of the youth population, and the dramatic shift in the educational composition of new labor market entrants, there have not been major changes in labor force participation rates among either men or women in Tunisia in recent years. Participation rates have been rising very slowly for both sexes. The fact that they have not risen faster for women is somewhat surprising given the strong gradient that exists for women between participation and educational attainment and the rapid growth of educational attainment among Tunisian women.

The labor market insertion problems of youth and the high unemployment rates that result from them have been a persistent feature of the Tunisian labor market for some time, but the problem became much more acute with the economic crisis brought about by the Tunisian revolution of January 2011. While unemployment rates have declined steadily since late 2011, they are still higher than they were in mid-2010 and very high by international standards. Tunisia’s overall unemployment rate ranks as the 30<sup>th</sup> highest in the world and its youth unemployment rate is the 25<sup>th</sup> highest (World Bank, 2016). If one further considers the large spatial differences in unemployment in Tunisia, the gravity of the unemployment problem in some of the inland regions becomes quite apparent.

In what follows, we examine the growth and changing age composition of the working age population (Section 1.2), its changing educational composition (Section 1.3), the trends and patterns of labor force participation (Section 1.4), the trends and patterns of the share of the

population employed (Section 1.5), and the trends and patterns of unemployment and under-employment (Section 1.6). Section 1.7 concludes.

## **2. The Growth of the Working Age Population**

The fundamental changes in Tunisia's population structure as it undergoes its demographic transition are readily apparent from comparing the population pyramids obtained from the 1994 and 2014 censuses shown in Figure 1.<sup>1</sup> The shape of the population pyramid in the 1994 census highlights the large share of young people in the population, with a noticeable bulge around the ages of 5-9 and 10-14. The early stages of fertility decline are apparent in the smaller size of the 0-4 population in 1994. By 2014, the bulge had moved to the age groups of 25-29 and 30-34, which can be characterized as the later stages of a youth bulge, suggesting that Tunisia has experienced the peak of its youth bulge in the intervening 20 years between the two censuses. There is also a noticeable demographic "echo" which is manifested by the relatively large size of the 0-4 cohort in 2014. This echo is the result of the population momentum generated by the large youth bulge generation, which is now entering parenthood, rather than by an actual increase in fertility rates. Another important change between 1994 and 2014 is the increasing share of the prime age population (30-54) among those of working age. Nevertheless, the population remains quite young in 2014, with about 40 percent of the population being under age 25 and only 2 percent aged 80 and over.

Comparing the structure of the population in urban and rural areas over time, we note that the age structures were fairly similar in 1994, although the proportion of individuals in the age group 25-34 was higher in urban areas, probably due to age-selective migration (Figure 2). By 2004, Tunisia was at the peak of its youth bulge phenomenon, with a pronounced mode of the distribution centered on the 15-19 and 20-24 cohorts in both urban and rural areas. By 2014, the population distribution had become distinctly bimodal in urban areas, with one mode at the ages of 30-34 and an emerging "echo" at the ages of 0-4. In rural areas, there was a less pronounced bimodal pattern, with a less pronounced trough among those 5-9 to 15-19, indicating less rapid fertility declines there compared to urban areas.

Table 1 shows the distribution of the population by region and by residence in 2014. The table shows the concentration of the population in the three main relatively developed coastal regions of the country, which are Greater Tunis, the North East and the Central East. Indeed, nearly 62 percent of the national population and 71 percent of the urban population lives in these three regions. Besides the nearly one-third of the urban population that is located in Greater Tunis, the Central East region, which contains Sfax and Sousse, the second and third largest cities in the country, makes up another quarter of the urban population. The regions with the largest share of the rural population are the Central West and North West regions, which are worse off economically (World Bank, 2014).

The evolution of labor supply in Tunisia can be more directly ascertained from the growth of the working age population (15-64), the youth population (15-24), and the young adult population (25-29), relative to the total population. These growth rates across the three censuses of 1994, 2004 and 2014 are shown in Table 2. The total population grew at the relatively modest rate of 1.2 percent per annum (p.a.) from 1994 to 2004, and this growth decelerated further to 1.0 percent p.a. from 2004 to 2014. This overall population growth rate masks some distinct differences by residence and by age group. We first note that due to rural-urban migration, the growth rate of the urban population was much more rapid than that of the rural population in both time periods. The rural population hardly grew at all, at a rate of 0.2 to 0.1 percent p.a. in both time periods, relative to 1.8 and 1.5 percent p.a. in urban

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<sup>1</sup> Individual weights in the TLMPS 2014 data are based on Census 2014 urban/rural, governorate, five-year age group, and sex-specific individual populations (Assaad, Ghazouani, Krafft, & Rolando, 2016).

areas in 1994-2004 and 2004-2014, respectively. The differences in population growth by sex are not large, except for the fact that the female population was growing slightly faster than the male population, possibly due to the sex selectivity of international migration from Tunisia.

The working age population (15-64) grew more rapidly than the overall population, but its growth rate decelerated even more in the past decade. As shown in Table 2, the working age population was growing at nearly twice the rate of the overall population (2.3 percent p.a.) in the 1994-2004 decade, but its growth decelerated to 1.3 percent p.a. in the 2004-2014 decade. While the rate of growth of the urban working age population is more than twice as high as that of the rural one, the growth of the rural working age population was much more rapid than the growth of the overall population in rural areas.

The demographic transition Tunisia has undergone, and its accompanying fertility decline, is reflected in the growth (or lack thereof) of the child (0-14) population. Over the past twenty years, the child population in Tunisia has actually contracted by 1.4 percent p.a. in 1994-2004 and by 0.1 percent p.a. in 2004-2014. The deceleration in the decline is indicative of the population “echo” that was apparent in Figure 1. The large young adult cohorts that are now in their prime childbearing years will contribute to an increasing birth rate even if fertility rates continue to decline. A similar trend has been observed in Egypt, but there the “echo” was amplified by rising fertility rates (See Krafft & Assaad, 2014).

Perhaps the most important demographic development in Tunisia in relation to the growth of labor supply is the reversal that was experienced in the growth of the youth population (15-24). While this age group was growing at 1.6 percent p.a. in 1994-2004, it contracted at a similar rate in 2004-2014. This development portends a substantial reduction of labor supply pressures on the Tunisian labor market in the near future; a reprieve that will only last for one or two decades until the “echo” generation comes of age. In contrast, the young adult cohort (25-29) continued to grow in the 2004-2014 period, although it too has experienced a deceleration in its growth compared to the previous decade. The continued growth of the youth and young adult population in the 1994-2004 period, coupled with the rapid changes in the educational composition of new entrants, which we will review below, contributed to the labor supply pressures felt over the past two decades and the growing youth unemployment problem. However, more recent demographic trends show that these pressures are subsiding even though compositional changes continue to pose challenges with regard to the potential mismatch between labor supply and demand.

A comparison between trends in urban and rural areas shows that the deceleration in the youth and young adult populations is even more pronounced in rural areas. In fact, both age groups have experienced a decline in their numbers in rural areas in the previous decade. An emerging and somewhat surprising trend is that this rural contraction is more pronounced among female young adults than among male young adults, suggesting that rural-urban migration is becoming more selective of young females in Tunisia. Another reason for this trend, identified through further exploration of the data, is that young males who are from rural areas are more likely to directly migrate abroad, whereas young females from rural areas are more likely to be migrating within Tunisia. A recent increase in demand for female labor in manufacturing firms, which are in urban areas, may help explain this trend (Lamine, 2008).

### 3. The Educational Composition of the Working Age Population

We begin by discussing the educational composition of the working age population as ascertained by the TLMPS 2014<sup>2</sup> and then move to a discussion of its evolution over time. We first note from Figure 3 that illiteracy continues to be prevalent among individuals of working age in Tunisia despite the vast improvement in educational attainment observed in recent years. As shown in Figure 3, the overall illiteracy rate is 19 percent, but it is more than twice as high among women than among men (27 percent for women vs. 12 percent for men). Illiteracy is also much higher in rural areas than in urban areas (33 percent vs. 13 percent), and is particularly high among rural women, where nearly half of the female population is illiterate (45 percent). These figures are indicative of how recently it is that education became widely available and universally accessible in Tunisia. There is still a large backlog of individuals who are too old to have benefited from the substantial expansion in access, highlighting the need for more adult literacy programs to close the generational gap in literacy. However, they may also point to a possible continuing problem with dropout from primary schools for children in rural areas (Krishnan, Ibarra, Narayan, Tiwari, & Vishwanath, 2016).

Those who manage to acquire a sufficient level of education to become literate but not to complete a primary certificate (which requires six years of schooling) constitute an appreciable proportion of the working age population, about 15 percent nationally, with no measurable differences between urban and rural areas (Figure 3). The preparatory (lower secondary) level requires three years beyond the primary level. For individuals born after 1985, basic schooling constitutes primary and preparatory, a total of nine years of schooling, which are now mandatory, at least in theory. Primary is now the most prevalent educational attainment in Tunisia, with 20 percent of the working age population being at this level in 2014. Preparatory is also a common level, 16 percent nationally. The proportion with primary or preparatory is higher for men than for women (for example, 24 percent primary for working age men vs. 17 percent primary for working age women). Primary is more common in rural areas (23 percent) than urban areas (19 percent), due to the higher share of working age individuals in urban areas who attained levels beyond the primary level.

Secondary attainment refers to upper secondary, which is four years in Tunisia and could be either general or technical. The technical degrees, obtained from vocational schools, include a variety of qualifications, such as BTP, CAP, and BTS.<sup>3</sup> The secondary level of attainment was achieved by 15 percent of the working age population, with a three percentage point difference in favor of males and an eight percentage point difference in favor of urban areas. In Tunisia, university short cycle is 2-3 years, and the university long cycle and above level corresponds to the university studies that are 4+ years and a variety of post-graduate degrees.<sup>4</sup>

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<sup>2</sup> The TLMPS 2014 data is publicly available from [www.erfdataportal.com](http://www.erfdataportal.com) (OAMDI, 2016a). See Assaad, Ghazouani, Krafft, and Rolando (2016) for further information on the survey.

<sup>3</sup> BTP (Brevet de Technicien Professionnel) is a professional diploma obtained after 2 years of specialized training. Basic schooling successfully achieved or a CAP diploma is needed to access to this training cycle. CAP (Certificat d'Aptitude Professionnelle) is also a professional diploma obtained after one year of training for pupils who achieved basic schooling successfully. BTS (Brevet de Technicien Supérieur) is a diploma reserved for baccalaureate or BTP holders and obtained after one year of training.

<sup>4</sup> There was a substantial change in the structure of higher education at the 2006/2007 school year. In the old system (before the academic year 2006/2007), the long cycle diploma was called "Maitrise" and was obtained after 4 years of training. This was the most common degree, but there were students in short cycle university (three years or five semesters in higher technology schools). After the change in 2006/2007, the "Maitrise" diploma was suppressed and it is now three years for the first diploma (license (or five semesters in higher technology schools)), two years (so 3+2) for the next (master's), and three years (3+2+3) for the third (Ph.D. or Doctorate). In some specialties (especially engineering and medicine) diplomas are obtained after at least 5 years of training.



As shown in Figure 3, about 6 percent of the working age population reached the short cycle level and 8 percent reached the university long cycle and above level. There are only minor differences by sex in the proportion with that level of attainment, but the proportion of short cycle in urban areas is more than twice what it is in rural areas, and the proportion of long cycle and above is three times higher. As we will see in Figure 1.3, it is the explosive increase in those acquiring these two levels of higher education that is one of the most important developments in the evolution of labor supply in Tunisia.

Although starting from a low base, educational attainment has been increasing very rapidly in Tunisia in recent years. According to the most recent version of the Barro-Lee Educational Attainment in the World data set, Tunisia ranked 10<sup>th</sup> among the 146 countries included in the data set in terms of the absolute increase in the mean years of schooling from 1990 to 2010 (Barro & Lee, 2013). The mean years of schooling in Tunisia increased by 3.6 years over that period, from 3.3 to 6.9 years, a rate of increase of 3.7 percent p.a. This rate of increase is about twice as high as the world average rate of 2.0 percent p.a.<sup>5</sup> As shown in Figure 4, this very rapid increase in the mean years of schooling was accompanied by a complete closing of the gender gap in education. For those born in 1950, the gender gap was more than three years of schooling in favor of men. By the 1985 birth year, the gap had completely closed. In fact, for the cohorts born after 1985, the gender gap appears to have reversed in favor of women.<sup>6</sup>

Another way to examine the increase in educational attainment is to observe the proportion of the working age population reaching a particular level of attainment by year of birth.<sup>7</sup> As shown in Figure 5, the proportion of illiterates dropped sharply from over 50 percent for those born in 1950 to less than 10 percent for those born in the 1980s. At the opposite end of the educational spectrum, the proportion of long-cycle and above graduates grew from less than 5 percent of those born in the 1950s to over 20 percent of those born in the second half of the 1980s. The proportion of those with the short cycle university degrees also increased rapidly from 1-2 percent to more than 10 percent over the same birth cohorts.

The rapid increase in educational attainment began when those born in the 1950s through 1970s began obtaining primary and preparatory degrees at an accelerating rate. This development is associated with the most rapid decline in the proportion of illiterates in the population. The proportion of university graduates (short and long cycles) in the working age population did not start growing rapidly until the cohorts born in the late 1970s. There was a further acceleration in the proportion of individuals with university education for the cohorts born in the second half of the 1980s. By then, nearly one-third of individuals were receiving some kind of post-secondary education.

The growth in the number of university graduates in the 1990s and 2000s is perhaps the most important development in the labor supply outlook in recent years. As shown in Figure 6, the number of graduates per year increased more than seven-fold from 5,552 in 1990 to 40,300 in 2004, a staggering annual growth rate of 14.2 percent p.a. Over the period 1994 to 2004, the annual growth rate was over 12 percent p.a. in comparison to a growth rate of the working age population of 2.3 percent p.a. during that period. The growth in the number of graduates continued at this torrid pace until 2006, after which it slowed temporarily from 2006 to 2009 to a pace of 5 percent p.a., only to accelerate to a pace of 31 percent p.a. from 2009 to 2010. The overall rate of growth from 1990 to 2010 was 13.7 percent p.a. Since then, the number of

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<sup>5</sup> Calculated by authors from Barro & Lee (2013).

<sup>6</sup> We limit the graph to cohorts born prior to 1990, i.e. those who were 25 years or older in 2014 to make sure that the vast majority would have already completed their education.

<sup>7</sup> Again, we limit ourselves to those 25 and older in 2014 to ensure that most have completed their education.

university graduates from public institutions in Tunisia actually fell from 86 thousand per year in 2010 to 58 thousand per year in 2015, an annual rate of decline of 7.8 percent p.a.<sup>8</sup>

The growth in the number of university graduates at five times the rate of growth of the working age population has no doubt contributed to the labor market insertion problems Tunisia has experienced in recent years. Individuals with these educational qualifications have substantially higher expectations of obtaining formal jobs than their less educated counterparts. They are much more likely to remain unemployed until they can locate such jobs (Assaad & Krafft, 2016), and they are also likely to be very vocal about their sense of entitlement for these jobs, something that governments can only ignore at their peril. With such rapid increases in their ranks, it is a huge challenge for the demand side of the labor market to respond quickly enough to increase the number of formal job offers enough to keep up with the increase in supply.

#### **4. Labor Force Participation**

In the following analysis, we will use various definitions of the labor force to illustrate how changes in definition affect the labor force participation rate. The most common definition is the standard market labor force definition. This is the sum of those who are either engaged one hour or more in the reference week in activities aiming at producing a product or a service to exchange in the market and those not so engaged, but who desire to work, are available to start work within the next two weeks, and have actively searched for employment sometime in the past three months. The broad market definition would add to this group the discouraged unemployed, that is those who were not employed a single hour during the reference week, who desire to work and are available to start work within two weeks, but have not actively searched for employment in the past three months. The standard extended and broad extended labor force definitions add to the respective market definitions those who are employed in subsistence production, which is the production or processing of primary commodities for the purpose of own household consumption. Such subsistence production is not likely to be important for adult males in an economy such as Tunisia's in either urban or rural areas, or for adult females in urban areas. Because all other definitions expand on the standard market definition, that definition will produce the lowest estimate for the labor force participation rate (LFPR) among the four estimates provided. The highest estimate of LFPR will be obtained from the broad extended labor force definition.

As shown in Table 3, the overall labor force participation rate in Tunisia according to the standard market definition was 48.3 percent in 2014. This average estimate masks a large difference in participation between men and women, with the LFPR among men 15-64 being 72.8 percent and among women 24.5 percent. At that level, female labor force participation in Tunisia is higher than average for the Arab World but is still among the lowest 20 countries in the world.<sup>9</sup> As a comparison, female LFPR in Egypt in 2012, and in Jordan in 2010, were 23.1 percent and 16.5 percent, respectively, when using the same definitions and methods of measurement. The relatively low female participation rates in Tunisia are somewhat surprising given the favorable institutional environment for gender equality relative to other Arab countries and given the very rapid increase in educational attainment among Tunisian women in recent years.

As shown in Table 3, the differences in the LFPR estimates according to the various definitions are not very large in Tunisia. There is very little difference between the market

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<sup>8</sup> The sharp increase in the number of short cycle graduates starting in 2010 and the sharp decrease in long cycle graduates starting in 2011 is the result of the structural changes in the education system, discussed earlier, implemented starting in 2006/2007.

<sup>9</sup> Authors' calculations using data on female labor force participation in 2014 from modeled ILO estimates for female ages 15-64 as reported in the World Development Indicators (World Bank, 2016).

and extended definitions for men, as few men participate in subsistence work. The difference for women is about 5.0 percentage points (p.p.) using the standard definition, but it goes up to about 13.5 p.p. in rural areas and only 0.8 p.p. in urban areas. The much larger difference in rural areas makes sense since the vast majority of subsistence activities are related to agriculture, animal husbandry, processing grain and dairy products and gathering firewood, all of which are much more prevalent in rural areas. Hence, one should keep in mind in what follows that the use of the market versus extended definitions is mostly relevant for women in rural areas, for whom the inclusion or exclusion of subsistence activities makes a large difference. The difference between the standard and broad market definitions is about 1.8 p.p. for men and 1.5 p.p. for women. That difference results from the discouraged unemployed (those who are not actively searching for work), who are included in the broad definition but excluded from the standard definition.<sup>10</sup> That difference is similar across urban and rural areas for men, but slightly larger in rural areas for women. Again, this is an indication of the difficulty that women who wish to work outside the home in rural areas face in accessing labor markets. T-tests reveal that urban-rural differences in labor force participation are statistically significant at the 5 percent level across all definitions of participation for both males and females.

Participation rates among youth (15-24) can be affected by increasing enrollment in education and particularly in higher education. As we see in Table 4, youth LFPRs are lower than overall LFPRs, but the gender gap in participation is smaller (41.4 percent vs. 18.8 percent using the standard market definition). Differences between market and extended definitions are small for young men and women in urban areas but are somewhat larger for young men in rural areas (~2.6 p.p.) than for all men. These differences suggest that participation in subsistence work is more prevalent among male youth than among adult males in rural areas, although not as prevalent as among female youth. Conversely female youth in rural areas are less likely to participate in subsistence work compared to adult females. Differences between the broad and standard definitions are somewhat larger than for all males and females, indicating that youth are more likely to be affected by the discouraged unemployment phenomenon than their adult counterparts.

Young adults (25-29) have presumably completed their education and are unlikely to be affected by retirement, and would thus be expected to have higher participation rates than either all working age individuals or youth. As shown in Table 5, their participation is indeed much higher (at 60.4 percent according to the standard market definition) and this difference is due to higher participation among both men and women. In fact, as we will see in Table 5, 25-29 is the age range in which peak participation occurs for women. For this age group, there is virtually no difference between market and extended definitions for men in either urban or rural areas, since this is the age of peak market participation. This is also the case for women in this age group in urban areas. In rural areas however, about one fourth of young adult women's extended participation is in the form of subsistence work. The differences between the broad and standard definitions are also somewhat higher for this age group than for the broader working age group. The difference in LFPR between the broad and standard definition is around 3 p.p. for men and 2 p.p. for women, indicating that discouragement is a significant problem among young adults, particularly in rural areas.

In the discussion that follows we will use the standard market definition of participation because this is the definition normally used in Tunisian labor force statistics. Figure 7 compares our estimates of labor force participation using the standard market definition to the estimates obtained from the Tunisian National Survey on Population and Employment

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<sup>10</sup> In the TLMPS fielding, problems distinguishing missing and "no" responses for search among the unemployed occurred and may lead to slight over-estimates of discouraged unemployment.

(ENPE), the official labor force survey carried out by the National Institute of Statistics (INS). While the overall estimate from TLMPS 2014 seems to be wholly in line with the trend obtained from the ENPE, our estimate of male LFPR seems a bit higher than the INS trend line and our estimate of the female LFPR as little lower. Male participation rates have been rising slowly in recent years in Tunisia, but female participation rates have been relatively flat. The slight increase in male participation is probably due to the aging of the youth bulge generation and their transition to the peak working age of 25-29. As we will see in Figure 7, the very slight increase in female LFPRs in recent years can be almost fully attributed to increases in unemployment rather than employment.

As shown in Figure 8, male participation rates rise sharply with age from the ages of 15 to 30 as more individuals complete their education and begin to search for employment. For males, participation over this age range goes from under 20 percent to nearly 90 percent. The increase in participation is sharper and earlier in rural areas for males, where educational attainment is not as high as in urban areas. Peak participation for males is reached at about age 40 and remains at that level until age 50 or so. After that age, retirement starts to set in, but a little earlier in urban areas than in rural areas. For females, participation rises equally fast with age in both urban and rural areas until the age of 20 and then the increase slows down considerably in rural areas and peaks at about 30 percent in the mid-20s. In urban areas female participation keeps rising with age until it peaks at about 40 percent in the late 20s. The difference in the age at which participation peaks is probably associated with the later age at marriage in urban areas, an issue we return to again in Assaad, Ghazouani, and Krafft (2016). After peak female participation is reached in the late 20s, participation drops rapidly for women in their thirties as their domestic and reproductive work burden increases.<sup>11</sup> It stabilizes first for women in rural areas at just over 20 percent in the mid to late 30s. For urban women, it continues to drop with age until it falls below the average for rural areas by the mid-50s. Older rural women continue to be economically active well into their sixties whereas urban women's participation drops to very low levels.

As shown in Figure 9, participation does not vary much with education for males but increases substantially with education for females. Male participation declines a little for those with preparatory through higher education, primarily because these groups include some males who are still in school. Participation rates remain low for long cycle university and above males in both urban and rural areas and urban short cycle graduates, which may reflect discouraged unemployment among graduates. For females, participation increases steadily with education, especially in urban areas, where every level of educational attainment is associated with a higher participation rate than the previous level. In rural areas, female participation is fairly flat at low levels of education up to the secondary level and then increases sharply for the short and especially long cycle university levels.

## **5. Employment to Population Ratios**

We now move from the concept of labor force participation to employment and unemployment to highlight the separate contributions of the two components of participation. Here again, we distinguish between the market and extended definitions of employment, keeping in mind that the latter includes both market and subsistence work.<sup>12</sup> As shown in Table 6, the overall employment-to-population ratio in Tunisia is 41.3 percent according to the market definition and 44.0 percent according to the extended definition. These estimates are lower than those for Egypt, where the corresponding estimates were 46.7 percent (market)

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<sup>11</sup> See Assaad, Krafft, and Selwaness (2016) for an examination of the impact of marriage on employment in Tunisia.

<sup>12</sup> The distinction between standard and broad is not relevant here since it involves differences in the way unemployment is defined, not employment.

and 53.2 percent (extended), but they are only a little higher than in Jordan where the estimates are 38.9 percent and 39.6 percent, respectively.<sup>13</sup> Extended employment rates are much higher in Tunisia in rural areas than in urban areas, reflecting the greater involvement of rural women in subsistence work.

The employment-to-population ratio for men according to either definition is around 64 percent, which means that fewer than two-thirds of men of working age in Tunisia are employed. Again this compares to 77 percent in Egypt in 2012 and 65 percent in Jordan in 2010. Male employment rates are between 2.0 and 4.9 p.p. higher in rural areas than in urban areas depending on the definition used. This difference in favor of rural areas reflects the earlier entry into, and later exit from, economic activity among rural men, a pattern that we also observed in Figure 8. Female employment rates differ more according to the definition used, especially in rural areas, given the greater involvement of rural females in subsistence activities. Female employment rates increase by less than 1 p.p. if we include subsistence activities in urban areas, but nearly double from 16.1 percent to 29.9 percent in rural areas when subsistence activities are included. Although both are low, rural women have substantially lower market employment rates than urban women (16.1 percent vs. 20.6 percent), but substantially higher rates if subsistence activities are included. Comparing employment rates to participation rates for women, we note that only around three-quarters of participation for women consists of employment and the rest consists of unemployment.

As in the case of labor force participation, we compare our estimate of the employment-to-population ratio according to the market definition with the trend for the same variable obtained from the quarterly ENPE carried out by INS. We find that our overall estimate is very slightly higher than the ENPE estimate, but this masks a higher estimate for males and a lower estimate for females. The ENPE trend for employment is very flat. For males, it increased very slightly from 2006 to 2010, fell in 2011, the year of the Tunisian revolution, and then recovered very slightly, but had not reached by 2013 the level it was at in 2010. For females, it was flat before the revolution, fell as a result of the revolution in 2011 and then slowly recovered since then to reach the levels it had been at in 2006.

Figure 11 reproduces similar patterns for employment-to-population ratio vs. age to what was obtained for labor force participation rates (Figures A.1). However, a slight difference is found for males when we observe that the peak of about 90 percent is shifted slightly to the right, to the population aged 40-50 years. For females, the peaks seen in the labor force participation rates around the mid to late 20s are strongly attenuated in the employment-to-population ratio figure, suggesting that these women are more likely to be unemployed than their older counterparts. Thus, the sharp reduction in participation observed in Figure 8 is in large part due to women dropping out of the unemployment queue due to discouragement, rather than withdrawing from employment. For rural women, in particular, employment rates are almost completely flat from age 25 to the late 40s.

Turning to employment-to-population ratios by education (Figure 12), employment rates are lower for more educated males. This pattern is driven by the additional time in school, high rates of unemployment and discouragement among educated men. Women's employment rates increase with education, but to a lesser extent than their labor force participation, due again to high unemployment rates.

## **6. Unemployment and Under-Employment Rates**

Open unemployment, and especially youth unemployment, has been quite high in Tunisia in recent years by international standards, and is cited as one of the main grievances that led to

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<sup>13</sup> Authors' calculations from data from the Integrated Labor Market Panel Surveys data set version 1.5 (OAMDI, 2016b).

the Tunisian revolution. With a 12.4 percent overall unemployment rate in 2014, as modeled by the ILO, Tunisia has the thirtieth highest unemployment rate among the 176 countries with data in the Key Indicators of the Labor Market database of the ILO.<sup>14</sup> The unemployment rate in Tunisia is more than twice the world average rate of 5.9 percent in 2014. With a youth unemployment rate of 31.8 percent in the same year, Tunisia ranks 25<sup>th</sup> among the 176 countries and territories with non-missing data. Again, this is more than twice the world average youth unemployment rate of 14.0 percent.

We provide several estimates of the unemployment rate in Tunisia depending on the definition of unemployment and labor force used. The ILO modeled estimates appears to be closest to our standard unemployment with an extended labor force definition, which comes out to 12.7 percent (Figure 13). This estimate is lower than the official estimate of unemployment in Tunisia of 15.2 percent in 2014 because the official estimate uses the standard unemployment with a market labor force definition. The TLMPS 2014 estimate using that definition is slightly lower at 13.7 percent, but the official estimate is well within the 95 percent confidence interval for the TLMPS estimate (see Figure 14). The difference of around 3 p.p. between the broad and the standard definition suggests that 3 percent of the Tunisian labor force is made up of discouraged unemployed who are no longer actively searching for work but are still desiring and available for work if a job opportunity were to become available to them. The respective estimates based on the extended labor force definition are lower than those using the market labor force definition because the definition of employment is expanded to include subsistence work, which raises the denominator of the unemployment rate and slightly reduces the numerator.

As shown in Figure 13, female unemployment rates are substantially higher than male rates in Tunisia, with a ratio of almost 2:1 if we use the standard market definition. Such a large gender gap in the unemployment rate is not uncommon in the MENA region. In fact, the gap in Tunisia is smaller than some comparator countries in MENA. The female to male ratio in Egypt in 2012 based on the same definition of unemployment was 5.6 and, in Jordan in 2010, it was 2.1.<sup>15</sup>

Figure 14 compares the unemployment rate estimates obtained from the TLMPS 2014 to the time series estimates provided by the official ENPE survey carried out by INS according to the standard market labor force definition that is used in the ENPE. The overall and male estimates are just slightly lower than the official rate for the first quarter of 2014 but follow the decreasing trend and are well within the confidence interval, while the female estimate from the TLMPS 2014 appears to be exactly in line with the trend from the ENPE estimate.

The ENPE estimates provide a clear picture of the unemployment trend in Tunisia. Overall rates were quite stable between 2006 and 2008, but this masks a slightly declining trend among men and an increasing trend among women. Female unemployment then jumps sharply upward from 2008 to 2009, and the declining trend among males stops, making the overall rate rise. These changes are likely the effect of the world financial crisis on the Tunisian economy. Stability appears to return in 2010, to be shattered by the big shock brought about by the Tunisian revolution of 2011. Overall unemployment rates jump from 13.0 percent in mid-2010 to 18.3 percent in the second quarter of 2011, a relative increase of nearly 41 percent in less than one year. Women were relatively more affected than men, with their unemployment rates increasing by 45 percent compared to 38 percent for men. Unemployment rates continued to increase during the remaining quarters of 2011, reaching a

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<sup>14</sup> The data we use was downloaded from the World Bank World Development Indicators data base which was last updated on Feb. 1, 2016 and which cites the ILO's Key Indicators of the Labor Market Database as the source (World Bank, 2016).

<sup>15</sup> Authors' calculations based on data from the ELMPS 2012 and the JLMPS 2010 (OAMDI, 2016b).

peak of 18.9 percent in the fourth quarter. As the Tunisian economy slowly recovers from the shock of the revolution since then, unemployment rates have been declining steadily quarter over quarter since 2012, but at 15.2 percent in the first quarter of 2014, they are still substantially higher than they were just before the revolution in 2010.

The urban/rural and regional dimensions of unemployment in Tunisia are issues that garner a lot of policy attention and public concern because of the problem of lagging regions in Tunisia and differences in the economic dynamism of coastal versus inland regions (World Bank, 2014). From an urban/rural perspective, differences in average unemployment are fairly limited, with rural unemployment being 0.5 p.p. higher than what it is in urban areas. Urban/rural differences by sex are even smaller (Figure 15).

Regional differences in unemployment are much larger than urban/rural differences. As expected, the inland regions have much higher unemployment rates than the more developed coastal regions. As shown in Figure 16, unemployment is much more pronounced in the western inland regions (the North West and the Center West) than in the coastal regions of Greater Tunis, the North East, and the Center East that have long been known to be the more economically prosperous regions of the country (World Bank, 2014). The low male unemployment rate in the South West, thus the low overall unemployment rate, can be explained by the presence of phosphate mining, which is concentrated in this region. This sparsely populated region is also home to the Oasis of Tozeur, which is the center of Saharan tourism in Tunisia (Muller & Bibi, 2010). Since neither Saharan tourism nor phosphate mining are likely to provide substantial opportunities for educated women, the female unemployment rate in this South West region is nearly as high as that of other inland regions, such as the North West. The ratio of female to male unemployment rates in the South West is a staggering 10:1. Other regions with large gender gaps in unemployment also include the other two inland regions of Center West and North West and the South East region. This underscores the relative inability of educated women compared to educated men to move to regions where the employment opportunities are and thus become trapped in lagging region labor markets.

Figure 17 strongly suggests that unemployment in Tunisia is a labor market insertion phenomenon involving young new entrants to the labor market. For males, the unemployment rate is the highest for the age group 20-30 years reflecting the high levels of youth unemployment. Beyond the age of 30, male unemployment rates drop rapidly, reaching very low levels by age 40. As discussed above few differences emerge between urban and rural males. For females, unemployment rates are very high for the very young in rural areas and increase rapidly in urban areas to reach a maximum at the typical labor market entry ages of 20-24.

An examination of unemployment patterns by educational attainment confirms that unemployment in Tunisia is, for the most part, a problem that involves relatively more educated workers searching for formal jobs. The expansion of higher education in Tunisia has dramatically increased the ranks of new entrants with short and long cycle university educational attainment. As seen in Figure 18, these are the groups that are experiencing the highest unemployment rates (except short cycle males in urban areas). Higher education graduates in rural areas have substantially higher unemployment rates than their urban counterparts, further confirming that unemployment in rural and lagging regions is a problem of educated young people having difficulty finding jobs in their home regions that are compatible with their educational qualifications. Rural females with a short-cycle university education have an unemployment rate of close to 80 percent! The rate for long-cycle rural female university graduates is only slightly lower at almost 60 percent. With their more limited geographical mobility, these female graduates appear to be truly trapped in local labor

markets with few prospects for any kind of employment that meets their educational qualifications.

Besides open unemployment, which primarily affects educated workers who are seeking formal jobs, another measure of underutilization of labor is visible under-employment. Visible under-employment is defined as working less than full time (40 hours per week) for lack of employment opportunities. While open unemployment in Tunisia and in much of the MENA region generally affects more educated, and thus somewhat more privileged, individuals seeking formal employment for the first time, underemployment is likely to affect much more vulnerable individuals whose work is precarious and irregular. As shown in Figure 19, under-employment, as defined above, affects about 4.4 percent of the labor force in Tunisia, with the rate being higher in rural areas (7.0 percent) than in urban areas (3.2 percent). We can also see that under-employment is higher for females than for males.

## **7. Conclusions**

We have reviewed in this paper the most important demographic and educational developments that have shaped the evolution of labor supply in Tunisia in recent decades and the ensuing labor absorption challenges that accompanied these trends. The most important demographic development is the slowing growth of the working age population and the aging of the youth bulge generation into young adulthood and therefore past the ages of labor market entry. The reduced labor supply pressures made possible by these demographic developments were counteracted by dramatic changes in the educational composition of the labor force that brought about labor market insertion challenges of their own. The very rapid growth of higher education graduates (both short and long cycle), in particular, has strained the ability of the Tunisian labor market to absorb these graduates. The ranks of these graduates have been growing at a staggering rate of 12.5 percent p.a. from 1994 to 2010, more than five times the rate of growth of the working age population. Although the number of graduates has been falling since 2010, the backlog of graduates seeking jobs is still large.

The problem of labor market insertion among graduates is not evenly distributed by sex and across regions. The problem appears to be particularly acute for women, whose ranks among graduates have been growing at an even faster rate than among men, and for residents of lagging inland regions such as the North West and the Center West. Residents of rural areas, in general, are also finding it more difficult to find employment commensurate with their educational qualifications. The greater difficulties experienced by educated women in labor market insertion are not just because their ranks are increasing more rapidly than those of men, but also to the fact that they are less geographically mobile than men. Despite the difficulties that migration poses, young men do have the option to move to the more economically dynamic regions of Tunisia to find work, or even to migrate abroad. That option is not as readily available to young women seeking to capitalize on their newly acquired educational credentials. They are therefore more likely to be trapped in local labor markets that simply do not provide the employment opportunities that correspond to their education.

The demographics in Tunisia point to some aspects of labor supply that will be important factors in the country's medium and long-term economic outlook. The slowdown of population growth will substantially reduce medium-term labor supply pressures as the current youth generation is absorbed into the labor market. In the long run, the echo of the youth bulge will increase labor supply pressures once again. Over time, the compositional shift in labor supply will continue, with the labor force becoming increasingly educated. Although the rapid increase in higher education graduates of the 2000s has reversed, the labor force will nonetheless continue to shift towards higher levels of education. As in much of the region, a long-term challenge for Tunisia's economy will be ensuring that labor demand

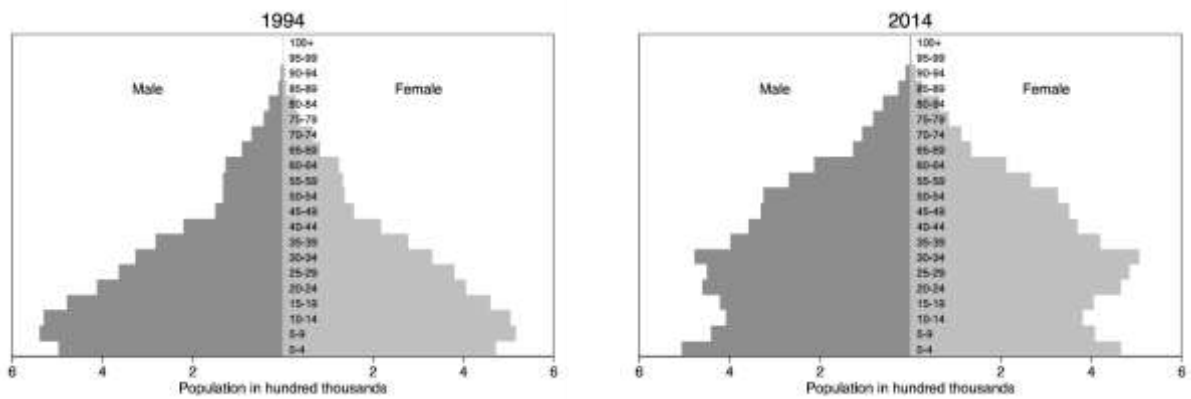


matches labor supply, in particular, that growth in the demand for educated labor matches growth in the supply of educated labor.

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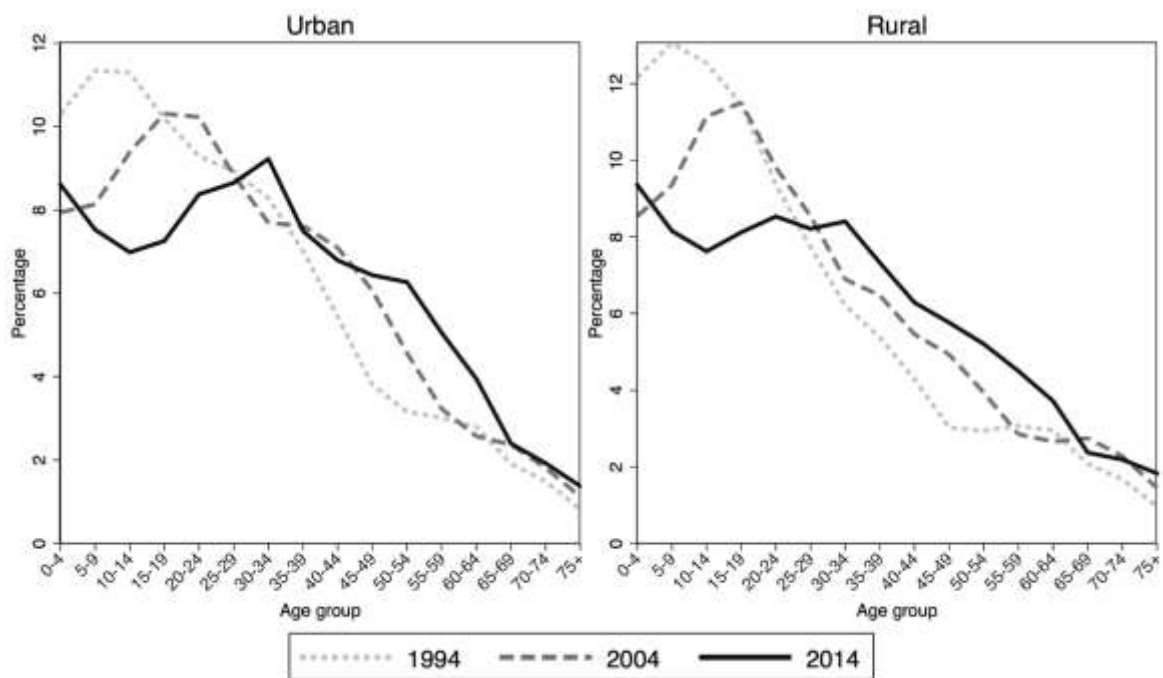
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**Figure 1: Population Structure by Five-Year Age Groups and Sex In 1994 and 2014 Population Censuses, Population In Hundreds Of Thousands**



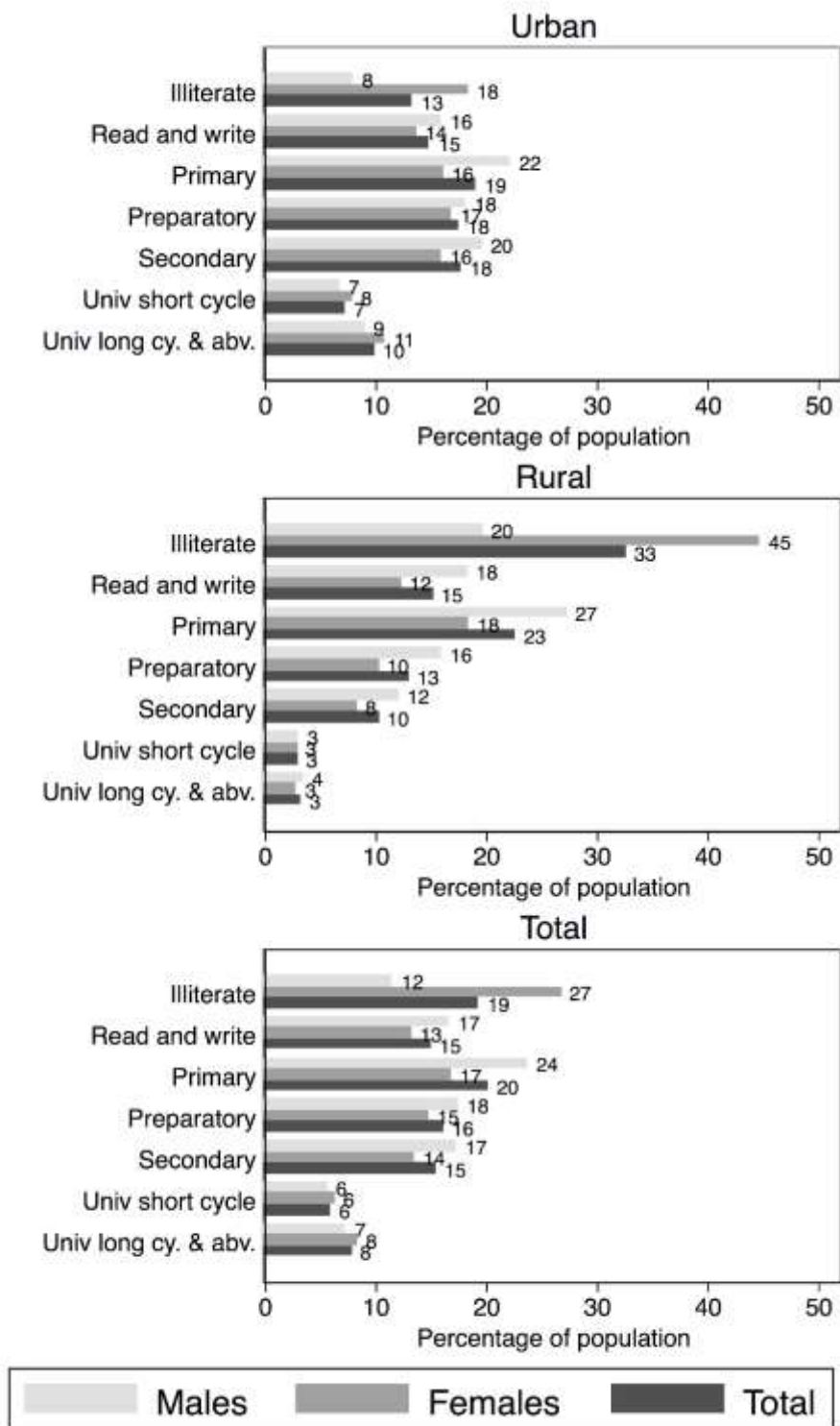
Source: Author's calculations based on INS (1994, 2014).

**Figure 2: Age Distribution by Five-Year Age Cohorts and Residence, Across the 1994, 2004 and 2014 Population Censuses (percentage of the population)**



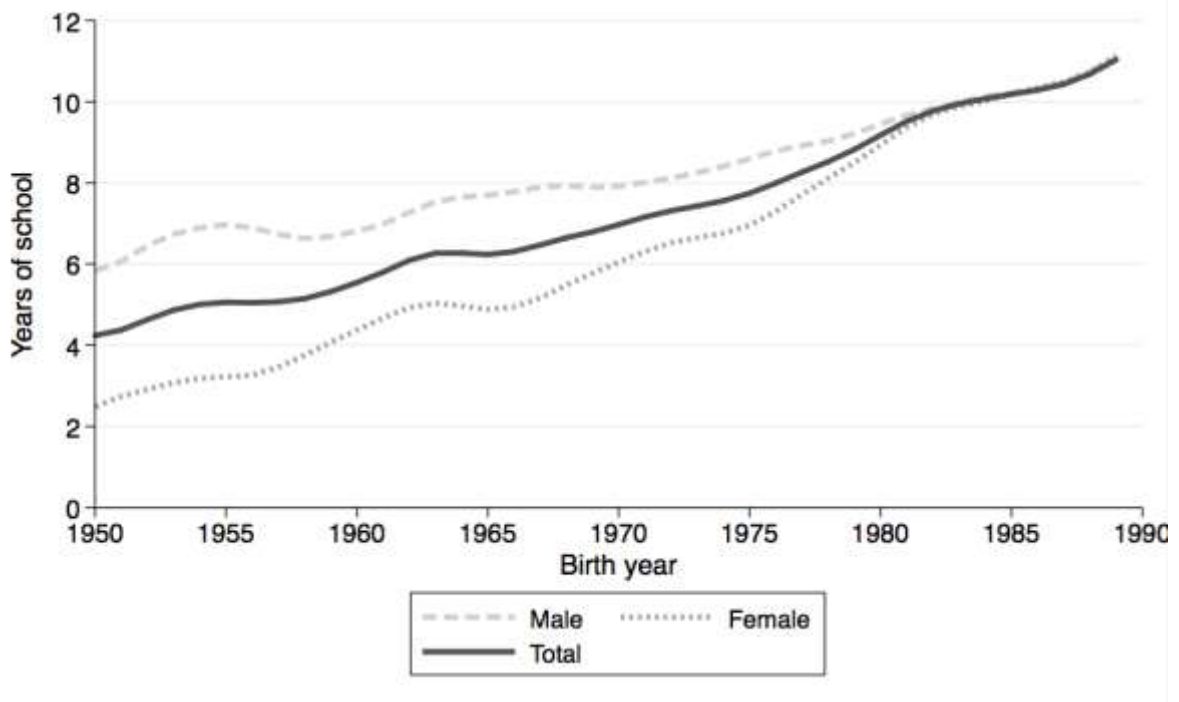
Source: Author's calculations based on INS (1994, 2004, 2014).

**Figure 3: Educational Attainment by Sex and Residence, Ages 15-64 (percentage of population)**



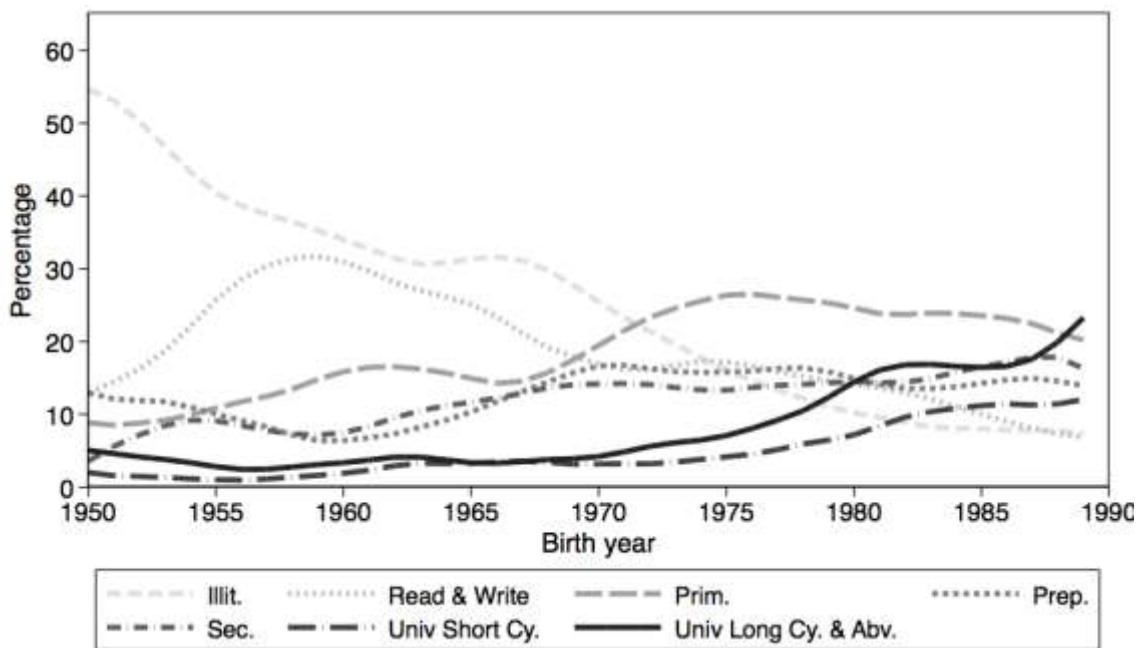
Source: Authors' calculations based on TLMPs 2014

**Figure 4: Mean Years of Schooling by Sex and Birth Year, Ages 25-64**



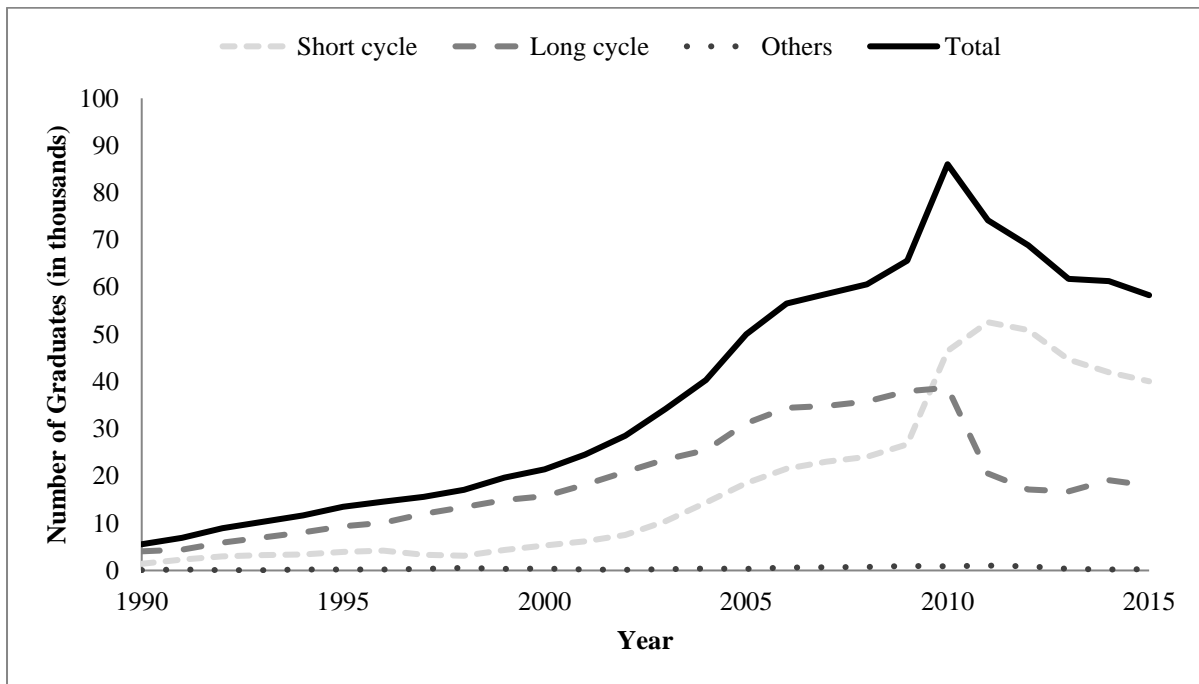
Notes: Lowess smoother with bandwidth of 0.3  
 Source: Authors' calculations based on TLMPs 2014

**Figure 5: Educational Attainment by Birth Year, Ages 25-64 (percentage of population)**



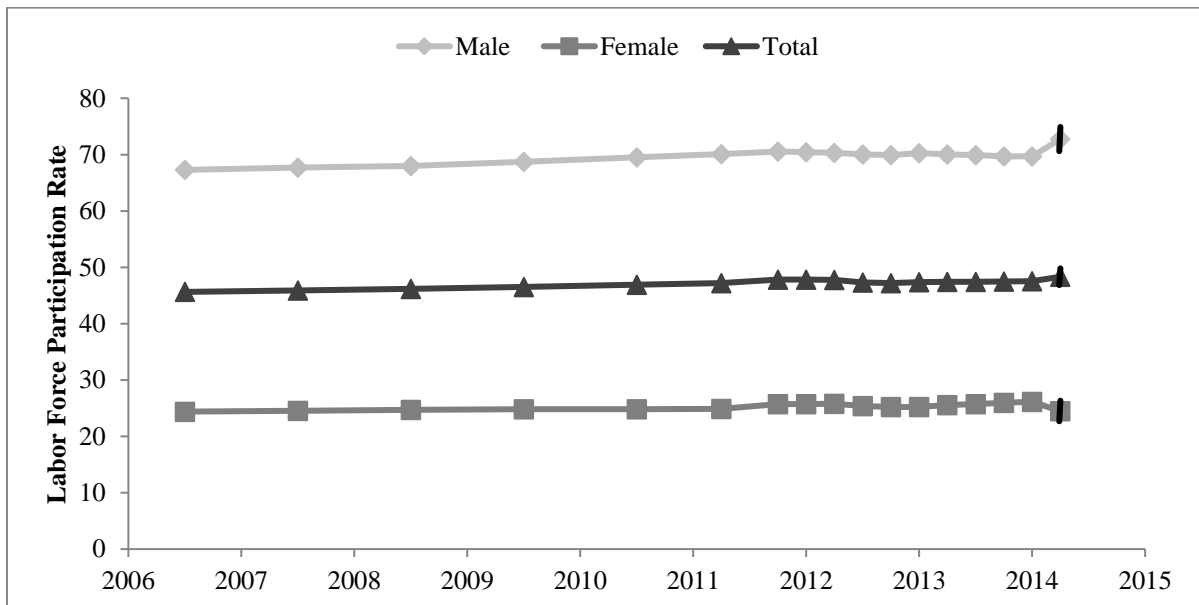
Notes: Lowess smoother with bandwidth 0.3  
 Source: Authors' calculations based on TLMPs 2014

**Figure 6: Number of University Graduates from Public Institutions, 1990-2015 (in thousands)**



Source: Communication with the Ministry of Higher Education

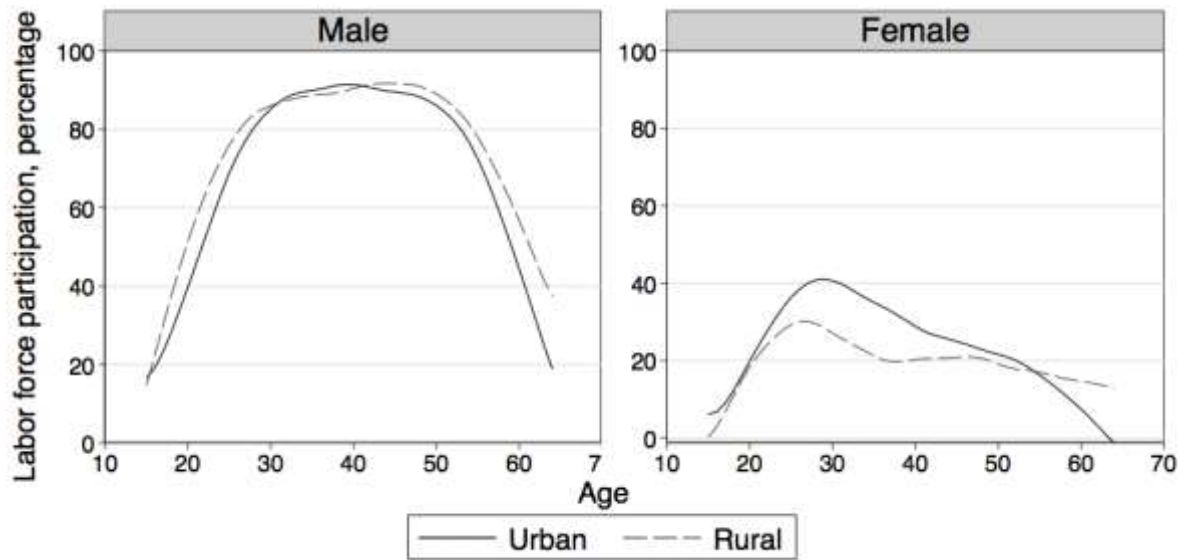
**Figure 7: Labor Force Participation Rate, Standard (Search Required) Market Labor Force Definition, by Sex and Year, Ages 15-64 (percentage)**



Note: Bars on 2014 denote 95 percent confidence interval

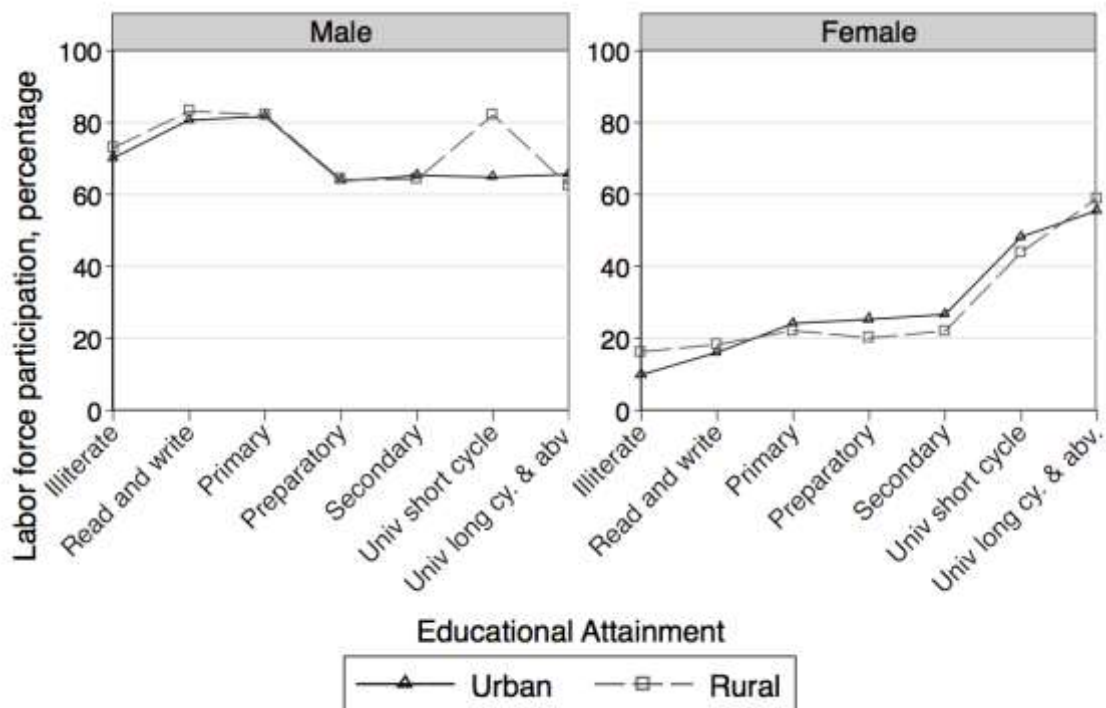
Source: Authors' calculations based on TLMPs 2014 and INS (n.d.)

**Figure 8: Labor Force Participation Rate, Standard (Search Required) Market Definition, by Age, Sex and Residence, Ages 15-64 (percentage)**



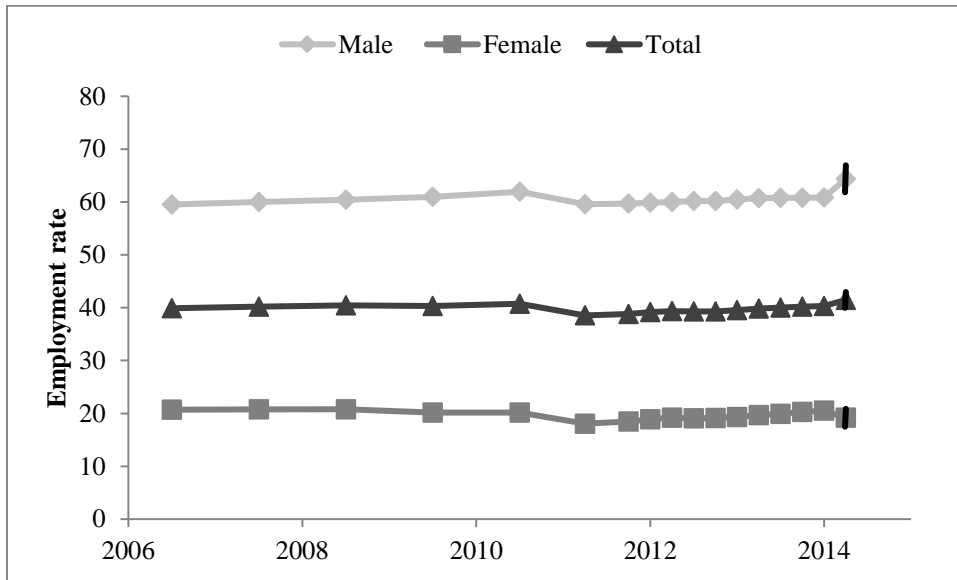
Source: Authors' calculations based on TLMPs 2014

**Figure 9: Labor Force Participation Rate, Standard (Search Required) Market Definition, by Education, Sex, and Residence, Ages 15-64 (percentage)**



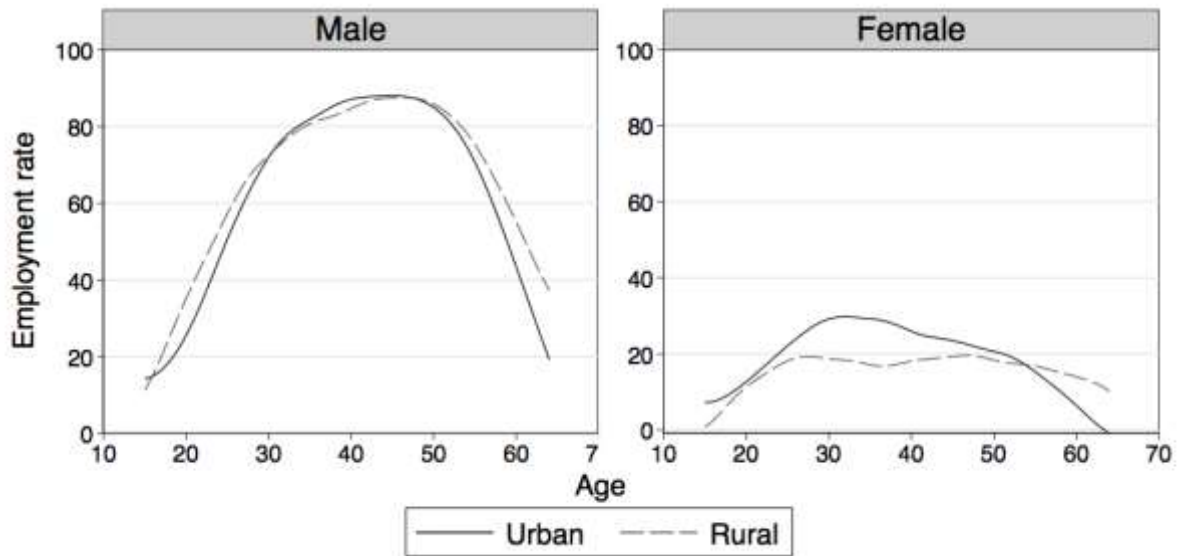
Source: Authors' calculations based on TLMPs 2014

**Figure 10: Employment to Population Ratio by Year and Sex, Market Definition, Ages 15-64 (percentage)**



Note: Bars on 2014 denote 95 percent confidence interval  
 Source: Authors' calculations based on TLMPs 2014 and INS (n.d.)

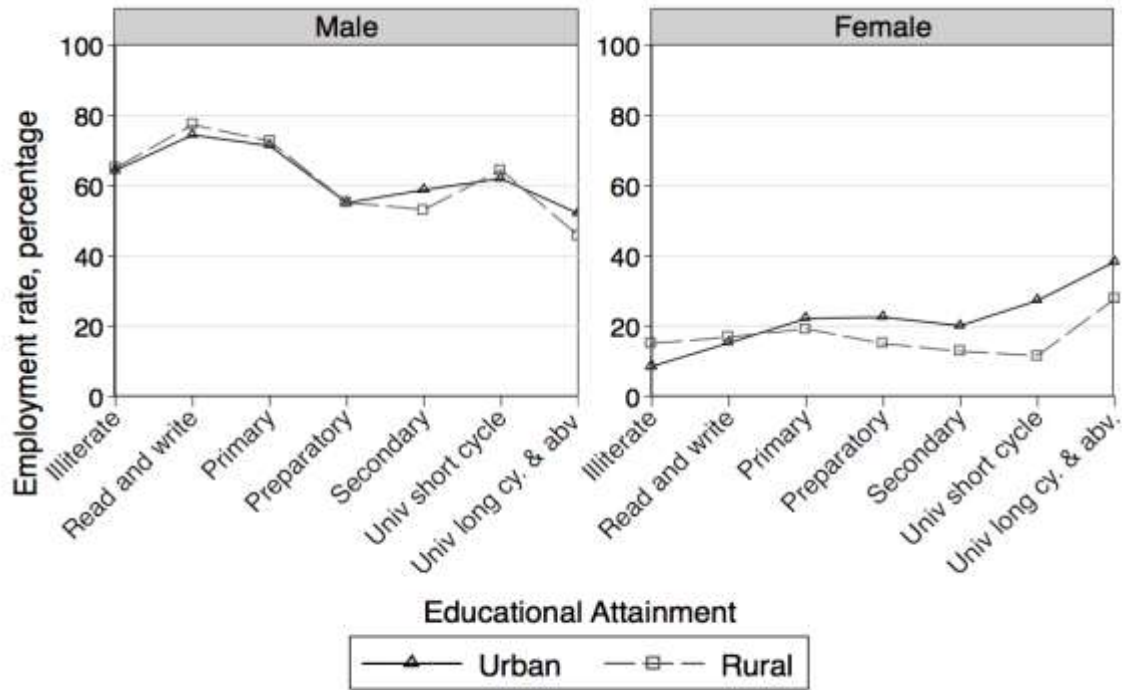
**Figure 11: Employment to Population Ratio, Market Definition, by Age, Sex and Residence, Ages 15-64 (percentage)**



Source: Authors' calculations based on TLMPs 2014

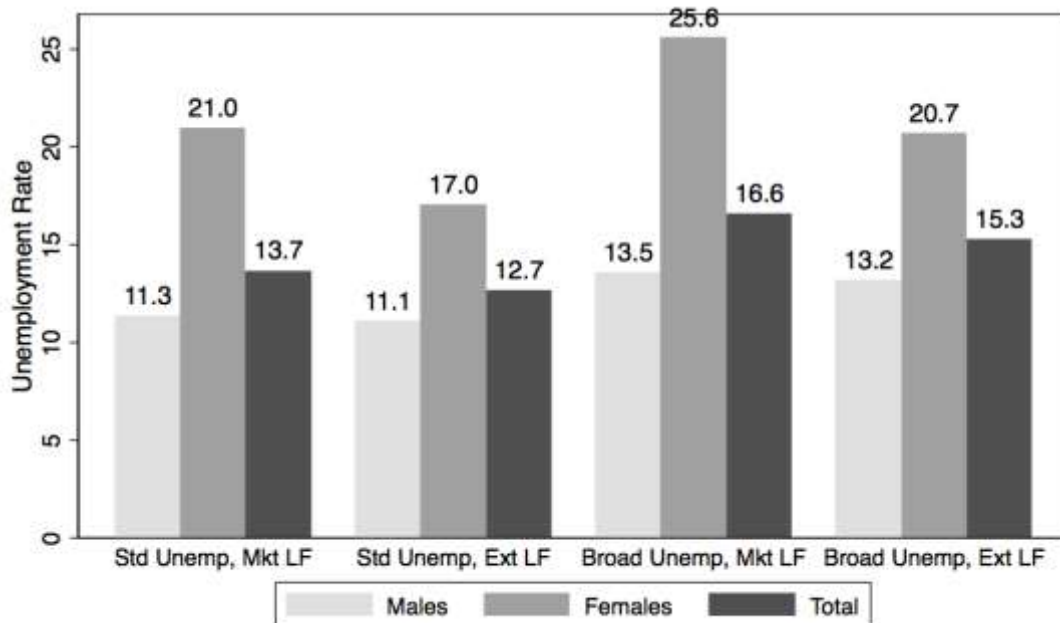


**Figure 12: Employment to Population Ratio, Market Definition, by Education Level, Sex, and Residence, Ages 15-64 (percentage)**



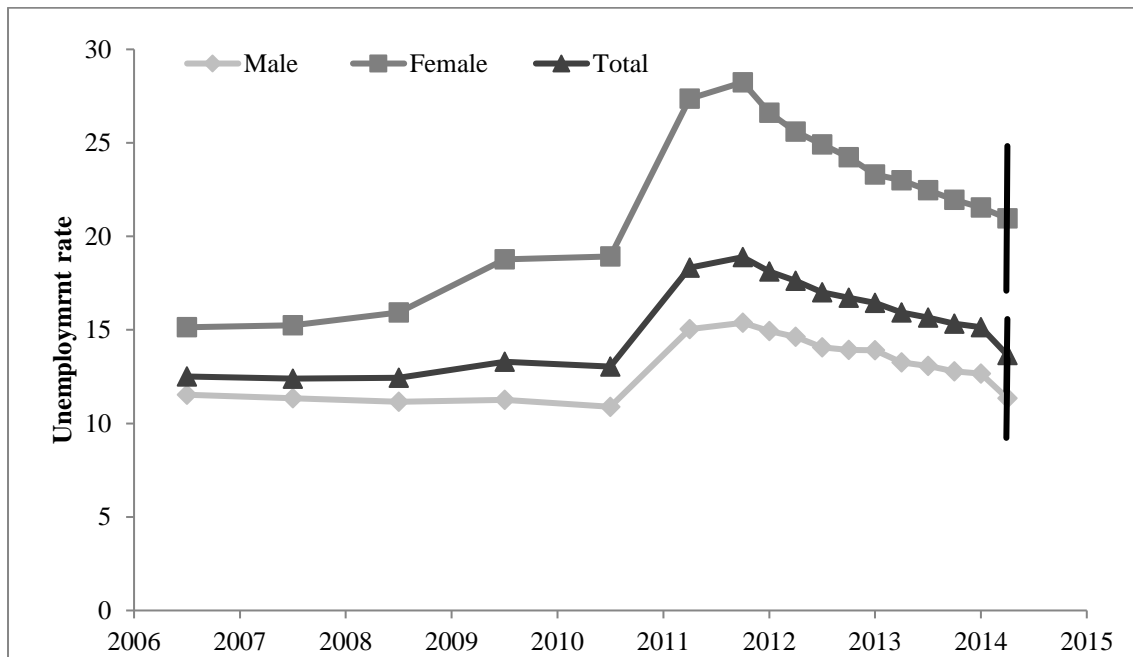
Source: Authors' calculations based on TLMPs 2014

**Figure 13: Unemployment Rate According to Various Definitions, by Sex, Ages 15-64 (percentage)**



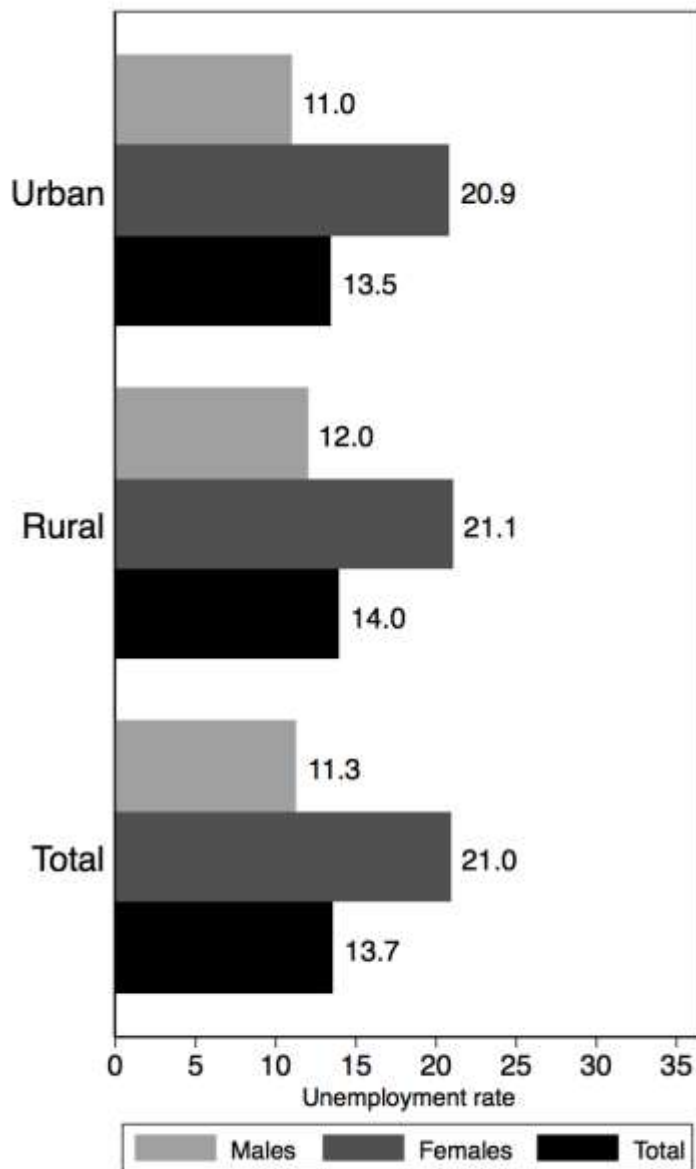
Source: Authors' calculations based on TLMPs 2014

**Figure 14: Unemployment Rate, Standard (Search Required) Market Labor Force Definition, by Sex and Year, Ages 15-64 (percentage)**



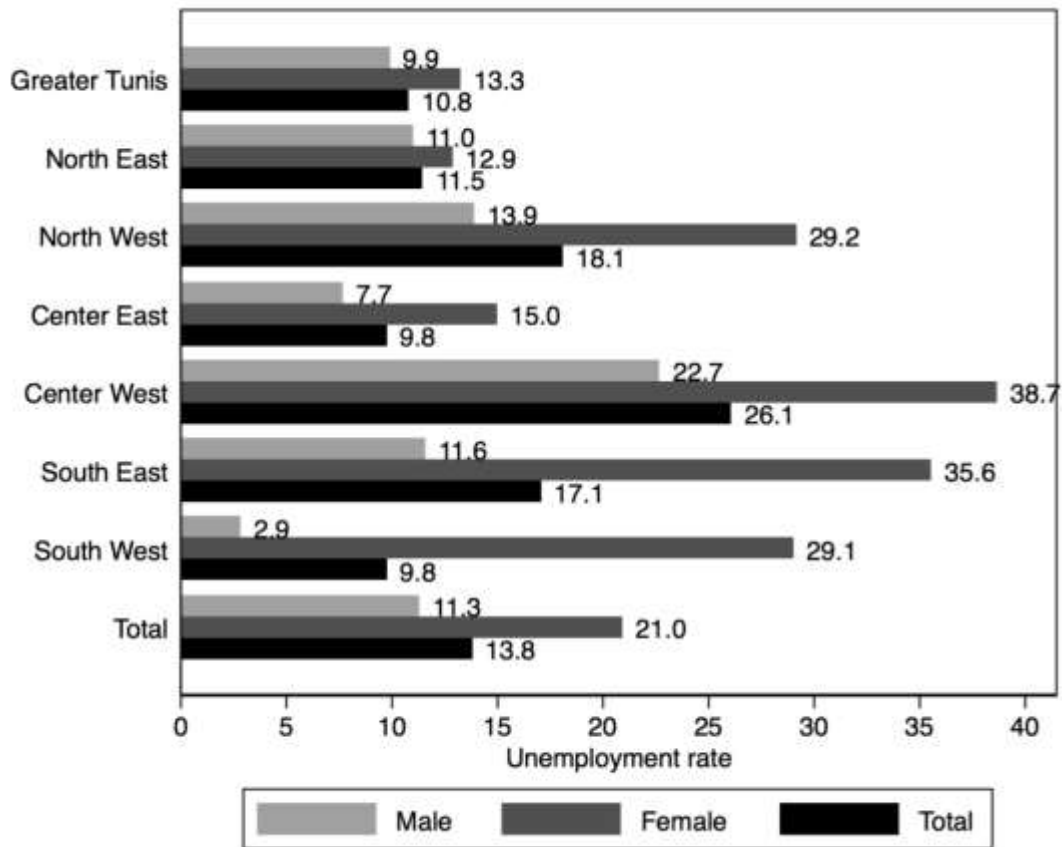
Note: Bars on 2014 denote 95 percent confidence interval  
 Source: Authors' calculations based on TLMPS 2014 and INS (n.d.)

**Figure 15: Unemployment Rate, Standard (Search Required) Market Labor Force Definition, by Sex and Residence, Ages 15-64 (percentage)**



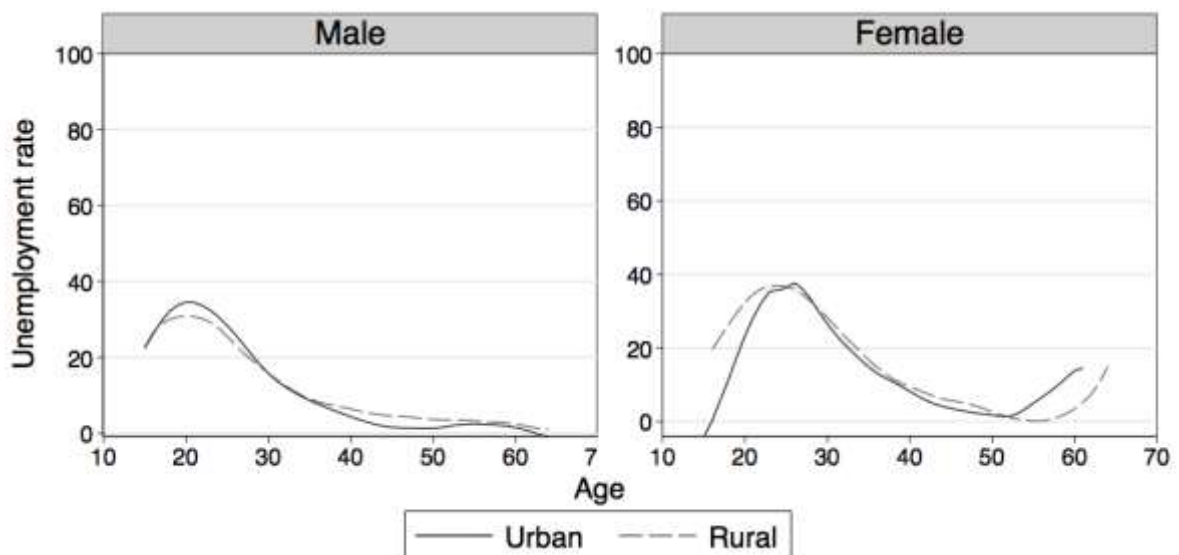
Source: Authors' calculations based on TLMPs 2014.

**Figure 16: Unemployment Rate, Standard (Search Required) Market Labor Force Definition, by Sex and Region, Ages 15-64 (percentage)**



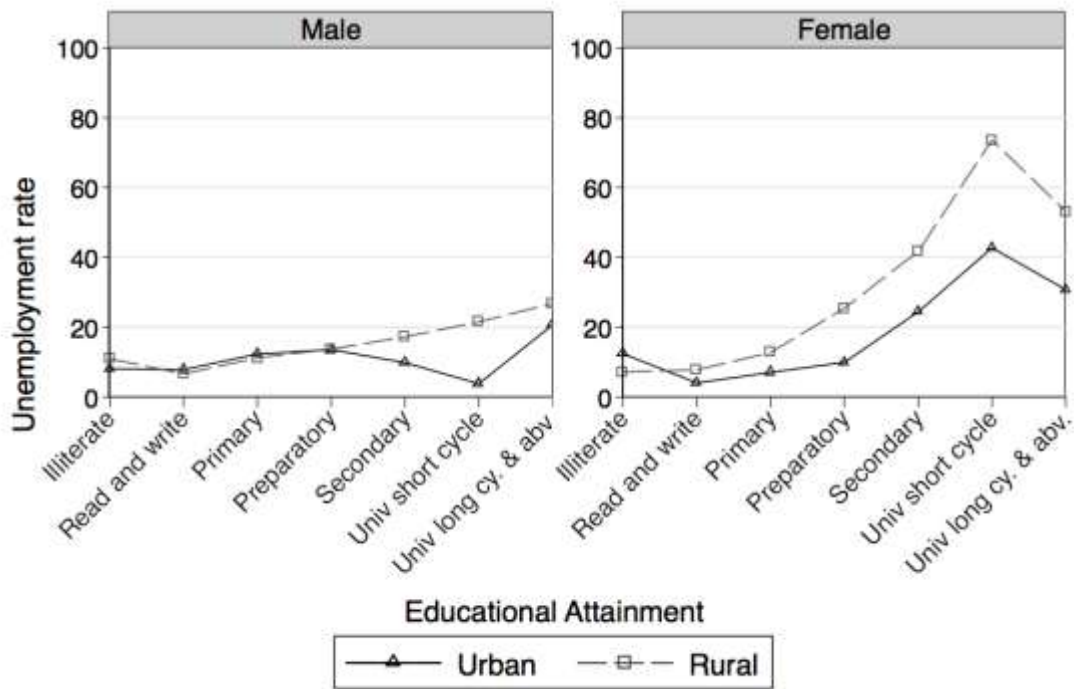
Source: Authors' calculations based on [TLMPS 2014](#)

**Figure 17: Unemployment Rate, Standard (Search Required) Market Labor Force Definition, by Age, Sex and Residence, Ages 15-64 (percentage)**



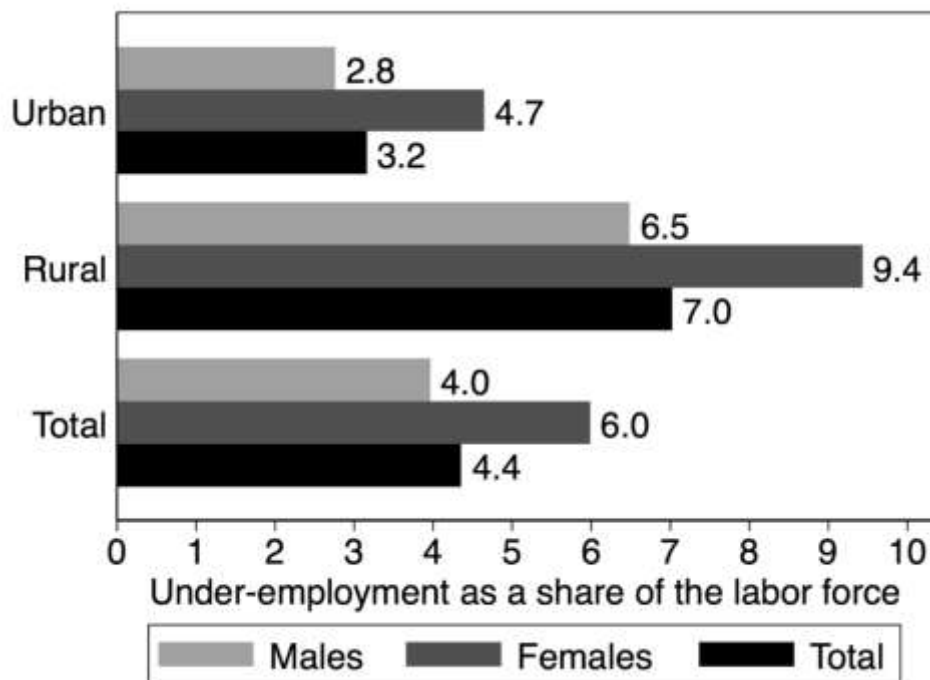
Source: Authors' calculations based on [TLMPS 2014](#)

**Figure 18: Unemployment Rate, Standard (Search Required) Market Labor Force Definition, by Education, Sex, and Residence, Ages 15-64 (percentage)**



Source: Authors' calculations based on TLMPs 2014

**Figure 19: Under-employment Rate as A Share of The Labor Force, by Sex and Residence, Ages 15-64 (percentage)**



Source: Authors' calculations based on TLMPs 2014

**Table 1: Distribution of Population by Region and Percentage Rural in 2014 (percentage of the population)**

	National	Urban	Rural	Percentage Rural
Greater Tunis	24.1	32.7	6.0	8.1
North East	14.0	13.2	15.5	35.8
North West	10.7	6.6	19.2	58.2
Central East	23.6	25.3	20.0	27.4
Central West	13.1	6.8	26.2	64.6
South East	9.1	9.9	7.6	26.7
South West	5.5	5.5	5.4	31.8
Total	100.0	100.0	100.0	32.3

Source: INS (2014).

**Table 2: Average Annual Population Growth Rates by Residence and Sex, 1994-2004 and 2004-2014 (percentage)**

	Total population		Working age population 15-64 years		Child population 0-14 years		Youth population 15-24 years		Young adult population 25-29 years	
	1994-2004	2004-2014	1994-2004	2004-2014	1994-2004	2004-2014	1994-2004	2004-2014	1994-2004	2004-2014
	<b>Male</b>									
Urban	1.8	1.4	2.7	1.5	-0.7	0.6	2.3	-1.3	1.7	1.0
Rural	0.1	0.2	1.1	0.8	-2.5	-1.2	0.4	-2.3	1.0	0.1
Total	1.1	1.0	2.2	1.3	-1.4	-0.1	1.6	-1.7	1.4	0.7
<b>Female</b>										
Urban	1.8	1.6	2.9	1.8	-0.9	0.4	2.4	-1.2	1.7	1.5
Rural	0.4	0.1	1.4	0.5	-2.4	-1.4	0.4	-2.3	1.3	-0.5
Total	1.3	1.1	2.4	1.4	-1.5	-0.2	1.6	-1.6	1.6	0.9
<b>All</b>										
Urban	1.8	1.5	2.8	1.6	-0.8	0.5	2.3	-1.3	1.7	1.3
Rural	0.2	0.1	1.3	0.6	-2.5	-1.3	0.4	-2.3	1.2	-0.2
Total	1.2	1.0	2.3	1.3	-1.4	-0.1	1.6	-1.6	1.5	0.8

Source: Authors' calculations based on Censuses 1994, 2004 and 2014 (INS).

**Table 3: Labor Force Participation Rate, Various Definitions, by Sex and Residence, Ages 15-64 (percentage)**

	Male	Female	Total
<b>Urban</b>			
Broad Market LF	73.5	27.7	50.5
Broad Extended LF	73.1	28.5	50.5
Standard Market LF	71.8	26.4	49.0
Standard Extended LF	71.3	27.2	49.0
<b>Rural</b>			
Broad Market LF	77.0	22.5	48.7
Broad Extended LF	78.2	35.7	56.0
Standard Market LF	74.9	20.6	46.7
Standard Extended LF	76.4	34.1	54.4
<b>Total</b>			
Broad Market LF	74.6	26.0	49.9
Broad Extended LF	74.7	30.8	52.3
Standard Market LF	72.8	24.5	48.3
Standard Extended LF	72.9	29.5	50.7

Source: Authors' calculations based on TLMPS 2014

**Table 4: Youth Labor Force Participation Rate According to Various Definitions, by Sex and Residence, Ages 15-24 (percentage)**

	Male	Female	Total
<b>Urban</b>			
Broad Market LF	40.2	22.0	31.1
Broad Extended LF	39.8	22.3	31.1
Standard Market LF	38.4	19.5	29.0
Standard Extended LF	38.2	19.8	29.0
<b>Rural</b>			
Broad Market LF	50.6	20.7	35.4
Broad Extended LF	53.1	26.1	39.3
Standard Market LF	47.2	17.5	32.1
Standard Extended LF	49.8	23.7	36.5
<b>Total</b>			
Broad Market LF	43.7	21.5	32.6
Broad Extended LF	44.3	23.6	33.9
Standard Market LF	41.4	18.8	30.1
Standard Extended LF	42.1	21.1	31.6

Source: Authors' calculations based on TLMPS 2014

**Table 5: Young Adult Labor Force Participation Rate, Various Definitions, by Sex and Residence, Ages 25-29 (percentage)**

	Male	Female	Total
<b>Urban</b>			
Broad Market LF	86.5	44.8	64.8
Broad Extended LF	86.2	44.8	64.3
Standard Market LF	83.9	43.5	63.0
Standard Extended LF	83.6	43.5	62.3
<b>Rural</b>			
Broad Market LF	86.8	33.4	57.8
Broad Extended LF	86.9	42.3	62.5
Standard Market LF	83.2	30.5	54.6
Standard Extended LF	83.2	39.4	59.3
<b>Total</b>			
Broad Market LF	86.6	41.1	62.7
Broad Extended LF	86.5	44.0	63.7
Standard Market LF	83.7	39.3	60.4
Standard Extended LF	83.5	42.2	61.4

Source: Authors' calculations based on TLMPS 2014

**Table 6: Employment to Population Ratio, Various Definitions, by Sex and Residence, Ages 15-64 (percentage)**

	Male	Female	Total
<b>Urban</b>			
Market employment	63.8	20.6	42.0
Extended employment	63.2	21.6	42.1
<b>Rural</b>			
Market employment	65.8	16.1	40.0
Extended employment	68.1	29.9	48.2
<b>Total</b>			
Market employment	64.4	19.2	41.3
Extended employment	64.7	24.3	44.0

Source: Authors' calculations based on TLMPS 2014

## Appendix Tables:

### Standard Errors and Confidence Intervals for the Main Labor Market Aggregates

**Table A.1: Standard Errors for Standard Market Labor Force (ref. 7 day, proportion)**

	Mean	SE	95% CI Lower Bound	95% CI Upper Bound	Coeff. of Variation (%)	N (Obs.)
<b>Total</b>	0.483	0.008	0.468	0.498	1.6	9387
<b>Sex</b>						
Male	0.728	0.011	0.706	0.749	1.5	4256
Female	0.245	0.009	0.227	0.263	3.8	5016
<b>Residence</b>						
Urban	0.490	0.010	0.470	0.510	2.1	4124
Rural	0.469	0.010	0.449	0.488	2.1	5263
<b>Region</b>						
Greater Tunis	0.463	0.018	0.427	0.499	4.0	1540
North East	0.512	0.020	0.473	0.551	3.9	1464
North West	0.508	0.017	0.474	0.541	3.4	1446
Center East	0.497	0.017	0.464	0.531	3.4	1960
Center West	0.420	0.017	0.388	0.453	4.0	1391
South East	0.477	0.016	0.445	0.509	3.4	1061
South West	0.553	0.026	0.502	0.604	4.7	525
<b>Education</b>						
Illiterate	0.305	0.016	0.274	0.336	5.1	2414
Read and Write	0.526	0.017	0.493	0.560	3.3	1472
Primary	0.571	0.018	0.535	0.606	3.2	1901
Preparatory	0.456	0.025	0.406	0.506	5.6	1334
Secondary	0.476	0.020	0.436	0.516	4.3	1173
Univ. Short Cycle	0.571	0.043	0.488	0.655	7.5	393
Univ. Long Cy. & Abv.	0.604	0.036	0.534	0.674	5.9	469
<b>Age Group</b>						
15-19	0.165	0.017	0.130	0.199	10.6	1126
20-24	0.418	0.024	0.372	0.465	5.7	1108
25-29	0.606	0.021	0.565	0.647	3.5	942
30-34	0.609	0.023	0.563	0.655	3.8	976
35-39	0.581	0.020	0.541	0.621	3.5	1005
40-44	0.578	0.020	0.539	0.617	3.5	960
45-49	0.541	0.023	0.496	0.587	4.3	935
50-54	0.532	0.023	0.487	0.578	4.4	859
55-59	0.423	0.023	0.378	0.469	5.5	732
60-64	0.214	0.022	0.172	0.256	10.1	744

Source: Authors' calculations based on TLMPs 2014



**Table A.2: Standard Errors for Standard Extended Labor Force (ref. 7 day, proportion)**

	Mean	SE	95% CI Lower Bound	95% CI Upper Bound	Coeff. of Variation (%)	N (Obs.)
<b>Total</b>	0.507	0.008	0.492	0.523	1.6	9275
<b>Sex</b>						
Male	0.729	0.011	0.707	0.751	1.6	4179
Female	0.295	0.010	0.275	0.314	3.4	4981
<b>Residence</b>						
Urban	0.490	0.011	0.470	0.511	2.1	4058
Rural	0.544	0.012	0.522	0.567	2.1	5217
<b>Region</b>						
Greater Tunis	0.455	0.020	0.417	0.494	4.3	1509
North East	0.518	0.020	0.478	0.557	3.9	1450
North West	0.551	0.019	0.513	0.588	3.5	1428
Center East	0.528	0.017	0.494	0.561	3.2	1942
Center West	0.497	0.021	0.456	0.538	4.2	1380
South East	0.507	0.019	0.470	0.544	3.7	1044
South West	0.565	0.029	0.508	0.623	5.2	522
<b>Education</b>						
Illiterate	0.388	0.017	0.354	0.422	4.4	2398
Read and Write	0.549	0.017	0.515	0.583	3.2	1454
Primary	0.592	0.018	0.556	0.627	3.0	1875
Preparatory	0.463	0.026	0.413	0.513	5.5	1314
Secondary	0.479	0.020	0.439	0.519	4.3	1158
Univ. Short Cycle	0.567	0.044	0.480	0.654	7.8	387
Univ. Long Cy. & Abv.	0.598	0.036	0.527	0.669	6.0	464
<b>Age Group</b>						
15-19	0.180	0.018	0.144	0.215	10.2	1117
20-24	0.434	0.024	0.386	0.482	5.6	1093
25-29	0.616	0.021	0.575	0.657	3.4	926
30-34	0.622	0.024	0.576	0.669	3.8	963
35-39	0.621	0.021	0.581	0.662	3.3	995
40-44	0.602	0.020	0.563	0.640	3.3	942
45-49	0.582	0.023	0.537	0.627	3.9	928
50-54	0.563	0.025	0.515	0.612	4.4	842
55-59	0.464	0.024	0.417	0.512	5.2	728
60-64	0.257	0.022	0.214	0.300	8.6	741

Source: Authors' calculations based on TLMPS 2014

**Table A.3: Standard Errors for Broad Market Labor Force (ref. 7 day, proportion)**

	<b>Mean</b>	<b>SE</b>	<b>95% CI Lower Bound</b>	<b>95% CI Upper Bound</b>	<b>Coeff. of Variation (%)</b>	<b>N (Obs.)</b>
<b>Total</b>	0.500	0.008	0.485	0.515	1.6	9387
<b>Sex</b>						
Male	0.746	0.011	0.725	0.767	1.4	4256
Female	0.260	0.010	0.241	0.279	3.7	5016
<b>Residence</b>						
Urban	0.505	0.010	0.485	0.525	2.1	4124
Rural	0.489	0.010	0.470	0.508	2.0	5263
<b>Region</b>						
Greater Tunis	0.478	0.019	0.442	0.515	3.9	1540
North East	0.521	0.019	0.483	0.559	3.7	1464
North West	0.520	0.019	0.483	0.558	3.6	1446
Center East	0.526	0.018	0.490	0.562	3.5	1960
Center West	0.438	0.017	0.405	0.471	3.8	1391
South East	0.495	0.017	0.461	0.529	3.5	1061
South West	0.554	0.027	0.502	0.606	4.8	525
<b>Education</b>						
Illiterate	0.313	0.016	0.282	0.344	5.0	2414
Read and Write	0.550	0.018	0.515	0.586	3.3	1472
Primary	0.593	0.018	0.558	0.627	3.0	1901
Preparatory	0.468	0.026	0.418	0.519	5.5	1334
Secondary	0.493	0.021	0.452	0.534	4.3	1173
Univ. Short Cycle	0.581	0.043	0.497	0.664	7.4	393
Univ. Long Cy. & Abv.	0.625	0.036	0.555	0.696	5.8	469
<b>Age Group</b>						
15-19	0.181	0.018	0.145	0.216	10.0	1126
20-24	0.451	0.024	0.404	0.498	5.3	1108
25-29	0.629	0.021	0.588	0.670	3.3	942
30-34	0.631	0.023	0.586	0.675	3.6	976
35-39	0.595	0.020	0.556	0.635	3.4	1005
40-44	0.590	0.019	0.552	0.628	3.3	960
45-49	0.554	0.023	0.510	0.599	4.1	935
50-54	0.536	0.023	0.491	0.582	4.4	859
55-59	0.428	0.023	0.382	0.474	5.5	732
60-64	0.226	0.023	0.181	0.271	10.1	744

Source: Authors' calculations based on TLMPS 2014

**Table A.4: Standard Errors for Broad Extended Labor Force (ref. 7 day, proportion)**

	<b>Mean</b>	<b>SE</b>	<b>95% CI Lower Bound</b>	<b>95% CI Upper Bound</b>	<b>Coeff. of Variation (%)</b>	<b>N (Obs.)</b>
<b>Total</b>	0.523	0.008	0.507	0.539	1.6	9275
<b>Sex</b>						
Male	0.747	0.011	0.725	0.768	1.5	4179
Female	0.308	0.010	0.288	0.328	3.3	4981
<b>Residence</b>						
Urban	0.505	0.011	0.484	0.526	2.1	4058
Rural	0.562	0.012	0.539	0.584	2.0	5217
<b>Region</b>						
Greater Tunis	0.471	0.020	0.433	0.510	4.2	1509
North East	0.526	0.020	0.488	0.564	3.7	1450
North West	0.561	0.020	0.522	0.600	3.5	1428
Center East	0.554	0.018	0.518	0.589	3.3	1942
Center West	0.512	0.021	0.470	0.553	4.2	1380
South East	0.525	0.019	0.487	0.563	3.7	1044
South West	0.566	0.030	0.508	0.625	5.3	522
<b>Education</b>						
Illiterate	0.395	0.017	0.361	0.428	4.4	2398
Read and Write	0.572	0.018	0.536	0.608	3.2	1454
Primary	0.612	0.018	0.577	0.646	2.9	1875
Preparatory	0.475	0.026	0.424	0.526	5.5	1314
Secondary	0.496	0.021	0.454	0.537	4.2	1158
Univ. Short Cycle	0.574	0.044	0.487	0.661	7.7	387
Univ. Long Cy. & Abv.	0.619	0.036	0.548	0.690	5.9	464
<b>Age Group</b>						
15-19	0.194	0.019	0.157	0.231	9.7	1117
20-24	0.465	0.025	0.417	0.513	5.3	1093
25-29	0.639	0.021	0.598	0.681	3.3	926
30-34	0.642	0.023	0.597	0.687	3.6	963
35-39	0.635	0.020	0.596	0.675	3.2	995
40-44	0.613	0.019	0.575	0.650	3.1	942
45-49	0.595	0.022	0.552	0.639	3.7	928
50-54	0.567	0.025	0.519	0.616	4.4	842
55-59	0.467	0.024	0.420	0.515	5.2	728
60-64	0.267	0.023	0.221	0.312	8.7	741

Source: Authors' calculations based on TLMPS 2014

**Table A.5: Standard Errors for Market Employment (ref. 7 day, proportion)**

	Mean	SE	95% CI Lower Bound	95% CI Upper Bound	Coeff. of Variation (%)	N (Obs.)
<b>Total</b>	0.415	0.008	0.400	0.430	1.8	9450
<b>Sex</b>						
Male	0.644	0.013	0.618	0.669	2.0	4268
Female	0.192	0.009	0.175	0.209	4.5	5065
<b>Residence</b>						
Urban	0.421	0.010	0.401	0.441	2.4	4161
Rural	0.401	0.010	0.381	0.421	2.5	5289
<b>Region</b>						
Greater Tunis	0.412	0.019	0.376	0.449	4.5	1550
North East	0.452	0.018	0.418	0.487	3.9	1470
North West	0.416	0.019	0.379	0.452	4.5	1448
Center East	0.446	0.016	0.416	0.477	3.5	1968
Center West	0.310	0.018	0.274	0.346	6.0	1401
South East	0.388	0.021	0.348	0.429	5.3	1084
South West	0.495	0.031	0.435	0.555	6.2	529
<b>Education</b>						
Illiterate	0.274	0.015	0.244	0.304	5.5	2431
Read and Write	0.486	0.017	0.452	0.520	3.5	1480
Primary	0.502	0.018	0.467	0.538	3.6	1919
Preparatory	0.394	0.024	0.347	0.440	6.0	1344
Secondary	0.403	0.021	0.362	0.443	5.1	1177
Univ. Short Cycle	0.426	0.041	0.345	0.507	9.7	396
Univ. Long Cy. & Abv.	0.439	0.036	0.369	0.509	8.1	471
<b>Age Group</b>						
15-19	0.122	0.016	0.091	0.154	13.2	1136
20-24	0.257	0.020	0.218	0.296	7.8	1115
25-29	0.442	0.025	0.393	0.491	5.7	948
30-34	0.526	0.021	0.484	0.567	4.0	980
35-39	0.527	0.020	0.487	0.567	3.9	1013
40-44	0.555	0.020	0.515	0.595	3.7	965
45-49	0.526	0.023	0.481	0.571	4.4	944
50-54	0.521	0.023	0.475	0.567	4.5	863
55-59	0.400	0.022	0.357	0.443	5.5	737
60-64	0.210	0.021	0.168	0.252	10.1	749

Source: Authors' calculations based on TLMPS 2014

**Table A.6: Standard Errors for Extended Employment (ref. 7 day, proportion)**

	Mean	SE	95% CI Lower Bound	95% CI Upper Bound	Coeff. of Variation (%)	N (Obs.)
<b>Total</b>	0.441	0.008	0.425	0.457	1.9	9323
<b>Sex</b>						
Male	0.647	0.014	0.621	0.674	2.1	4188
Female	0.243	0.010	0.224	0.261	3.9	5018
<b>Residence</b>						
Urban	0.422	0.011	0.401	0.443	2.5	4087
Rural	0.483	0.012	0.460	0.506	2.5	5236
<b>Region</b>						
Greater Tunis	0.404	0.020	0.365	0.442	4.9	1517
North East	0.459	0.019	0.422	0.496	4.1	1454
North West	0.461	0.022	0.417	0.505	4.9	1429
Center East	0.479	0.016	0.448	0.511	3.4	1946
Center West	0.393	0.023	0.348	0.439	5.9	1388
South East	0.421	0.023	0.376	0.466	5.5	1066
South West	0.512	0.032	0.449	0.575	6.3	523
<b>Education</b>						
Illiterate	0.360	0.016	0.328	0.392	4.6	2408
Read and Write	0.509	0.017	0.475	0.543	3.4	1461
Primary	0.526	0.019	0.490	0.563	3.5	1890
Preparatory	0.402	0.024	0.356	0.449	5.9	1323
Secondary	0.408	0.021	0.368	0.449	5.0	1161
Univ. Short Cycle	0.429	0.043	0.344	0.513	10.1	389
Univ. Long Cy. & Abv.	0.431	0.036	0.360	0.502	8.4	465
<b>Age Group</b>						
15-19	0.138	0.017	0.105	0.171	12.3	1125
20-24	0.279	0.021	0.238	0.319	7.5	1098
25-29	0.455	0.025	0.406	0.504	5.5	931
30-34	0.541	0.022	0.498	0.583	4.0	966
35-39	0.569	0.021	0.527	0.611	3.8	1001
40-44	0.580	0.020	0.541	0.619	3.5	947
45-49	0.571	0.023	0.526	0.616	4.0	933
50-54	0.553	0.025	0.504	0.602	4.5	846
55-59	0.442	0.023	0.397	0.487	5.2	731
60-64	0.253	0.022	0.210	0.296	8.7	745

Source: Authors' calculations based on TLMPS 2014

**Table A.7: Standard Errors for Underemployment as A Share of the Labor Force (proportion)**

	<b>Mean</b>	<b>SE</b>	<b>95% CI Lower Bound</b>	<b>95% CI Upper Bound</b>	<b>Coeff. of Variation (%)</b>	<b>N (Obs.)</b>
<b>Total</b>	0.044	0.006	0.032	0.055	13.1	3369
<b>Sex</b>						
Male	0.040	0.006	0.028	0.051	15.0	2531
Female	0.060	0.013	0.035	0.085	21.1	783
<b>Residence</b>						
Urban	0.032	0.006	0.019	0.044	20.4	1459
Rural	0.070	0.011	0.050	0.091	15.0	1910
<b>Region</b>						
Greater Tunis	0.013	0.007	0.000	0.027	52.2	537
North East	0.033	0.008	0.017	0.049	24.8	560
North West	0.047	0.011	0.024	0.069	24.6	591
Center East	0.054	0.014	0.026	0.082	26.2	737
Center West	0.092	0.028	0.037	0.147	30.5	383
South East	0.065	0.024	0.018	0.112	37.0	357
South West	0.032	0.010	0.013	0.052	30.8	204
<b>Education</b>						
Illiterate	0.095	0.018	0.060	0.130	19.0	618
Read and Write	0.027	0.006	0.015	0.039	23.0	656
Primary	0.034	0.009	0.017	0.051	25.9	845
Preparatory	0.015	0.005	0.006	0.024	29.7	465
Secondary	0.028	0.011	0.007	0.048	38.7	398
Univ. Short Cycle	0.058	0.025	0.009	0.108	43.5	142
Univ. Long Cy. & Abv.	0.069	0.021	0.027	0.110	31.1	162
<b>Age Group</b>						
15-19	0.100	0.067	-0.031	0.231	67.0	130
20-24	0.035	0.015	0.006	0.065	42.5	262
25-29	0.028	0.010	0.008	0.048	36.3	351
30-34	0.042	0.010	0.021	0.062	24.8	435
35-39	0.041	0.010	0.022	0.060	23.4	467
40-44	0.049	0.011	0.027	0.071	22.7	464
45-49	0.040	0.013	0.014	0.065	32.3	438
50-54	0.042	0.013	0.017	0.067	29.9	409
55-59	0.061	0.023	0.015	0.107	38.3	262
60-64	0.050	0.018	0.015	0.086	35.8	151

Source: Authors' calculations based on TLMPS 2014

**Table A.8: Standard Errors for Standard Market Unemployment Rate (ref. 7 day, proportion)**

	<b>Mean</b>	<b>SE</b>	<b>95% CI Lower Bound</b>	<b>95% CI Upper Bound</b>	<b>Coeff. of Variation (%)</b>	<b>N (Obs.)</b>
<b>Total</b>	0.137	0.010	0.117	0.156	7.2	4242
<b>Sex</b>						
Male	0.113	0.011	0.092	0.135	9.5	3060
Female	0.210	0.020	0.171	0.248	9.4	1121
<b>Residence</b>						
Urban	0.135	0.013	0.109	0.161	10.0	1877
Rural	0.140	0.010	0.121	0.159	6.9	2365
<b>Region</b>						
Greater Tunis	0.105	0.024	0.058	0.152	23.0	650
North East	0.114	0.012	0.090	0.137	10.5	695
North West	0.180	0.041	0.099	0.260	22.9	706
Center East	0.098	0.015	0.069	0.127	15.3	918
Center West	0.259	0.031	0.198	0.321	12.0	513
South East	0.170	0.028	0.115	0.224	16.3	478
South West	0.095	0.013	0.069	0.121	14.0	282
<b>Education</b>						
Illiterate	0.093	0.020	0.054	0.132	21.4	717
Read and Write	0.070	0.011	0.048	0.091	15.9	767
Primary	0.113	0.018	0.077	0.149	16.3	1021
Preparatory	0.132	0.027	0.078	0.186	20.7	581
Secondary	0.151	0.022	0.109	0.194	14.2	523
Univ. Short Cycle	0.249	0.038	0.175	0.323	15.2	229
Univ. Long Cy. & Abv.	0.272	0.039	0.196	0.348	14.3	289
<b>Age Group</b>						
15-19	0.253	0.041	0.172	0.334	16.3	195
20-24	0.383	0.036	0.312	0.453	9.4	461
25-29	0.266	0.032	0.203	0.330	12.2	542
30-34	0.135	0.016	0.104	0.166	11.7	553
35-39	0.086	0.018	0.051	0.121	20.9	561
40-44	0.038	0.011	0.017	0.059	27.8	527
45-49	0.014	0.004	0.006	0.022	28.0	483
50-54	0.017	0.007	0.003	0.031	40.9	453
55-59	0.050	0.020	0.011	0.089	39.9	303
60-64	0.009	0.007	-0.005	0.023	81.8	164

Source: Authors' calculations based on TLMPS 2014

**Table A.9: Standard Errors for Broad Market Unemployment Rate (ref. 7 day, proportion)**

	<b>Mean</b>	<b>SE</b>	<b>95% CI Lower Bound</b>	<b>95% CI Upper Bound</b>	<b>Coeff. of Variation (%)</b>	<b>N (Obs.)</b>
<b>Total</b>	0.166	0.010	0.145	0.186	6.3	4400
<b>Sex</b>						
Male	0.135	0.012	0.112	0.159	8.8	3139
Female	0.256	0.020	0.217	0.295	7.8	1199
<b>Residence</b>						
Urban	0.161	0.014	0.132	0.189	9.0	1932
Rural	0.176	0.010	0.156	0.197	5.9	2468
<b>Region</b>						
Greater Tunis	0.134	0.025	0.084	0.184	19.1	670
North East	0.129	0.013	0.104	0.153	9.8	709
North West	0.199	0.039	0.123	0.276	19.6	721
Center East	0.147	0.020	0.108	0.187	13.7	986
Center West	0.289	0.031	0.229	0.349	10.7	539
South East	0.199	0.034	0.133	0.265	16.9	492
South West	0.096	0.013	0.070	0.122	13.8	283
<b>Education</b>						
Illiterate	0.118	0.019	0.080	0.156	16.6	744
Read and Write	0.111	0.016	0.079	0.143	14.8	797
Primary	0.146	0.020	0.106	0.186	14.0	1065
Preparatory	0.155	0.026	0.103	0.206	17.0	601
Secondary	0.182	0.023	0.136	0.227	12.8	540
Univ. Short Cycle	0.261	0.039	0.185	0.337	14.8	234
Univ. Long Cy. & Abv.	0.296	0.038	0.221	0.371	13.0	299
<b>Age Group</b>						
15-19	0.319	0.041	0.238	0.400	12.9	217
20-24	0.428	0.035	0.359	0.497	8.2	496
25-29	0.293	0.034	0.227	0.360	11.6	569
30-34	0.164	0.017	0.131	0.198	10.3	576
35-39	0.108	0.018	0.072	0.144	16.8	573
40-44	0.058	0.013	0.032	0.084	22.9	540
45-49	0.037	0.015	0.008	0.067	40.4	491
50-54	0.024	0.008	0.008	0.041	33.5	458
55-59	0.060	0.020	0.021	0.100	33.5	309
60-64	0.062	0.028	0.008	0.116	44.8	171

Source: Authors' calculations based on TLMPS 2014