

Cyclical Variations in Participation and Employment in Urban Brazil*

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1. Introduction

Brazilian labor markets have performed very strongly for most of the last 15 years, with dramatic increases in the employment rate of unskilled workers and significant declines in the overall unemployment rate. However, the economic and political developments and fiscal crisis of the last sixteen months in Brazil have resulted in a substantial decline in the rate of economic activity, a dramatic slowdown in the rate of new job creation a devaluation of the domestic currency and increasing concerns about the sustainability of the gains in poverty reduction and inequality accomplished during the years of the commodity boom...The decline in economic activity has raised concerns again about increasing unemployment rates, and the extent to which these developments will have an adverse impact on specific age and gender groups. Efforts to maintain or increase the proportion of the population employed in the aggregate or within any specific demographic group must take into consideration how the unemployment rate and the labor force participation rate of the group vary with changes in the level of economic activity. The sensitivity of the proportion of the population employed to changes in the level of aggregate demand is a key parameter informing the design of an appropriate and effective labor market policy.

Much of the recent labor market literature in Brazil has focused on the labor demand and labor supply effect of structural changes in economy on the labor market during the two decades of the 1990's and 2000's. During these two decades, Brazil experienced dramatic structural changes such as the price stabilization program in the early 1990's, a liberalization in trade and financial markets as well as the "macroeconomic tripod" in the late 1990's, a policy framework consisting of an inflation target regime, floating exchange rate and targets of fiscal discipline. Recent studies have focused on the negative or declining trend in the national unemployment rate during the 2000's in comparison to the increasing trend in the unemployment rate observed during the 1990's² Brunelli (2014), for example, carries out an analysis of two decades (1992-2012) of structural shifts of labor supply and labor demand by using the PNAD survey of IBGE, to examine the extent to which there have been structural changes in the Brazilian labor markets over the long run as opposed to conventional business cycle fluctuations. He finds that despite the importance of structural factors for both the labor supply and labor demand, that the business cycle changes explain the bulk of the aggregate unemployment rate developments, especially in the metropolitan regions.

Yet, aside from the literature on these long-run structural changes in the labor market in Brazil over the last two decades, there is very little evidence available on how the Brazilian labor market might have evolved in more recent years (e.g. within the last decade) as opposed to between the 1990's and the 2000's. In most cases analyses and policies are based on casual empiricism and inferences drawn from the evidence available for the US labor market. Clark and Summers (1981), for example, demonstrate that in the US, teenagers and young women are particularly sensitive to short-run movements in aggregate economic activity. Specifically, teenagers and young women between 20-34 years of age comprise only 25 percent of the adult population, but they account for more than 50 percent of the cyclical variation in employment. In contrast, adult men between 26 and 64 years of age, who comprise 32.6 per cent of the population in the US account for only 23.6 percent of the change in the cyclical variation in employment.³ Estimates of the sensitivity of the proportion of the population employed to changes in the level of aggregate demand based on data from recent years that reflect the prevailing

² Early studies of the effect of structural changes in economy on the labor market during the 1990's, include Barros et al. (1997) and Ramos and Reis (1997) and Camargo, Neri and Reis (2000).

³ A recent paper by Gomme et al (2004) builds on the heterogeneity of cyclical employment across demographic groups documented by Clark and Summers (1981) to extend the predictive power of the standard business cycle model.

structural relationships between labor demand and employment and labor supply, labor force participation and unemployment are more useful for predicting how labor force participation is likely to react to the downturn in economic activity since the end of the commodity boom and the onset of the economic crisis in Brazil.

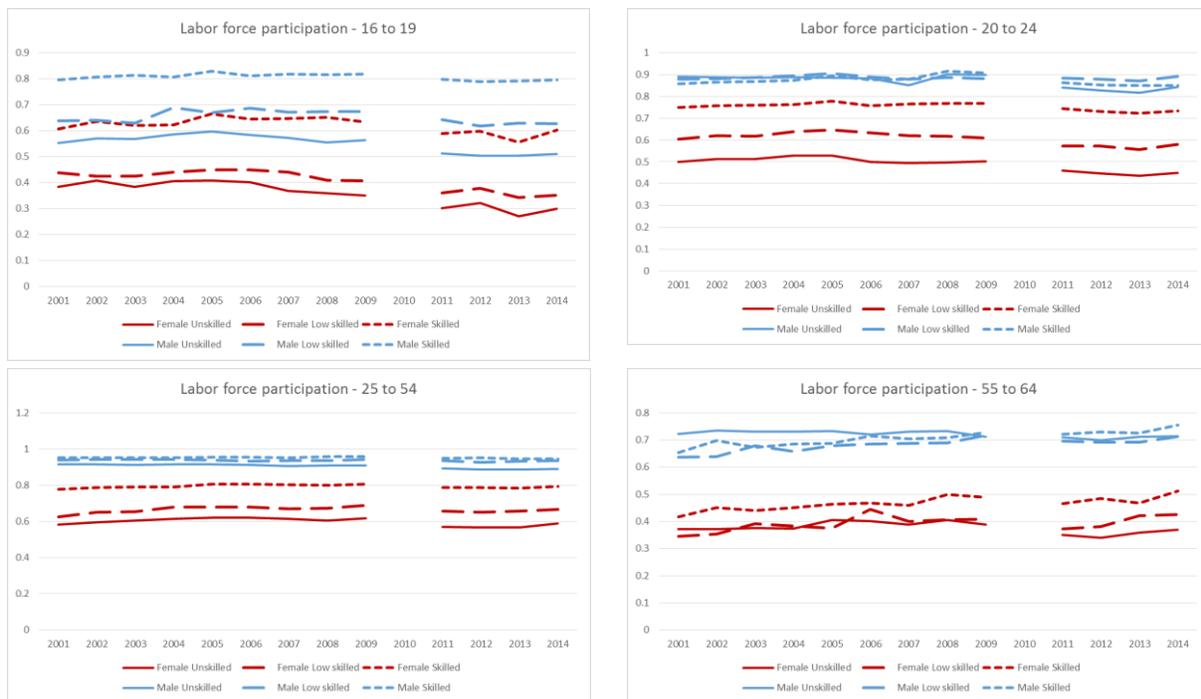
The purpose of this paper is to examine two inter-related questions about the behavior of the labor market in Brazil. The first question is about the direction and sensitivity of the labor force participation rate, and the employment rate to changes in the level of aggregate demand. The second question relates to the differences in the cyclical sensitivity of these key variables across age and gender groups.

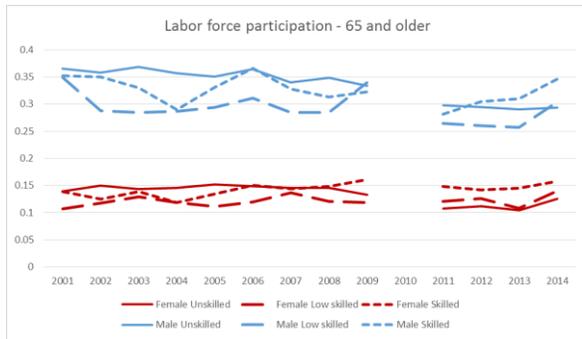
The next section of the paper discusses the recent macroeconomic context, and some of the limitations associated with using PNAD data to predict changes in the on the labor force participation rate of different age gender and skill groups during the crisis. Section 3 discusses the data and the model used

2. Labor Force Participation Trends, Vulnerability, and The Economic Downtrun

Between 2001 and 2014, there has been a considerable decline in the labor force participation rate among most age groups and for both males and females (see Figure 1).

Figure 1: Labor Force Participation Patterns by age, gender and skill group: 2001-2014

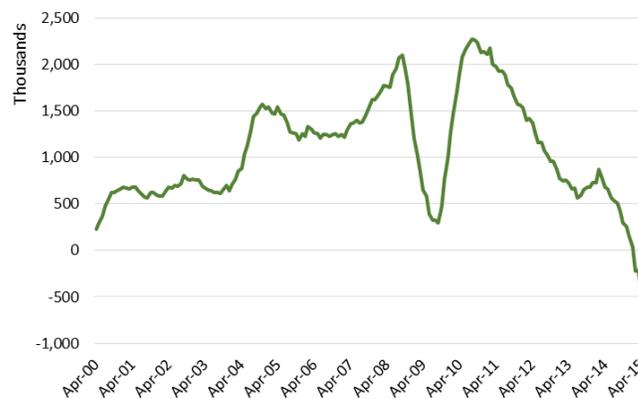




Source: PNAD surveys various years (16+)

The end of the commodity boom has led to a steady reduction in the number of formal jobs created in the Brazilian economy since the second half of 2010 (see Figure 2). These changes, in turn, have exposed the underlying weaknesses and constraints in the consumption-driven growth model of Brazil. Brazil is one of the countries with the weakest performance in productivity, accompanied by major deficiencies in infrastructure, a distorted trade and investment climate, a lack of incentives and capacity for innovation and insufficient individual skills. The change in external conditions has also revealed the fragility of the progress made so far, with a growing middle class still vulnerable to falling back into poverty, if growth of output and employment continue to stagnate as in the last three years. Yet the rising aspirations of Brazil's "new middle class" imply that policies that fail to address expectations of further social progress are unlikely to be politically sustainable.

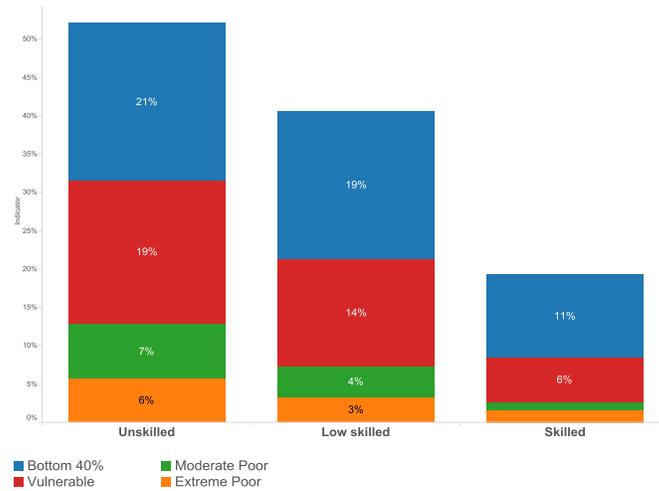
Figure 2: 12 month Formal Employment Creation in Brazil



Source: Ministério do Trabalho e Emprego, Cadastro Geral de Empregados e Desempregados (MTE/CAGED)

Even though poverty rates have significantly decreased in Brazil over the past decade, vulnerability remains high, particularly among less skilled workers. In 2013, for example, 13% of unskilled workers (with less than primary education completed) lived below the poverty line of R\$ 140 reais/month. Nonetheless, another 20% lived between the R\$140 and the vulnerability line of R\$291, suggesting they are in danger of falling back into poverty in the cases of a prolonged crisis (see Figure 3). The same is true for workers with completed primary education (low-skilled workers): even though only 7% of them are poor, another 14% live in the vulnerability zone.

Figure 3: Poverty status of workers by skill level - 2013



Source: PNAD 2013 and the World Bank).

Notes:

Workers are classified into three skill levels: the Unskilled, who did not complete primary schooling (including those with no formal schooling at all); the Low Skilled, who completed primary school but did not complete secondary; and the Skilled, who have at least a secondary-school education

Extreme Poor: if income per capita/month is less than the extreme poverty line of R\$70 per capita /month

Moderate Poor: if income per capita/month is less than the moderate poverty line: R\$140 per capita /month

Vulnerable: if income per capita/month is less than the Vulnerability Poverty Line: R\$291 per capita /month

With labor income as the major source of income of the moderate poor and vulnerable households there is a serious threat to the sustainability of the gains in poverty and inequality reduction (see figure 4). In spite of the downturn, persistent inflation nudging double digits continues to erode the real wages of the employed (real wages down 4.3% year on year). At the same time continued reductions in formal employment are already being reflected in a rising unemployment rate which has increased to 10.9 per cent in March 2016, from 4.9 percent in February 2015. These trends are likely to result in increased informal employment, and exits and/or entries into the labor force depending on the extent to which affected households have access to adequate formal and informal safety nets.

Significantly positive “added worker effects” have been documented for the urban areas of Brazil, whereby wives enter the labor force in response to their husband’s unemployment (Fernandes, and de Felicio, 2005). However, this study covered the years before the establishment of the formal safety net system in Brazil as reflected by the *Bolsa Familia* program and its new version of *Brasil sim Miseria*. The extent to which added worker effects dominate over discouraged worker effects and the way these two opposing effects interact in the new context of coverage by social assistance programs is unknown.

Figure 4. Decomposition of per capita household income, by socioeconomic groups (2014)



Source: Authors' calculations based on PNAD (2014) (see Skoufias, Rodella, and Viveros, 2016)

Extreme Poor: if income per capita/month is less than the extreme poverty line of R\$70 per capita /month

Moderate Poor: if income per capita/month is less than the moderate poverty line: R\$140 per capita /month

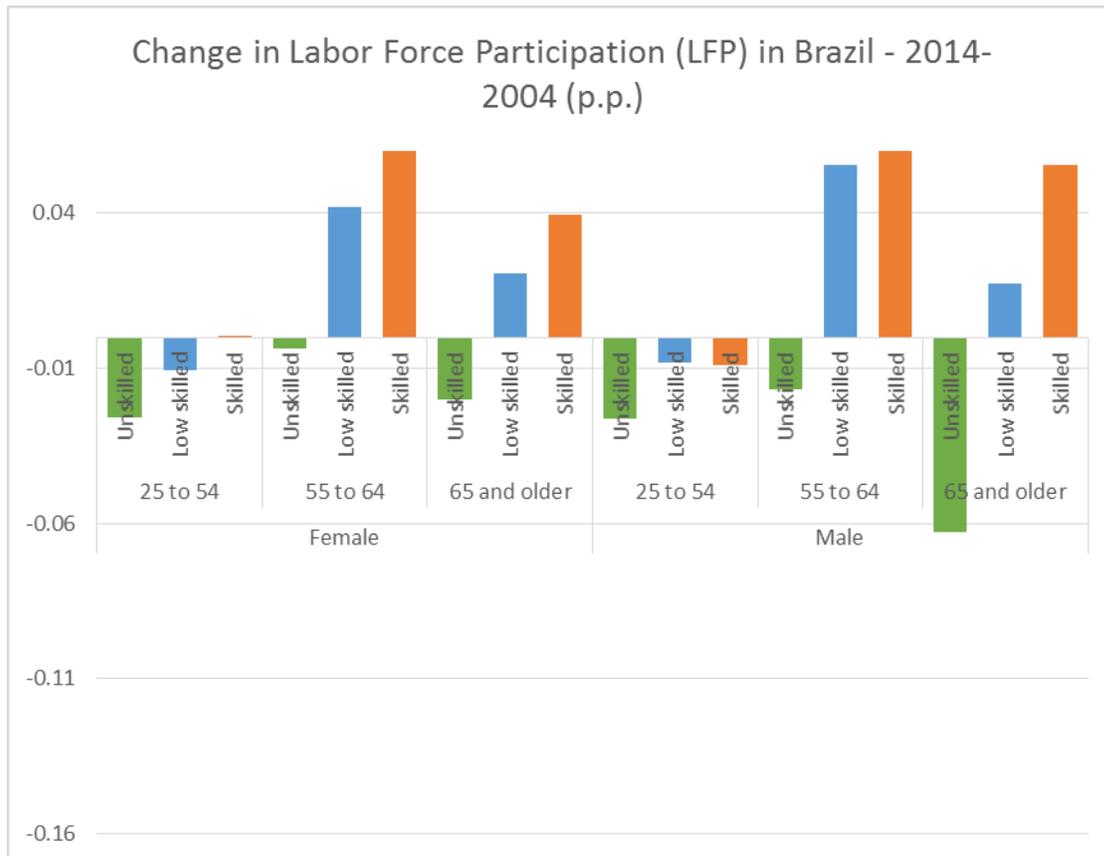
Vulnerable: if income per capita/month is less than the Vulnerability Poverty Line: R\$291 per capita /month

NOTE: In the 2016 PNAD it is not possible to distinguish between income from social programs and capital gains. So the share of 28.2% of total per capita household income from capital gains/social programs is actually exclusively composed of income from social programs rather than capital gains.

The largest reductions in LFPR took place among unskilled men and women (see Figure 5). For example, between 2004 and 2014, LFP declined among unskilled females and males irrespective of age. The only groups with an increase in labor force participation were older (55 yrs old and above) low skilled and skilled males and females with at least completed primary education.

One possible explanation for the decline in unskilled labor force participation is that with the onset of the decline in new job creation in late 2010, the unskilled (those with less than primary), were sufficiently discouraged so as to exit the labor force. A complementary explanation may be disincentive effects associated with the increasing coverage of the cash transfers of the Bolsa Familia program between 2004 and 2014. However, the variety of studies carried out so far have been unable to attribute a major disincentive effect associated with these cash transfers.

Figure 5: Change in Labor Force Participation (LFP) in Brazil: 2014-2004 (p.p.)



Source: PNAD 2004 and 2014. This figure reports the percentage point (p.p.) change in labor force participation rates in Brazil by gender, age group, and skill level between 2014 and 2004.

Workers in each age category are classified into three skill levels:

--Unskilled: Those who did not complete primary schooling (including those with no formal schooling at all);

--Low Skilled: those who completed primary school but did not complete secondary; and

--Skilled: those who have at least a secondary-school education

A Blinder-Oaxaca decomposition of the determinants of the change in labor force participation between 2004 and 2014 reveals that the majority of the change in labor force participation change can be attributed to changes in the coefficients of the determinants of labor force participation rather than to changes in demographic characteristics of the population. Thus, the data suggest structural changes in the labor market even within the 2004 to 2014 period, which serves to reinforce the argument that elasticity estimates based on data from more recent years are more useful for predicting how labor force participation is likely to react to the downturn in economic activity.

One more factor that enters in to play is the extent to which the simple elasticity estimates of how the labor force participation varies with growth in GDP based on annual changes in recent years is believable. For example, as table 1 below highlights, simple elasticity estimates based on changes in labor force participation from 2014 and 2013 PNAD suggest a positive relation between labor force participation and changes in real GDP. If these elasticity estimates (based on the back of the envelope calculations) were to be used then the decline in real GDP with the onset of the crisis would suggest a decline in labor force participation during the crisis.

Table 1: The Elasticity of Participation Rate to Real GDP based on annual data in PNDAD

	Elasticity of LFPR to Real GDP between 2014 and 2013	2014	2013
Real GDP Growth (at Constant Market Prices)		0.1%	3.0%
Economically Active Population (EAP) (ages 15+)	0.153	66.3%	65.3%
EAP-Females	0.276	55.9%	54.4%
EAP-Males	0.065	77.7%	77.2%
Sources: Real GDP growth rate from Brazil Macro-Poverty Outlook			
Total EAP and EPA for males and females: Authors' estimates based on 2014 and 2013 PNAD			

3. Data and Empirical Analysis

The data used are extracted from the Monthly Employment Survey (*Pequisa Mensal de Empleo* or PME), which is the main monthly cross-sectional survey regarding employment in the formal and informal labor markets in Brazil. The survey covers only six metropolitan regions (Belo Horizonte, Porto Alegre, Rio de Janeiro, Recife, São Paulo and Salvador) and it collects information on time use for individuals aged 12 and over, education, family structure, and dwelling characteristics, as well as a standard set of detailed questions on employment, unemployment and exit from the labor market.

The analysis in this note focuses on the labor force participation and employment of individuals 16 yrs of age or older on the surveys from 2010:7 to 2016:1 (or a total of 67 monthly observations). These years are, by assumption, more representative the structural relations prevailing in the labor market in Brazil these days, as opposed to the structural relationship underlying the elasticity estimates from the 2013 and 2014 PNAD surveys as well as the earlier years of the PME survey.⁴

The official measure GDP measure by the Brazilian Institute of Geography and Statistics (IBGE) is constructed at a quarterly frequency using primary information from the national accounts. The monthly GDP measure, used in this paper, is estimated by the Brazilian Central Bank (BCB) for the purpose of calculating the ratio between monthly economic aggregates such as public debt, current accounts or credit and the GDP itself. In the first stage, BCB estimates the quantum values based on information about the industrial production, energy consumption and primary goods exports and then adjusts it according to the previous official quarterly GDP and real GDP estimates. The real value is calculated using a weighted average of IGP-DI and IPCA.

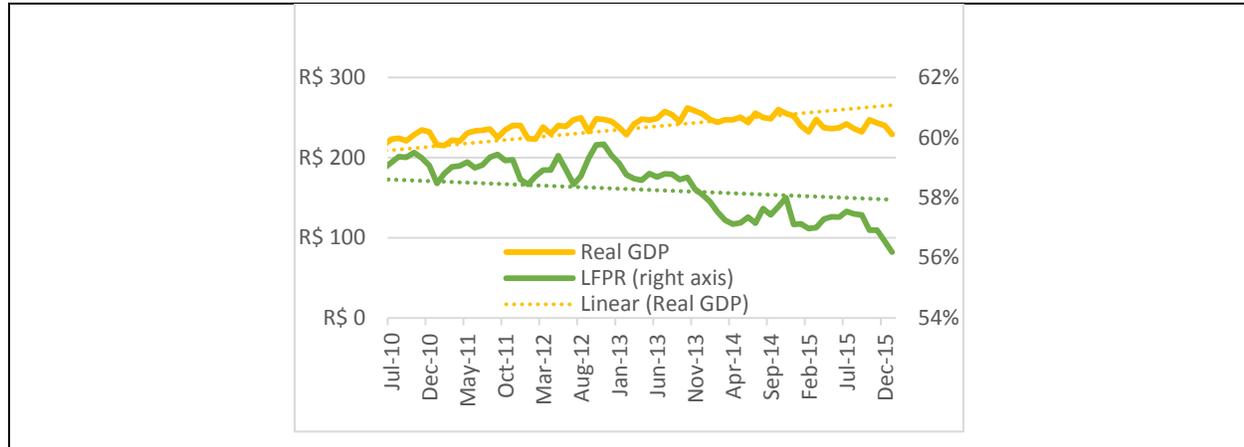
The labor force status (employment, unemployment and being out of the labor force) of an individual is defined according to the standard definitions. Specifically, an individual is employed (E) if he/she was

⁴ As the annex of this note demonstrates, ignoring the structural change in the determinants of labor force participation by pooling all the monthly observations for the period 2003 to 2016 results in elasticity estimates that imply a positive relationship between cyclical variation in real GDP and labor force participation rates. The positive relationship also if one were to carry out the analysis separately for the sample of years dominated by the commodity boom in Brazil 2003:1 to 2010:6

working last week or if he/she held a job but was temporarily not working last week (e.g. being on vacation, sick or waiting to start work within the week). An individual is unemployed if he/she searched for a job during the last four weeks and if he/she was on lay-off last week, or if he/she was waiting to report to a new job within thirty days or more. If an individual is not in the labor force (i.e. neither employed nor unemployed) then he/she is classified as being out of the labor force (N).

Figure 6 below presents the labor force participation rate on a monthly basis as calculated from the PME survey and the monthly real GDP estimated by the Banco Central do Brasil. Clearly, the trend in the real GDP is positive whereas the trend in the labor force participation rate is negative.

Figure 6: Monthly Real GDP and Monthly Labor Force Participation Rate (LFPR) in Metropolitan Brazil: 2010:7-2016:1



Source: Time series of LFPR (L/N) and Employment Rate (E/L) constructed by the authors from PME Real GDP series: Banco Central do Brasil, Boletim. Secao Atividade Economica (BCB Boletim/Ativ. Ec.)

The employment to population ratio $\left(\frac{E}{N}\right)$ for age and gender group g can be decomposed as the product of the employment rate⁵ $\left(\frac{E}{L}\right)$ of group g and the labor force participation rate $\left(\frac{L}{N}\right)$ of the same group g . Specifically,

$$\left(\frac{E}{N}\right)^g \equiv \left(\frac{E}{L}\right)^g \left(\frac{L}{N}\right)^g \quad (1)$$

After transforming logarithmically and taking the total differential of both sides of identity (1) one obtains

$$d\ln\left(\frac{E}{N}\right)^g \equiv d\ln\left(\frac{E}{L}\right)^g + d\ln\left(\frac{L}{N}\right)^g \quad (2)$$

⁵ Note that the employment rate is equal to 1 minus the unemployment rate, since $\left(\frac{E}{L}\right) = \left(\frac{E+U-U}{E+U}\right) = \left(1 - \frac{U}{L}\right)$, where U is the number of unemployed and $\left(\frac{U}{L}\right)$ is the unemployment rate.

The main focus of this study is to examine separately for each age and gender group the sensitivity of each one of the two terms in the right hand side of equation (2) to the level of aggregate economic activity. The sensitivity of the employment to population ratio to changes in aggregate demand is likely to differ significantly across demographic groups.

Identity (2) reveals that the net effect of cyclical fluctuations in aggregate demand on the employment to population ratio is determined by how the cyclical sensitivity of the employment rate and labor force participation rate varies across different groups. As long as certain age and gender groups of workers are more likely to enter the labor force or to be laid-off due to employers' rules in laying off, or have a higher tendency to quit over the business cycle, then there are likely to be differences in the extent to which the employment to population ratio varies of the business cycle.

In order to examine the cyclical sensitivity of employment and labor force participation, the analysis follows Clark and Summers (1981) and estimates separate regressions using as explanatory variables, the current and various lags of real gross Domestic Product (RGDP) (in log), a trend (T) and trend squared, and twelve binary variables identifying each month in a calendar year (M_i). Thus, the equations estimated for each age and gender group indexed by the superscript g , are

$$\ln\left(\frac{L}{N}\right)_t^g = \alpha_0^g + \alpha_1^g T + \alpha_2^g T^2 + \sum_{j=0}^{11} \beta_j^g \ln RGDP_{t-j} + \sum_{i=1}^{12} \gamma_i^g M_i + \varepsilon_t^g \quad (3)$$

and

$$\ln\left(\frac{E}{L}\right)_t^g = \delta_0^g + \delta_1^g T + \delta_2^g T^2 + \sum_{j=0}^{11} \theta_j^g \ln RGDP_{t-j} + \sum_{i=1}^{12} \varphi_i^g M_i + \eta_t^g \quad (4)$$

Equations (3) and (4) are intended as a reduced form approximation for the cyclical determinants of labor force participation and employment rates. A more structural approach would include additional explanatory variables such as the inflation rate and the wage rate corresponding to the demographic group g . However, such variables may also be co-determined cyclically with labor force and employment thus raising problems about endogeneity and identification. The inclusion of the trend and trend-squared terms allows for the long-run (secular) trend in growth in the economy whereas the twelve indicator variables for each month of the calendar year are included in order to control for seasonality.

To ensure that empirically meaningful relationships are modeled and the problem of spurious regressions is avoided it is necessary to test for the presence of cointegration between real GDP and the labor force participation rate (and between real GDP and the employment rate). The presence of a common stochastic trend (or cointegration) among two variables of interest is the main criterion for stationarity in the relationship among two possibly nonstationary variables. For this purpose, two alternative tests of cointegration between the two variables of interest in equations (3) and (4) were carried out: (i) the Engle-Granger Augmented Dickey Fuller test for cointegration (Engle and Granger, 1987) and (ii) the Johansen test for cointegration (Johansen, 1988, 1991, 1995).⁶ The null hypothesis in both tests is that there is no cointegration between the variables of interest while the alternative hypothesis is that the variables are cointegrated. Rejection of the null hypothesis of no cointegration in favor of the alternative implies that the regression equations (3) and (4) with RGDP and the labor force participation rate or the employment rate in levels would be sufficient for the validity of standard inference methods. In contrast, the inability to reject the null hypothesis of no cointegration would

⁶ The EG-ADF test was carried out using the "egranger" ado file for Stata by Schaffer (2010) while the Johansen test was carried out using the "vecrank" command of Stata.

imply that the relationship between these two possibly nonstationary variables would need to be carried out in first-difference instead of level form.

The cointegration tests were carried out using the full data set of monthly observations for the period 2003:1-2016:1, so as to have the maximum number of time series observations. Table 2a in Appendix B shows that for the majority of the gender age groups the null hypothesis of no cointegration is rejected which implies that the regression equations (3) and (4) with RGDP and the labor force participation rate or the employment rate in levels are sufficient for the validity of standard inference methods.⁷

After controlling for the long-run trend, the real Gross Domestic Product (RGDP) serves as a measure of the cyclical conditions in the labor market.⁸ The specification of equations (3) and (4) allows RGDP to affect the current period labor force participation and employment rate with a lag. Recognition lags in the realization that the aggregate economic activity has changed and lags in responding to these changes due to frictions and other types of transactions costs may be reasonable explanations of why the RGDP of previous months may affect current participation and employment rates. The lag length is specified to be up to 11 months long. Therefore, the total effect of RGDP on the labor force participation of group g is given by the sum of the coefficients of the current period RGDP and all its lags, i.e.

$$\beta^g = \sum_{j=0}^{11} \beta_j$$

whereas the total effect of RGDP on the employment rate of group g is given by

$$\theta^g = \sum_{j=0}^{11} \theta_j$$

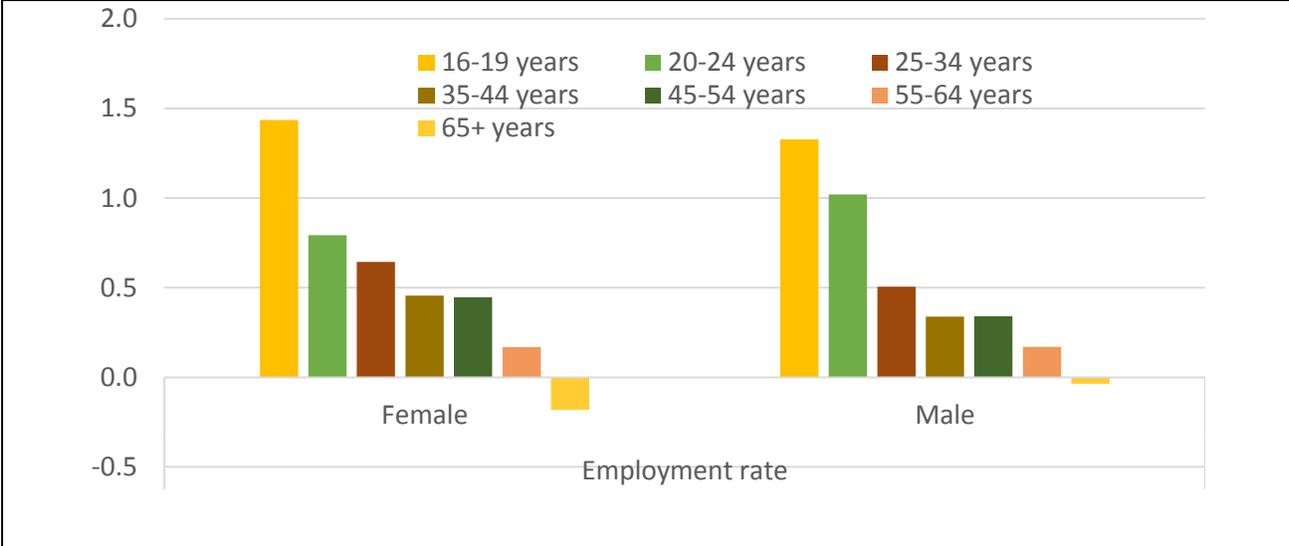
The estimates of these total effects on the labor force participation rate and employment rate are presented in Figure 7, while the full set of elasticity estimates along with their respective p-values are presented in Appendix A Tables 1-4b.⁹

**Figure 7: The Elasticity of the LF Participation Rate and Employment Rate to changes in Aggregate Economic Activity (real GDP): (2010:7-2016:1)
By Gender and Age Group**

⁷ In Table 2a the cells where the hypothesis of no cointegration is rejected, is denoted by green background font. In fact, the hypothesis is rejected in all female age groups for both the participation rate and the employment rate. That is not the case for all age groups of males.

⁸ In the US, the unemployment rate, is widely considered to be the more sensitive indicator of cyclical aggregate demand relative to real GDP (Clark and Summers, 1981; Bils, 1985; Keane, Moffitt and Runkle, 1988; Abraham and Haltiwanger, 1995; Dellas and Sakellaris, 2003).

⁹ The coefficients reported for the employment to population ratio are obtained by estimating a version of equation (3) with $\left(\frac{E}{N}\right)$ on the left-hand side. In principle, since equation (3) is an identity, the total effect of RGDP on the employment to population ratio could also be derived from the sum of the effect of RGDP on the labor participation rate and the employment rate i.e., $(\beta^g + \theta^g)$.



Source: Authors' Calculations

See Table 1 in Appendix A for full set of elasticity estimates and p-values

The estimates reveal substantial heterogeneity across age groups within gender as well as across gender within any given age group. Cyclical increases in aggregate economic activity (proxied by cyclical increases in the RGDP appear to be associated with dramatic changes in the gender composition of the labor force and employment.

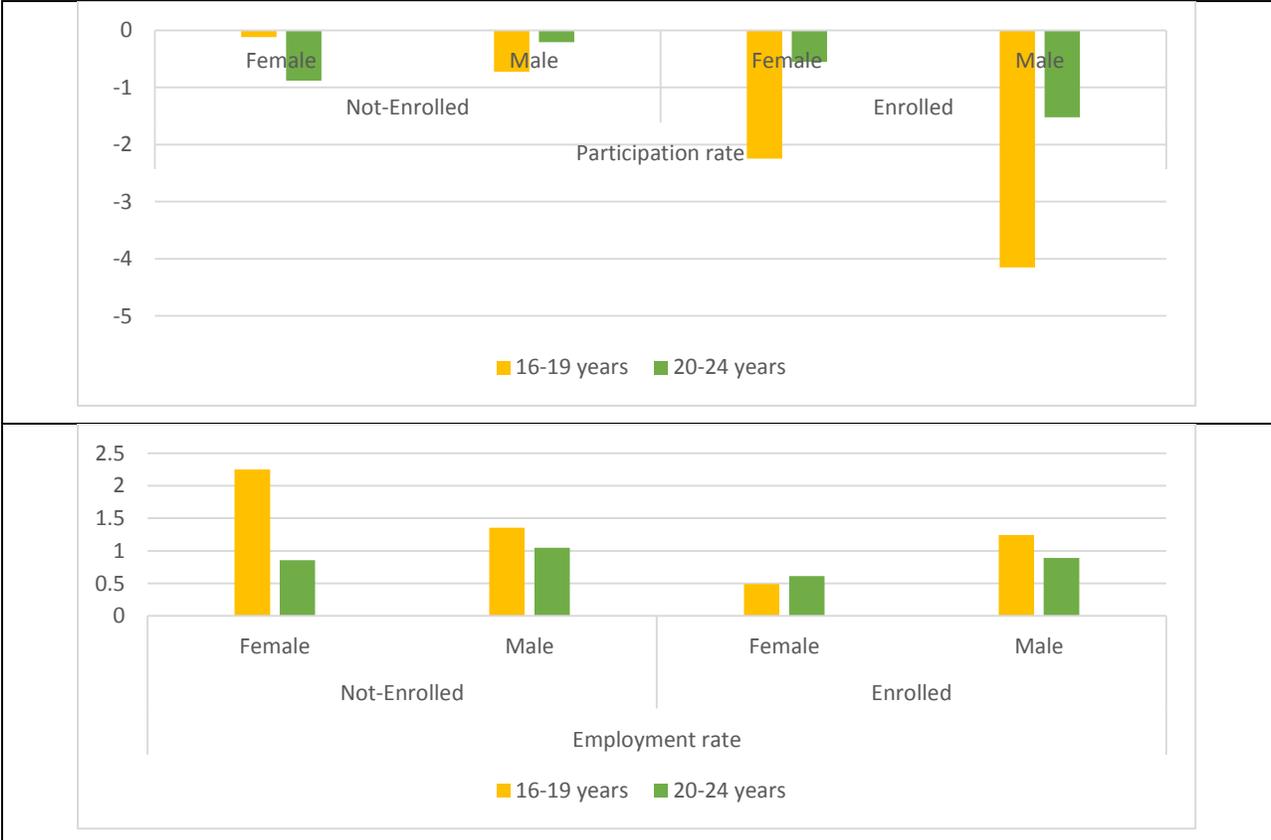
Higher aggregate demand (higher RGDP) is associated with a decline in the labor force participation of both males and females except individuals of older age. Thus declines in RGDP during the crisis are likely to lead to an increase in the labor force participation rate of females in all age categories less than 65. On the other hand, higher aggregate demand (higher RGDP) is associated with an increase in the proportion of males and females employed in most age categories except 65 yr old males and females. In general the sensitivity of the employment rate to RGDP declines with age for both males and females. The relatively higher bars in Figure 2 for females than males suggest that the employment rate of females is more sensitive to RGDP than for males. Of course, this also implies that with declines in RGDP the unemployment rate of females will increase more than that of males and the overall unemployment rate likely to increase further because of the increased entry of women of all ages in the labor market.

An examination of the elasticity estimates for males reveals a different picture. The labor force participation of adult males does not appear to be very sensitive to cyclical fluctuations. For example, for 25-34 and 35-44 year old males, the estimated labor force participation elasticity is not statistically different from zero. In contrast the labor force participation of teenagers (16-19 years old) appears to be highly sensitive to cyclical changes in aggregate demand.

Equations (4) and (5) were also estimated separately for age and gender groups of 16 to 24 year olds distinguishing between those attending school and those not attending school. An individual is defined as attending school if he/she is reported to have devoted more than 10 hours studying during the last week. (see Figure 8)

Figure 8 Differences in the Elasticity of the LF Participation Rate and Employment Rate to changes in Aggregate Economic Activity (real GDP) :

By Age group, Gender, and School Enrollment status (2010:7-2016:1)



Source: Authors' Calculations

See Table 2 in Appendix A for the full set of elasticity estimates and p-values

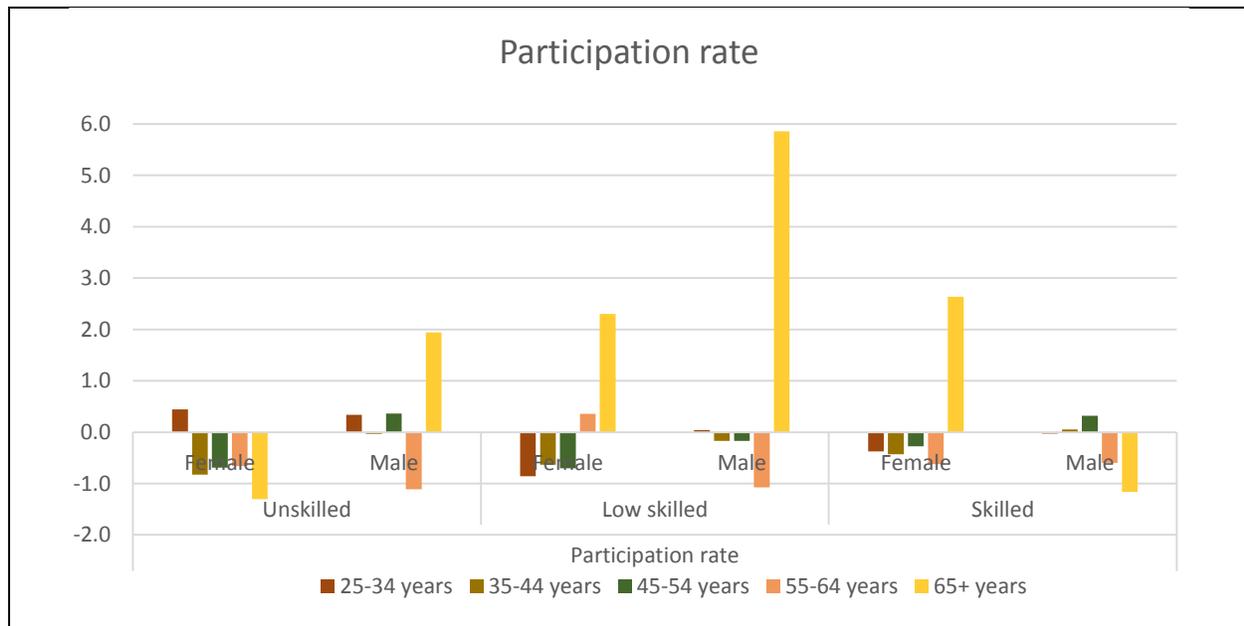
The estimates in figure 8 reveal that the labor force participation rate of teenage men and women who are not attending school is negatively correlated with increases in real GDP. However, there are some striking differences between those not enrolled and those enrolled in school. The sensitivity of the labor force participation rate of males and females enrolled in school to changes in real GDP is considerably higher than that of male and female teenagers not enrolled in school. On the other hand, the sensitivity of the employment rate or (1-Unemployment rate) is much smaller compared to those not enrolled in

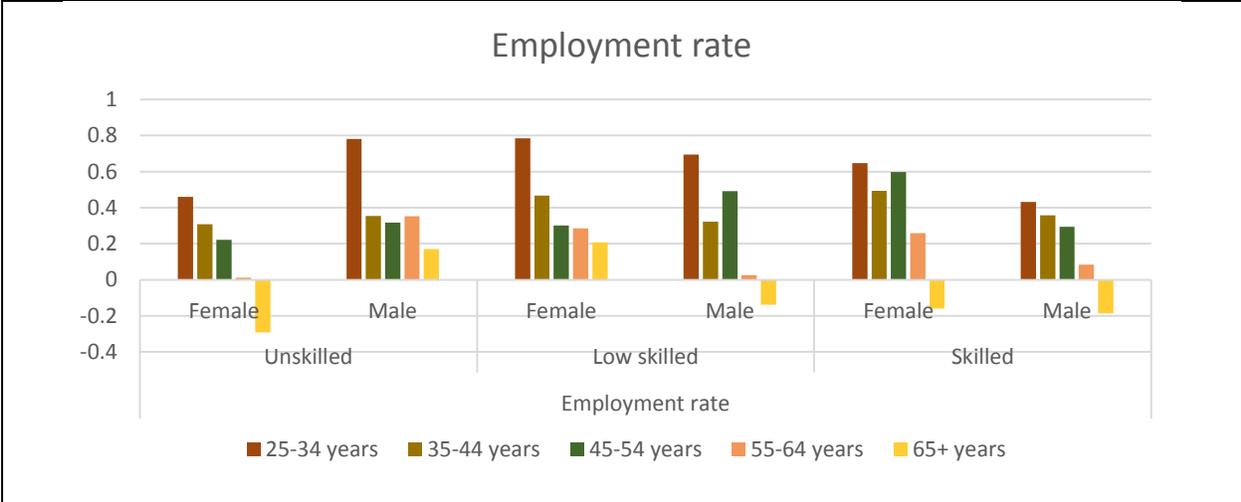
school. This pattern is identical to that observed for the US by Clark and Summers (1981). For young men and women enrolled in school the sensitivity of the employment rate to RGDP is small and the sensitivity of the labor force participation is high. As a consequence, for this group, the sensitivity of the employment to population rate to RGDP is determined almost exclusively by the sensitivity of the labor force participation. The opposite pattern characterizes youth who are not enrolled in school. For this group, the sensitivity of the employment to population rate to RGDP is determined almost exclusively by the sensitivity of the employment rate to RGDP. One possible explanation for this pattern, that youth enrolled in school, tend to passively await for job offers. When an acceptable offer arrives, they accept and join the labor force. Otherwise they remain out of the labor force.

The higher positive relation between the employment rate and RGDP for teenagers not enrolled in school suggests that declines in RGDP will decrease their employment more (and thus increase their unemployment rate more) relative to those who are already attending school.

Equations (4) and (5) were also estimated separately for gender groups age groups 25 years old and above by classifying individuals as unskilled, low skilled, and skilled workers. An individual is classified as skilled if he/she has 11 or more years of education, low skilled if he/she has 8-10 years of education and as unskilled if he/she has 7 or less years of education (see Figure 9).

Figure 9: Differences in the Elasticity of the LF Participation Rate and Employment Rate to changes in Aggregate Economic Activity (real GDP): (2010:7-2016:1)
By Age group, Gender, and Skill Level





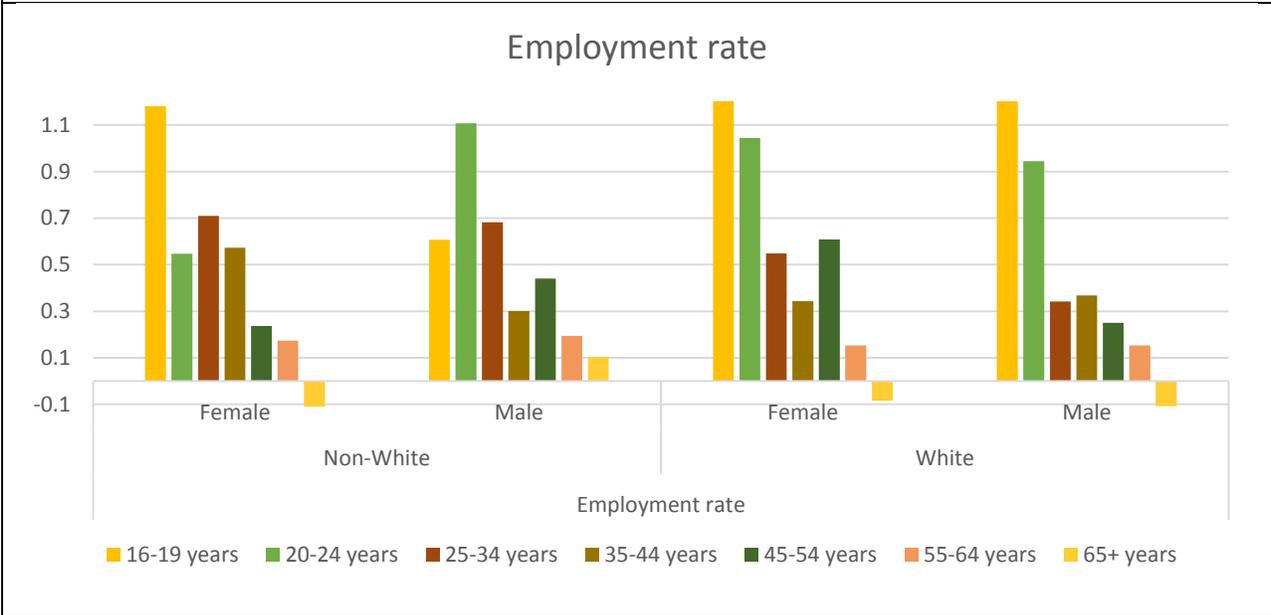
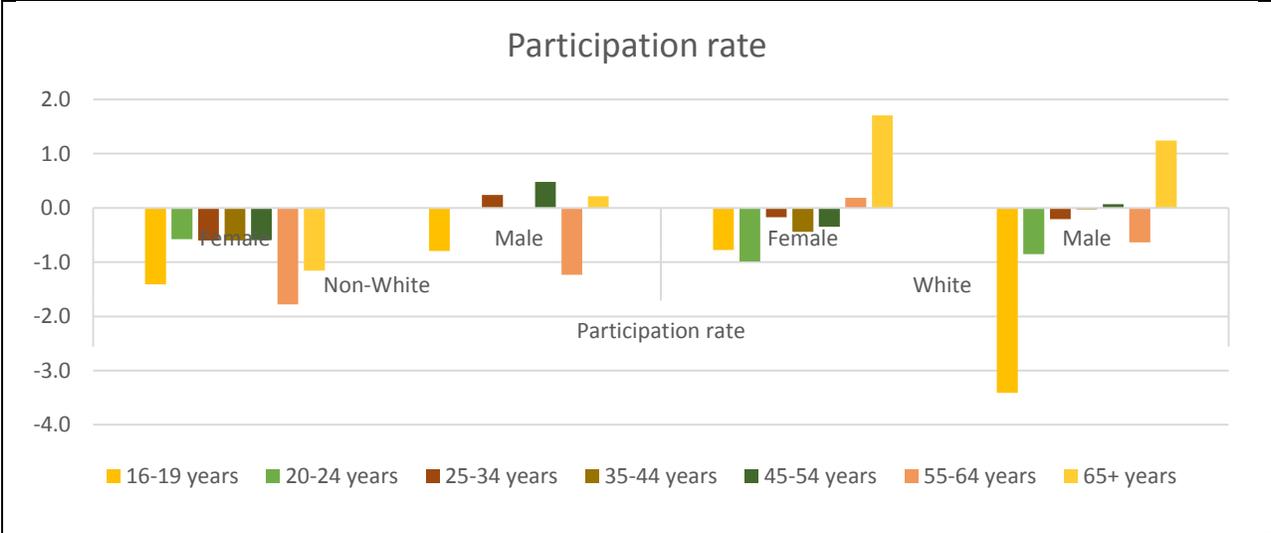
Source: Authors' Calculations

See Tables 3a, 3b and 3c in Appendix A for full set of elasticity estimates and p-values

Figure 9 also reveals a substantial heterogeneity in the cyclical sensitivity of skilled and unskilled workers. Increases in RGDP appear to be associated with a decline in the labor force participation rate of unskilled and low skilled workers but especially females. However, the employment rate of both males and females increases with real GDP. Thus that the decline in RGDP associated with the crisis, will decrease the employment rate of all males and females independently of the level of skill, while increase the labor force participation rate of unskilled and low skilled females is likely to fuel increases in the overall unemployment rate.

Finally Figure 10 also reveals differences in the cyclical sensitivity of Afrodescendants and white females and males by age group. It is easily apparent that females and especially female of Afro-descendant origin will enter the labor force as RGDP declines.

Figure 10: Differences in the Elasticity of the LF Participation Rate and Employment Rate to changes in Aggregate Economic Activity (real GDP) : (2010:7-2016:1)
By Race, Age group, and Gender



Source: Authors' Calculations

See Tables 4a and 4b in Appendix A for full set of elasticity estimates and p-values

Demographic contribution to cyclical variation of employment, participation, and unemployment

Having provided evidence on the extent to which the cyclical sensitivity of employment and unemployment varies across age and gender groups in the population, it is also useful to get estimates of the relative importance of the various age groups in accounting for cyclical movements in aggregate, participation.

Table 2 contains such estimates based on the elasticity estimates of labor force participation in to RGDP and the population shares of the different age and gender groups based on the 2010 Census. Column (1) simply reproduces the LFPR elasticity estimates reported in table 1 in Appendix A. Column (2) presents the total number and column (3) the share in the total population of that age and gender group (based on the 2010 Census) while column (4) presents the product of the estimated elasticity with the population share. The numbers in column (5) present the ratio of the population weighted elasticity of each demographic group to the sum of the population weighted elasticity across all demographic groups.

Table 2: Demographic Contribution to Cyclical Variation in LFPR Brazil 2010:7-2016:1

Demographic Group	Elasticity of LFPR	Number of People	Population Share	Weighted Elasticity	Share of Total
	(1)	(2)	(3)	(4)	(5)
Women			0.517	-0.231	0.682
16-19	-1.0779	6,659,247	0.047	-0.051	0.150
20-24	-0.8051	8,614,963	0.061	-0.049	0.145
25-34	-0.3250	16,670,273	0.118	-0.038	0.113
35-44	-0.5076	13,810,711	0.098	-0.050	0.146
45-54	-0.4371	11,446,745	0.081	-0.035	0.105
55-64	-0.6597	7,841,962	0.056	-0.037	0.108
65+	0.5124	7,966,401	0.056	0.029	-0.085
Men			0.483	-0.108	0.318
16-19	-2.0592	6,756,696	0.048	-0.099	0.291
20-24	-0.4253	8,630,229	0.061	-0.026	0.077
25-34	0.0187	16,178,653	0.115	0.002	-0.006
35-44	0.0011	13,087,232	0.093	0.000	0.000
45-54	0.2675	10,527,009	0.075	0.020	-0.059
55-64	-0.8762	6,943,379	0.049	-0.043	0.127
65+	0.8702	6,115,076	0.043	0.038	-0.111
Teenagers 16-19		13,415,943	0.095	-0.149	0.441
Young Workers 20-24		17,245,192	0.122	-0.075	0.222
Adult Women 25-64		49,769,691	0.352	-0.160	0.472
Adult Men 25-64		46,736,273	0.331	-0.021	0.062
Older M & F		14,081,477	0.100	0.067	-0.197
Total		141,248,576	1.000	-0.339	1.000

Notes: Number of people based on 2010 Census

Elasticity estimates (see table 1 in Appendix A) using data from the Monthly Employment Surveys (PME) of Brazil for the period 2010:7-2016:1

The estimates in Table 2, reveal that the total elasticity of the labor force participation rate is -0.34 which implies that a 1-percent decline (increase) in the RGDP leads to a 0.34 percent increase (decline) in the labor force participation rate. Table 2 also reveals a substantial change in the gender composition of the labor force during the business cycle. Even though adult females (25-64 yrs old) are 35.2% of the

population, they account for 47.2% of the increase in labor force participation during the crisis (or a period of decline in RGDP). Adult females are followed closely by teenagers 16-19 years old who account for only 9.5% of the population but 44.1% of the increase in the labor force during the crisis (see column 5 of Table 2). Thus, in combination, changes in the participation of adult females and teenagers account for 91.3% of the change in the total labor force participation during a crisis.

Calculating population weighted elasticity estimates for the employment rate (E/L) and the employment to population ratio (E/N) sheds more light on the behavior of urban labor markets in Brazil (see Table 3).

Table 3: Demographic Contribution to Cyclical Variation in LFPR Brazil 2010:7-2016:1

Demographic Group	Population Share	Weighted Elasticity of Labor Force Participation Rate	Weighted Elasticity of Employment Rate	Weighted Elasticity of Employment Ratio
	(1)	(2)	(3)	(4)
Women	0.517	-0.231	0.272	0.041
16-19	0.047	-0.051	0.068	0.017
20-24	0.061	-0.049	0.048	-0.001
25-34	0.118	-0.038	0.076	0.038
35-44	0.098	-0.050	0.045	-0.005
45-54	0.081	-0.035	0.036	0.001
55-64	0.056	-0.037	0.009	-0.027
65+	0.056	0.029	-0.010	0.019
Men	0.483	-0.108	0.247	0.140
16-19	0.048	-0.099	0.063	-0.035
20-24	0.061	-0.026	0.062	0.036
25-34	0.115	0.002	0.058	0.060
35-44	0.093	0.000	0.031	0.031
45-54	0.075	0.020	0.025	0.045
55-64	0.049	-0.043	0.008	-0.035
65+	0.043	0.038	-0.002	0.036
Teenagers 16-19	0.095	-0.149	0.131	-0.018
Young Workers 20-24	0.122	-0.075	0.111	0.036
Adult Women 25-64	0.352	-0.160	0.166	0.006
Adult Men 25-64	0.331	-0.021	0.123	0.102
Older M & F	0.100	0.067	-0.012	0.055
Total	1.000	-0.339	0.519	0.180

Notes: Number of people based on 2010 Census

Elasticity estimates (see table 1 in Appendix A) using data from the Monthly Employment Surveys (PME) of Brazil for the period 2010:7-2016:1

The population weighted elasticity estimates of the employment to population ratio for different groups, presented in column (4) of Table 3, yield two major insights. First, adult men (25-64) and older males and females account for 87% $(= (-0.102 + 0.055) / 0.180)$ of the cyclical variation in the employment to population ratio while adult women and teenagers account for a trivial (very small) part of the cyclical variation. Although teenagers and adult females account for 91.3% of the change in labor force

participation, this change in the labor force participation is accompanied by a commensurate change in the unemployment rate which ends having very little or no effect on the employment to population ratio. For example, the population weighted elasticity of the labor force participation of adult women is 0.160 whereas the population weighted elasticity of the employment rate is 0.166. As a consequence, the population weighted employment to population elasticity being the sum of these two elasticities is only 0.006. The same applies to teenagers. Thus, for these two groups the increases in the labor force participation during an economic downturn is practically equivalent to an increase in the unemployment rate. Second, the total population weighted elasticity of the employment to population ratio implies that a 1-percent increase (decline) in the RGDP leads to a 0.180 percent increase (decline) in the employment to population rate. This implies that discouraged worker effects, as opposed to added worker effects, are dominant in the urban areas of Brazil during times of crises.

Discouraged workers effects are also dominant in the US labor market, where for the economy as an aggregate, a 1-percent increase in the prime-age-male unemployment rate (used as a measure of changes in aggregate economy activity) leads to a 1.5-percent decline in the employment to population ratio (Clark and Summers, 1981). The decline in economic activity (accompanied by a higher unemployment rate) tends to discourage potential workers about their prospects of employment preventing them from entering the labor market and searching for a job.

In contrast, in urban Mexico and urban Colombia, the increased employment to population ratio during periods of decline in economic activity suggests that significant “added worker” effects are in operation. The added worker effect states that secondary workers such as women and teenagers who are not strongly attached to the labor force join the labor market when economic conditions deteriorate, and pull out of the labor market when conditions improve (Skoufias et al, 2007).

Table 3 is also helpful at getting a better understanding of the sources of the employment changes. The total population weighted elasticity estimate of the employment to population ratio is by definition equal to the sum of the total population weighted elasticity of the labor force participation (i.e., -0.339) and the employment rate (or one minus the unemployment rate) (i.e., 0.519). These elasticity estimates imply that a 1 percent decline in RGDP is accompanied by a 0.339% increase in the labor force participation rate and a 0.519 decline in the employment rate. Thus the observed decline in the employment to population ratio during the business cycle is driven by the exit of workers from the labor force (or the proportion entering the labor force is less than the proportion exiting).

4. Concluding Remarks and Policy Considerations

To summarize, the analysis in this paper implies that cyclical fluctuations in aggregate economic activity in Brazil, as in the US, Mexico and Colombia, are accompanied by dramatic changes in the composition of the labor force. When aggregate demand falls (and aggregate unemployment increases) adult females, and teenagers. The net effect of this inflow of “new” workers in the economy does not increase the overall proportion of the population that is employed in spite of the decline in aggregate economic activity. Instead it results in a higher unemployment rate for these demographic groups. Overall however, the estimate of the total population weighted elasticity of the employment to population ratio implies that a 1-percent increase (decline) in the RGDP leads to a 0.180 percent increase (decline) in the employment to population rate. This implies that discouraged worker effects as opposed to added worker effects are dominant in the urban areas of Brazil during times of crises.

These characteristics of labor market behavior in Brazil have at least two important implications for policy. First, efforts to decrease unemployment and/or increase employment among a specific demographic group need to take into consideration the way in which the labor force participation of this

group responds to cyclical variations. Teenagers and adult females account for 91.3% of the change in labor force participation during a crisis and for these two groups the increases in the labor force participation during an economic downturn is practically equivalent to an increase in the unemployment rate. Second, the prevalence of discouraged worker effects is likely to have serious consequences on the information content of the official unemployment measures. During good times the influx of discouraged workers may increase and contribute to keeping unemployment rates high (while they are looking for job and until they eventually get a job) while during economic downturns, they may contribute to unemployment rates being artificially low. These workers, because they have not looked for work in the previous four weeks, are not considered unemployed, even if they want to go back to work. As a result, the monthly unemployment figures don't necessarily offer a complete picture.

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**Table 1: Cyclical Response of Participation, Unemployment and Employment:
by Age and Gender Groups**

Demographic Group	Employment to population ratio	Participation rate	Employment rate
Women			
16-19 yrs	0.357207	-1.07793	1.435134
	0.59972	0.083016	0.008123
20-24 yrs	-0.01156	-0.80506	0.793494
	0.971456	0.013783	0.000309
25-34 yrs	0.318578	-0.32498	0.643559
	0.0374	0.012873	3.79E-06
35-44 yrs	-0.05168	-0.50755	0.455876
	0.535002	1.24E-06	4.45E-10
45-54 yrs	0.009119	-0.43715	0.446269
	0.962419	0.022458	3.04E-09
55-64 yrs	-0.49139	-0.65966	0.168278
	0.321368	0.182854	0.000681
65+ yrs	0.330606	0.512447	-0.18184
	0.688752	0.534465	0.038526
Men			
16-19 yrs	-0.73214	-2.0592	1.327066
	0.078921	1.46E-06	0.000179
20-24 yrs	0.595156	-0.42529	1.020444
	0.001688	0.009106	5.57E-08
25-34 yrs	0.52448	0.018672	0.505808
	8.65E-07	0.752909	6.09E-10
35-44 yrs	0.33968	0.001096	0.338584
	0.000592	0.984568	7.23E-07
45-54 yrs	0.607313	0.267477	0.339836
	1E-06	0.017364	1.91E-08
55-64 yrs	-0.70605	-0.87617	0.170114
	0.031565	0.009859	0.003352
65+ yrs	0.83333	0.870225	-0.0369

APPENDIX A: Estimates for the period 2003:1-2010:6

0.154645 0.137482 0.668188

Note: p-values in smaller font in cells below the elasticity estimates

Table 2: Cyclical Response of Participation, Unemployment and Employment: by School Enrollment Status of 12-24 year olds

Demographic Group	Employment to Population Ratio	Participation Rate	Employment Rate
(a) Not-Enrolled in/ Not Attending in School			
Women			
16-19 yrs	2.130507	-0.11641	2.246915
	0.003917	0.853671	0.000115
20-24 yrs	-0.02567	-0.88369	0.858016
	0.944869	0.013974	4.52E-05
Men			
16-19 yrs	0.628335	-0.72452	1.35286
	0.150953	0.048567	2.54E-05
20-24 yrs	0.836106	-0.2094	1.045505
	0.000899	0.259872	7.75E-08
(b) Enrolled in/Attending School			
Women			
16-19 yrs	-1.75916	-2.24722	0.488055
	0.130886	0.019689	0.513281
20-24 yrs	0.056489	-0.55315	0.60964
	0.910343	0.227014	0.076217
Men			
16-19 yrs	-2.9061	-4.14888	1.242781
	0.000431	7.09E-07	0.0268
20-24 yrs	-0.63056	-1.52038	0.889817
	0.192372	0.002074	0.006171

Notes:

1. p-values in smaller font in cells below the elasticity estimates,

Table 3a: Cyclical Response of Participation, Unemployment and Employment:

Unskilled			
Demographic Group	Employment to population ratio	Participation rate	Employment rate
Female			
25-34 yrs	0.901257	0.441556	0.459701
	0.067563	0.336785	0.097356
35-44 yrs	-0.51432	-0.8236	0.309281
	0.138702	0.030977	0.022817
45-54 yrs	-0.4683	-0.691	0.2227
	0.235658	0.042217	0.032832
55-64 yrs	-0.64576	-0.65762	0.011854
	0.303907	0.273229	0.877882
65+ yrs	-1.59444	-1.30209	-0.29236
	0.079097	0.148529	0.030592
Male			
25-34 yrs	1.119055	0.337688	0.781367
	0.001251	0.219607	2E-06
35-44 yrs	0.321434	-0.03199	0.353427
	0.130632	0.790326	0.010419
45-54 yrs	0.683713	0.366083	0.31763
	0.000539	0.049495	0.000837
55-64 yrs	-0.75868	-1.11179	0.353114
	0.114381	0.019442	8.06E-05
65+ yrs	2.111917	1.941773	0.170144
	0.019837	0.03201	0.174558

Notes:

1. p-values in smaller font in cells below the elasticity estimates.

Table 3b: Cyclical Response of Participation, Unemployment and Employment:

Low Skilled			
Demographic Group	Employment to population ratio	Participation rate	Employment rate
Female			
25-34 yrs	-0.07269	-0.85803	0.785346
	0.901027	0.049935	0.009586
35-44 yrs	-0.16763	-0.63434	0.466713
	0.626519	0.024237	0.003537
45-54 yrs	-0.4037	-0.70531	0.301617
	0.482701	0.254293	0.055317
55-64 yrs	0.640356	0.354844	0.285512
	0.480775	0.699264	0.02578
65+ yrs	2.511644	2.304433	0.207211
	0.346273	0.379758	0.393663
Male			
25-34 yrs	0.738721	0.043679	0.695042
	0.003606	0.813831	2.72E-06
35-44 yrs	0.152073	-0.17068	0.322757
	0.411443	0.274605	0.013951
45-54 yrs	0.324373	-0.16773	0.492105
	0.165141	0.39118	6.7E-05
55-64 yrs	-1.04774	-1.07349	0.025744
	0.085386	0.058948	0.850192
65+ yrs	5.717642	5.855472	-0.13783
	0.001325	0.000765	0.582966

Notes:

2. p-values in smaller font in cells below the elasticity estimates.

Table 3c: Cyclical Response of Participation, Unemployment and Employment:

Skilled			
	Employment to population ratio	Participation rate	Employment rate
Female			
25-34 yrs	0.275284	-0.37281	0.64809
	0.043312	0.004067	2.69E-06
35-44 yrs	0.066205	-0.42683	0.493033
	0.530552	9.21E-05	2.63E-09
45-54 yrs	0.321552	-0.27657	0.598119
	0.13391	0.158356	2.1E-10
55-64 yrs	-0.36238	-0.62105	0.258672
	0.442858	0.187857	0.000304
65+ yrs	2.477969	2.637208	-0.15924
	0.032575	0.020863	0.170889
Male			
25-34 yrs	0.404434	-0.02678	0.43121
	3.86E-05	0.634563	5.51E-07
35-44 yrs	0.409602	0.051062	0.35854
	0.000182	0.45773	2.62E-07
45-54 yrs	0.611586	0.318007	0.293579
	1.18E-06	0.011658	2.95E-05
55-64 yrs	-0.51257	-0.59724	0.084671
	0.141464	0.102533	0.262424
65+ yrs	-1.34485	-1.15887	-0.18598
	0.029124	0.067476	0.051257

Notes:

1. p-values in smaller font in cells below the elasticity estimates

Table 4a: Cyclical Response of Participation, Unemployment and Employment:

Non-White Females and Males			
Demographic Group	Employment to population ratio	Participation rate	Employment rate
Women			
16-19 yrs	-0.22754	-1.40868	1.181138
	0.816417	0.073869	0.072139
20-24 yrs	-0.02817	-0.57431	0.546132
	0.940446	0.124039	0.064154
25-34 yrs	0.107907	-0.60211	0.710018
	0.67313	0.004314	0.000216
35-44 yrs	-0.02584	-0.59818	0.572346
	0.865442	0.000606	3.52E-09
45-54 yrs	-0.35838	-0.5954	0.237019
	0.146761	0.009643	0.003872
55-64 yrs	-1.60749	-1.78133	0.173835
	0.008997	0.002258	0.043448
65+ yrs	-1.51929	-1.15828	-0.36101
	0.126042	0.234481	0.02255
Men			
16-19 yrs	-0.18909	-0.79542	0.606325
	0.686536	0.083758	0.11596
20-24 yrs	1.113464	0.006848	1.106616
	0.000582	0.973928	5.82E-06
25-34 yrs	0.923663	0.241722	0.681941
	1.25E-10	0.010234	9.42E-10
35-44 yrs	0.296545	-0.00455	0.301096
	0.005103	0.94005	0.000139
45-54 yrs	0.918699	0.47856	0.440139
	9.25E-09	0.001155	1.19E-07
55-64 yrs	-1.04109	-1.23569	0.194597
	0.002296	0.000576	0.026518
65+ yrs	0.322942	0.21871	0.104232

APPENDIX A: Estimates for the period 2003:1-2010:6

0.758527 0.838984 0.433213

Note: p-values in smaller font in cells below the elasticity estimates

Table 4b: Cyclical Response of Participation, Unemployment and Employment:

White Females and Males

Demographic Group	Employment to population ratio	Participation rate	Employment rate
Women			
16-19 yrs	0.812814	-0.7752	1.588015
	0.211634	0.224464	0.009461
20-24 yrs	0.055989	-0.98854	1.044532
	0.90274	0.024292	4E-06
25-34 yrs	0.376762	-0.17197	0.548729
	0.045984	0.262892	7.56E-06
35-44 yrs	-0.09843	-0.44212	0.343689
	0.538693	0.002413	0.000128
45-54 yrs	0.25852	-0.34909	0.607614
	0.256821	0.109038	6.5E-10
55-64 yrs	0.342123	0.188393	0.153731
	0.511576	0.727963	0.025806
65+ yrs	1.619175	1.704151	-0.08498
	0.130186	0.117481	0.501002
Men			
16-19 yrs	-1.24759	-3.41239	2.164799
	0.108458	2.02E-06	6.81E-05
20-24 yrs	0.094023	-0.84997	0.943989
	0.742085	0.003027	2.98E-06
25-34 yrs	0.136706	-0.20488	0.341587
	0.228729	0.013278	6.07E-05
35-44 yrs	0.345907	-0.02158	0.367483
	0.00078	0.773858	5.93E-07
45-54 yrs	0.320176	0.07049	0.249686
	0.016198	0.614024	1.75E-05
55-64 yrs	-0.48006	-0.6333	0.153238
	0.201565	0.097868	0.011631
65+ yrs	1.136699	1.245156	-0.10846
	0.160621	0.120295	0.265256

APPENDIX A: Estimates for the period 2003:1-2010:6

Note: p-values in smaller font in cells below the elasticity estimates

APPENDIX B: Estimates for the full period 2003:1-2016:1

In this appendix, Table B.1 reports elasticity estimates using the full period of data available (2003:1-2016:1) ignoring the possibility of a structural change in the coefficients of equation (3) and (4). Table B.2 is analogous to Table 2 in the body of the paper, but based on the elasticity estimates from Table B.1. It is important to bear in mind that ignoring the structural change, the estimates suggest that the population weighted elasticity of labor force participation to RGDP is positive (0.224) meaning that a 1 percent decline in RGDP leads to 0.224 decline in the labor force participation rate. It should also be noted that repeating the regression analysis using the subsample of observations prior to onset of the crisis (2003:1-2010:6) also yields a positive population weighted elasticity of labor force participation to RGDP (0.104).

**Table B.1: Cyclical Response of Participation, Unemployment and Employment:
by Age and Gender Groups**

Demographic Group	Employment to population ratio	Participation rate	Employment rate
Women			
16-19 yrs	1.345 0.000	0.347 0.014	0.998 0.000
20-24 yrs	0.683 0.000	0.121 0.032	0.562 0.000
25-34 yrs	0.410 0.000	0.120 0.000	0.291 0.000
35-44 yrs	0.177 0.000	0.021 0.494	0.156 0.000
45-54 yrs	0.262 0.000	0.149 0.002	0.113 0.000
55-64 yrs	-0.086 0.402	-0.142 0.145	0.056 0.003
65+ yrs	0.440 0.038	0.463 0.028	-0.024 0.304
Men			
16-19 yrs	1.001 0.000	0.143 0.207	0.859 0.000
20-24 yrs	0.712 0.000	0.130 0.000	0.581 0.000
25-34 yrs	0.355 0.000	0.091 0.000	0.263 0.000
35-44 yrs	0.226 0.000	0.100 0.000	0.126 0.000
45-54 yrs	0.270 0.000	0.154 0.000	0.117 0.000
55-64 yrs	0.437 0.000	0.355 0.000	0.082 0.000
65+ yrs	0.277 0.050	0.223 0.109	0.055 0.008

Note:

1. p-values in smaller font in cells below the elasticity estimates
2. Shaded cells in green indicate that the null hypothesis of no cointegration is rejected.

APPENDIX B: Estimates for the full period 2003:1-2016:1

Table B.2: Demographic Contribution to Cyclical Variation Brazil 2003:1-2016:1

Demographic Group	Elasticity of LFPR	Number of People	Population Share	Weighted Elasticity	Share of Total
Women			0.517	0.151	0.674
16-19	0.347	6,659,247	0.047	0.016	0.073
20-24	0.121	8,614,963	0.061	0.007	0.033
25-34	0.120	16,670,273	0.118	0.014	0.063
35-44	0.021	13,810,711	0.098	0.002	0.009
45-54	1.149	11,446,745	0.081	0.093	0.415
55-64	-0.142	7,841,962	0.056	-0.008	-0.035
65+	0.463	7,966,401	0.056	0.026	0.116
Men			0.483	0.073	0.326
16-19	0.143	6,756,696	0.048	0.007	0.030
20-24	0.130	8,630,229	0.061	0.008	0.035
25-34	0.091	16,178,653	0.115	0.010	0.046
35-44	0.100	13,087,232	0.093	0.009	0.041
45-54	0.154	10,527,009	0.075	0.011	0.051
55-64	0.355	6,943,379	0.049	0.017	0.078
65+	0.223	6,115,076	0.043	0.010	0.043
Teenagers 16-19		13,415,943	0.095	0.023	0.103
Young Workers 20-24		17,245,192	0.122	0.015	0.068
Adult Women 25-64		49,769,691	0.352	0.101	0.452
Adult Men 25-64		46,736,273	0.331	0.049	0.217
Older M & F		14,081,477	0.100	0.036	0.159
Total		141,248,576	1.000	0.224	1.000

Notes: Number of people based on 2010 Census
Elasticity estimates using data from the Monthly Employment Surveys (PME) of Brazil for the period 2003:1-2016:1

Table B.3: Demographic Contribution to Cyclical Variation Brazil 2003:1-2010:6

Demographic Group	Elasticity of LFPR	Number of People	Population Share	Weighted Elasticity	Share of Total
Women			0.517	0.049	0.475
16-19	0.692	6,659,247	0.047	0.033	0.313
20-24	0.217	8,614,963	0.061	0.013	0.127
25-34	0.167	16,670,273	0.118	0.020	0.189
35-44	-0.015	13,810,711	0.098	-0.001	-0.014
45-54	0.021	11,446,745	0.081	0.002	0.016
55-64	-0.553	7,841,962	0.056	-0.031	-0.295
65+	0.256	7,966,401	0.056	0.014	0.139
Men			0.483	0.055	0.525
16-19	0.608	6,756,696	0.048	0.029	0.279
20-24	0.150	8,630,229	0.061	0.009	0.088
25-34	0.089	16,178,653	0.115	0.010	0.098
35-44	0.039	13,087,232	0.093	0.004	0.035
45-54	0.033	10,527,009	0.075	0.002	0.023
55-64	0.003	6,943,379	0.049	0.000	0.001
65+	0.000	6,115,076	0.043	0.000	0.000
Teenagers 16-19		13,415,943	0.095	0.062	0.592
Young Workers 20-24		17,245,192	0.122	0.022	0.215
Adult Women 25-64		49,769,691	0.352	-0.011	-0.103
Adult Men 25-64		46,736,273	0.331	0.016	0.158
Older M & F		14,081,477	0.100	0.014	0.139
Total		141,248,576	1.000	0.104	1.000

Notes: Number of people based on 2010 Census

Elasticity estimates using data from the Monthly Employment Surveys (PME) of Brazil for the period 2003:1-2010:6