

# Economic Impact on Women's Participation in the Labor Market: A General Equilibrium Approach

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## Abstract:

Woman's participation in Brazilian labor market has increased remarkably in the last decades. Moreover, those who found jobs are the most qualified ones. Despite these changes, unemployment rates are still higher, the wages are lower, and the employment is highly concentrated in some sectors. In this context, this paper aims to evaluate the importance of woman's work, and its growth, for the Brazilian economy in recent years. We use a Dynamic General Equilibrium Model for Brazil, which follows the Australian modelling approach, with two main developments. First, we disaggregate the labor factor by gender and qualification. Secondly, we split the household income into four types: labor; capital; government transfers and other sources. Two simulations were carried out, historical and decomposition, both for the period 2006-2013. Results showed that when analyzing the GDP composition, labor loses contribution. However, at the same time, woman's contribution to total labor increased from 34.71% to 42.38%. This increase reflects not only the increase in women's employment, but especially reveals its increasing contribution to the national income. The decomposition simulation demonstrates that 31.17% of the average growth of GDP in the period was explained by changes in labor usage, being 28.37% due to the increased use of high-skilled woman. Regardless the positive overall effect on the economy, for several sectors changes in labor composition produced negative effects on production growth in the period. In general, the positive impacts were concentrated in the sectors related to domestic demand, in which women's work with high qualification gained importance, such as clothing items and accessories, leather goods and footwear, perfumery, hygiene and cleaning and most service sectors. On the other side, the negative effects were concentrated in manufacturing sectors linked to exports and the services related to them.

**Key words:** women, labor market, economic growth, computable general equilibrium

## 1. Introduction

Women have gained participation in the Brazilian economy, notwithstanding difficulties of finding a job, as well as the vulnerability of employment, concentration in informal or unpaid work and in sectors and occupations with lower wage levels. In this context, not only labor supply factors that boost woman to the labor market are important, but also the types of jobs created and the economic conditions behind labor demand for female workers.

Taking into account both, labor supply and demand, the main goal of this paper is to analyze the importance of women's labor for Brazilian economy for the period 2006-2013, using a general equilibrium framework. With this approach, rather than the partial equilibrium, one can analyze

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specific aspects of labor demand and its technical requirements to the sectorial level, as well as, the effect of women's work in terms of income, consumption and well-being. Due to the explicit relationship between the economic agents, the demand for labor and the households consumption demand interact directly and feedback, allowing one to check the effects of women's labor expansion for the economy as a whole.

Methodologically three advances enable gender analysis into the proposed CGE model. First, the disaggregation of labor into six types, by gender and qualification. Second, the disaggregation of household income into four sources (labor income, capital income; government transfers and other sources). Finally, the connection of labor income for each representative household (divided into income deciles) and each labor type.

Based on the proposed model two sets of simulations were carried out, named historical and decomposition simulation. These simulations allows to separate the effect of changes in the composition of gender and qualification of women's work on economic growth of the 2006-2013 period from other macroeconomic and labor market changes in the same period.

The paper is organized as follows. The next section discusses relation between female labor and economic growth. Section 3 describes the methodology used, as well as the database, and simulations proposed. Section 4 discusses the results and section 5 concludes with final remarks.

## **2. Women in the labor market**

The debate on gender inequality and the economic importance of female labor was placed in focus mainly from the efforts of international organizations such as the United Nations (UN), the World Bank and the International Labour Organization (ILO). One of the most important actions was the inclusion of "Promotion of Women's Empowerment and Gender Equality" as the third millennium goal in the 2005 World Summit, attended by 170 countries (United Nations, 2005). The main argument was related to the relationship between economic growth and gender equality: the promotion of gender equality and women's empowerment have the potential to generate benefits for the society as a whole, through higher productivity and economic efficiency. From the World Bank perspective:

“Gender equality is a core development objective in its own right. But greater gender equality is also smart economics, enhancing productivity and improving other development outcomes, including prospects for the next generation and for the quality of societal policies and institutions. Economic development is not enough to shrink all gender disparities—corrective policies that focus on persisting gender gaps are essential” (World Bank, 2011, pp. 15).

The relation might be valid both ways. Gender equality allows higher employment and education for women. Both increases the human capital available, and therefore encourages economic growth (Costa et al., 2009; Braunstein, 2012; Kabeer et al., 2013; Kabeer and Natali, 2013). In addition, other effects can affect economic growth in the long run. Those are the externalities on fertility levels, children's health and education, consumption pattern, and social stability (Costa *et al.*, 2009; World Bank, 2011; Kabeer and Natali, 2013).

Conversely, economic growth can be translated into greater gender equality directly and indirectly. Directly, economic growth increases economic opportunities and bargaining power within the family; and indirectly, it increases the costs of discrimination when the market come to be more competitive and gender equality policies become more effective. Several empirical studies analyzed the direction of this causality: while the direction of gender equality to growth appears to be strong and robust in different contexts, the relation from growth to equality shows inconclusive results (Kabeer and Natali, 2013).

This dual causality have a serious consequence in terms of public policy. Under the argument that gender equality improves with growth, the focus of public policy should be to promote economic growth and prosperity without the need for specific policies for women (Duflo, 2012; Kabeer and Natali, 2013). In turn, when the emphasis takes the direction of gender equality for growth, there is a strong rationale in reducing inequalities, which become prerequisite for a virtuous cycle of growth (Duflo, 2012; Kabeer and Natali, 2013). Finally, even if there is a positive relationship, if growth itself is not enough to improve gender conditions, it is necessary to reformulate the growth strategies including fair measures between men and women (Kabeer and Natali, 2013).

In this regard, data and empirical tests suggest that economic growth alone is not able to guarantee gender equality (Kabeer and Natali, 2013). In many countries, persistent inequalities between men and women are observed in the labor market (World Bank, 2014). According to Kabeer and Natali (2013) those finding highlights the importance of distinguishing different patterns of growth and its effects on gender equality.

In the specific case of Brazil, women have advanced in two main aspects: labor market participation and the qualification level. On the other side, wages are lower, jobs are concentrated in specific sectors and occupations; jobs' quality is low (such as in informal and unpaid work) and unemployment is higher (Ñopo, 2012; ILO, 2014; World Bank, 2014). According to Kabeer and Natali (2013), this happens because educational policies were not sufficient to reduce gender barriers in the labor market.

In other words, labor demand did not increase as fast as women's labor supply. In this context, the types of jobs created are very important, and labor demand plays an especial role. In short, it is not enough to have several factors boosting more women to work; it is necessary that the demand for labor is increased, creating not vulnerable job opportunities.

Looking from this perspective, recent theoretical and empirical developments have shown that rising wages and employment for women may be explained by changes in labor demand, arising from structural changes favoring sectors which value typical women's skills (Akbulut, 2011; Rendall, 2013, 2014; Ngai and Petrongolo, 2014; Olivetti and Petrongolo, 2014).

Galor and Weil (1996) were the first to suggest a relationship between the decrease of the physical requirements of labor in production with increasing women's participation in the labor market. In their own words: *"While women and men have equal quantities of brains, men have more brawn. And the more developed is an economy the higher the rewards of brains relative to brawn"* (Galor and Weil, pp. 375, 1996).

In the same line, Rendall (2013, 2014) shows that part of the demand's growth for women's labor is the result of intraoccupational change in technical requirements of production, another part is due to the structural change in favor of the service sector (Rendall, 2013, 2014). According to her, countries with high share of the service sector tend to have high levels of employment of women and minor wage gaps. Causality works both ways. A larger service sector generates greater opportunities for women (in terms of salary and number of jobs) and greater participation of women in the labor market requires more services produced in the market such as child care, nursing homes for the elderly, restaurants, among others (Rendall, 2013, 2014).

Similarly, Ngai and Petrongolo (2014) reinforce the relationship between the expansion of the service sector and the increase in female participation. According to the authors, the relative increase in the productivity of market services compared to domestic services increased the opportunity cost of domestic labor, stimulating demand for market services that are close substitutes for domestic production. Thereafter, regarding the demand for labor, two forces favor the participation of women in the labor market: the increased demand for cognitive skills and the expansion of sectors in which women have high participation (Ngai and Petrongolo, 2014).

Olivetti and Petrongolo (2014) explain both as intra and inter-industrial components of labor demand, respectively. The intraindustrial component reflects labor composition differences in each sector, which can be explained by variances in the technical skills requirements; but also by differences in relative input prices; outsourcing and discrimination. In turn, the inter-forces reflect differences in the sectorial composition of the economy, changing to sectors more or less intense in a certain category of gender or skills, which occur due to changes in the composition of demand; the total productivity

growth; commodification of domestic production and international trade (Olivetti and Petrongolo, 2014)<sup>1</sup>.

When the focus is on exporting sectors, the discussion becomes more controversial. While these sectors tend to increase labor and women's income, average wages remain lower and the consequence is a rise or preservation of wage inequality (Seguino, 2000). In this context, inequality could even contribute positively to growth (Standing, 1999; Blecker and Seguino, 2002; Kabeer and Natali, 2013). The lowermost salaries would be used as comparative advantage, boosting export competitiveness, and consequently generating positive results for the economy as a whole. Namely, with no evidence that such labor as less productive, lower wages would mean productive and inexpensive labor, which at the same time tends to perpetuate wages inequalities and the concentration of women in low-wage occupations (Blecker and Seguino 2002 ; Seguino, 2000; Kabeer and Natali, 2013). Following the above argument, Braustein (2012) shows that low wages of women operate in the same way as currency devaluation policies, with the added advantage that the prices of imported goods are not affected.

In a broader context, as argued by the feminist literature, since many women work in informal conditions, with low payments and little or no legal protection, many of the opportunities created by the market would be of women's exploitation and not empowerment (Kabeer *et al.*, 2013). This argument is in the spirit of inclusive growth idea, discussed by Kabeer *et al.* (2013). According to the authors, the implementation of the third millennium goal "to promote gender equality and the empowerment of women" is only possible through inclusive growth, which implies the generation of equal opportunities for different sectors of the population. To Braunstein (2012), the conditions should be "equalized up" so that the number of decent jobs is higher for both men and women, increasing the well-being of society in general.

### **3. Methodology**

The CGE model built for this study has several elements that make it suitable for analyzing issues relating to gender in the Brazilian labor market, as raised in the previous session. The model started from the theoretical structure of the Brazilian Recursive Dynamic General Equilibrium Model model - BRIDGE (DOMINGUES *et al*, 2010), which in turn part of ORANI-G Model (Horridge, 2002, 2014).

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<sup>1</sup> With a general equilibrium model calibrated for the US economy, Ngai and Petrongolo (2014) show that the expansion of the service sector accounted for at least half of the increase in total hours worked by women and 20% of the increase in the wage rate in the period 1968 -1972.

The model was calibrated using input-output data for 2005 (IBGE, 2014a)<sup>2</sup>, with 26 activities producing 26 commodities. There are five final demand components: household consumption, government consumption, investment, exports and inventory; with households divided by decile of per capital income. The model counts with two primary factors are considered, capital and labour, with labor divided into 6 types (of gender and skills); and two margins sectors (trade and transport).

For this study two main modifications were introduced<sup>3</sup>. First, labor was divided into six groups of workers (men unskilled workers, medium and high and working women with high qualification, medium and low). Secondly, household income was subdivided into labor income, capital income, government transfers and other income; with labor income directly linked to the labor type composition within each representative household. Figure 1 schematically represents the CGE model basic structure, with main modifications highlighted in grey.

<< Figure 1 around here >>

As can be seen, at the first level, the producer sets the amounts of unskilled workers, medium and high that minimize the total cost of the work, subject to the CES type technology. On the second level, for each qualification, the producer chooses between men and women workers minimizing the total cost for each type subject to CES function.

This division holds the intuitive notion that the producers are looking for a set of skills in the labor market, and men and women are imperfect substitutes in production. In both cases, it is worth mentioning that the division of types of work simplifies reality. At the first level, years of education is used as a proxy for skills required in the production sector. In the second level, the possibility of substitution between genders simplifies a set of specific skills, preferences, occupational choices, and other differences between men and women as a production factor that differentiates the labor between than even for equivalent levels of qualification.

In terms of data used, labor types are ranked by skill level (low, medium and high) and gender, using the National Household Survey for 2005 (IBGE, 2014b). Skill level was measured in years of schooling: low-skilled, for workers with up to 10 years of schooling; medium-skilled, between 11 and 14 years of schooling; and high-skilled, for 15 or more years of study. For the worker's gender was used self-reported variable male or female.

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<sup>2</sup> 2005 is the last year of available official input-output data.

<sup>3</sup> Modifications were based on Wittwer (1999), Adams, Horridge and Wittwer (2002) and Corong (2014).

In order to disaggregated labor types, the first step was data compatibility between National Household Survey and Input-Output data. Therefore, in order to keep model's data consistency national accounts and the input-output matrix, it was decided to keep the total remuneration and sector occupations from input-output matrices and split types of workers' participation and households' decile according to the household survey data. Therefore, to estimate sectorial distribution of each type of worker (in terms of income and occupations) we used Balancing Bipropocional Matrices Method, known as RAS (HARRISON *et al.*, 2014).

By its turn, household income (classified by decile of per capita income) was decomposed into four sources using two databases: the National Survey of Households for 2005 (IBGE, 2014b) and the Household Budget Survey for 2008/2009 (IBGE, 2014c). The distribution of labor income among households follows the participation of the National Household Survey and was broken down by sector and type of labor using RAS method. Formally, household  $h$  total income  $VHOUINC_h$  was obtained using the income from labor for household  $h$ , paid by industry  $i$ , for workers with skill level  $o$ , and gender  $g$  ( $VHOULAB_{IOG_h}$ ) multiplied by the share of labor income in total income for household  $h$  ( $S_{LABTOTAL_h}$ ) obtained from household survey:

$$VHOUINC_h = S_{LABTOTAL_h} * VHOULAB_{IOG_h} \quad (3.1)$$

Thus, non-labor income ( $VNLAB_h$ ) was directly obtained by:

$$VNLAB_h = VHOUINC_h - VHOULAB_{IOG_h} \quad (3.2)$$

And finally, non-labor income was divided between income from capital ( $VHOUCAP_h$ ), government transfers ( $VHOUGOV_h$ ) and other sources ( $VHOUOCT_h$ ) using Household Budget Survey shares, respectively,  $S_{CAPPOF_h}$ ,  $S_{GOVPOF_h}$  and  $S_{CAPPOF_h}$ , as follows:

$$VHOUCAP_h = S_{CAPPOF_h} * VNLAB_h \quad (3.3)$$

$$VHOUGOV_h = S_{GOVPOF_h} * VNLAB_h \quad (3.4)$$

$$VHOUOCT_h = S_{OCTPOF_h} * VNLAB_h \quad (3.5)$$

From the proposed modifications, it was possible to perform two simulations, historical and decomposition, for the period 2006-2013 in order to evaluate the importance of women's labor for the Brazilian economy. The historical simulation allows updating the model; and estimating variations in the use of production factors, consumer preferences and other unobserved variables (Ng, 2012). In the decomposition simulation, we use historical simulation results as exogenous shocks, allowing separating the effect of each of the observed variables (receiving shock on historical simulation) on

the other model variables. By using both simulations, it was possible to isolate the contribution of women, taking into account the changes in the sectorial use of labor, changes in the macroeconomic conditions of the domestic and foreign markets, and changes on income and household consumption. The next section presents closure, shocks and results for each simulation.

#### **4. Simulations**

In historical simulation, observed variables are imposed to the model as exogenous shocks. For each variable shocked during historical simulation, another variable is hold endogenous, such as technological change variables, preferences or displacement parameters, giving the model the flexibility necessary to accommodate all observed changes. In turn, the endogenous results for these variables are used as shock in the decomposition simulation, allowing to identify the importance of each of the observed variables during the observed period (2006-2013). Following the Australian tradition of CGE models, the exchange between endogenous and exogenous variables in historical and decomposition simulations is active by using swap statements, as detailed in Table 1.

<< Table 1 around here >>

The variables observed between 2006-2013 which receive a shock on historical simulation were: GDP from income side, government consumption, households consumption, total investment (all sectors), total exports (all products), consumer price index, and the use of employment by sector, gender and race. Each of these variables has its endogenous counterpart, respectively: the total productivity of the primary factors (all sectors); government consumption shift; shift in household consumption preferences (all households); investment shift; shift in exports; exchange rate; and technological changes in the use of labor by industry, gender and qualification.

In turn, for the decomposition simulation, the exogenous variables receive the shocks endogenously calculated in historical simulation, and the same shocks to variables that are exogenous in both simulations. In this way, aggregated results produced in historical simulations and decomposition are exactly the same. Nonetheless, only with decomposition simulation the effect of each shock can be isolated. The following sections presents shocks and results for each simulation.



#### 4.1. Historical Simulation

Macroeconomic observations used as exogenous shock are displayed in Table 2. Data shows that the period 2006-2013 was particularly interesting, mainly due to variability in the data. The period 2006-2008 was characterized by high growth, with strong domestic consumption, increasing investments and a favorable external environment. In 2008, the signs of the international crisis show themselves, with the rise in the price of imports and reduced exports. Yet only in 2009 the country recorded a reduction of the product. With domestic consumption remaining positive, GDP reduction was minor, even with a reduction in investment and export. The year 2010 clearly shows the post-crisis recovery, while the rest of the period (2011-2013) displays moderate growth, sustained basically by domestic demand and the recovery of the external sector.

<< Table 2Table 1 around here >>

For labor usage shocks, we used percentage change in hours worked by sector, and labor type, for each year from Household Survey Data. Table 3 reports average percentage changes, to illustrate general trends. Data shows that in the period 2005-2013 Brazilian labor market experienced reductions in hours worked by low-skilled workers, women and men, as well as increasing use of high-skilled workers.

<< Table 3Table 1 around here >>

Those changes also affect types of labor composition within each representative household. As the model was calibrated for 2005, and the number of low skilled workers are in general concentrated at the beginning of income distribution, employment reduction for those types would decrease income from labor for households in the first income deciles. Nevertheless, this movement is inconsistent with observed data showing growth in labor income for poor households in Brazil.

For that reason, to adjust household labor income, we used annual values for hours worked by households to simulate changes in labor income between representative households. Table 4 reports average percentage changes, to illustrate general trends. The education level in Brazil is increasing, and so, as one could expect, almost every representative household has lost income from low-skilled workers, but they have gained income from medium and high-skilled workers.

<< Table 4Table 1 around here >>

As previous tables have showed, the shock at the sectorial use of labor incorporates detailed information about the labor market changes during 2006-2013. This data triggers a series of movements in the market of production's factors as a whole. Firstly, the change in labor usage directly alters the composition of payments to this factor at sectorial level and consequently the national level. Secondly, given the sectorial demand by each type of labor, labor factor prices (wages) adjust to active markets balance. Third, set the amount of labor used in each sector and the price difference between capital and labor, the amount of capital used is adjusted according to the CES function of substitution between capital and labor. Finally, changes in total demand for each sector not explained by changes in the relationship between capital and labor are calculated endogenously by technological change variables that reflect changes in the productivity of specific workers' type and industries.

The main results for historical simulation related to this paper goal are obtained using GDP decomposition. By using this technique, it is possible to see aggregated results for labor as a production factor, displayed in Figure 2. In the early years (between 2006 and 2008) the labor has a high share in total factors remuneration, and remain relatively stable in the following years, regardless of low or negative variations in GDP. Capital, in turn, gain participation from 2008 due to increased investment in the initial period (2006-2009) paralleled with the sluggish increase in use of the labor. By its turn, technical change, which includes the increase in the total productivity of the primary factors and the technical changes in the use of labor, shows its importance especially in periods when there was greater GDP growth and reveals the drop in productivity during periods of negative growth or low sluggish. Finally, the tax variable incorporates the entire set of taxes described in the model and follows sectorial activity level.

<< Figure 2Table 1 around here >>

We can also subdivide contributions of labor to GDP growth between genders, as shown in Figure 3. In 2006 the labor factor accounted for 2.42% of the GDP growth (that was 3.96% for this year). Of this variation, 34.71% correspond to the labor of women. With the increase in women's participation in the labor market, this percentage reaches 48.25% in 2011, but ends the period in 42.38%. This increase reflects the fact that not only the number of women who entered the labor market was great, and the total amount received has been growing in the Brazilian economy.

<< Figure 3 around here >>

In sectorial terms, results are heterogeneous for several reasons. First, sectors associated with household consumption do not suffer significant losses, since the household expenditure remained high throughout the period. Second, the high level of investments in the initial period boosts the construction industry, as a major capital goods' supplier. Third, even though government consumption growth was less than household consumption during this period, the preservation of positive growth rates tends to ensure that public service sectors retain participation. Fourth, instability in net exports lead to losses in export related sectors, and/or sectors highly sensitive to changes in imported input prices. Finally, sectorial shocks in the use of labor modify relative prices benefiting the sectors with the highest growth of this factor.

Table 5 shows changes in sectorial composition between 2005 and 2013. Results revealed that while agriculture holds its participation (at 5.13%), manufacturing industries gives place to services that increase 2.62% their participation, reaching 56.46% of total production. The increasing in services participation in general reflects the rise in household demand, government consumption (in the case of public services), and investment. In short, it is the result of stability in the components of domestic demand over the period 2006-2013, for which much of the production services is intended. Production growth in the tertiary is also accompanied by increased employment above average in these activities, mainly posts held by women. The sector that has gained larger share in the Brazilian productive was Construction, an increase of 1.23 percentage points, reaching 5.66% of national production in 2013. This increase can be explained the high level of investment between 2006 and 2008 and in 2010. As expected, the high production was reflected in increased labor demand (confirmed with the National Household Sample labor market data used as a shock) and led to the increase in employment above the average over 2006-2013.

<< Table 5Figure 3 around here >>

The second sector that earns more participation are "other services", an increase of 1.04 percentage points. The increase in their share in the period can be explained by the composition of sector activities, which are included personal services, home services, leisure activities and other services, all of them focused directly on household consumption. Among manufacturing sectors, some activities also linked to household consumption gain participation: clothing items and accessories; leather goods and footwear; and perfumery, hygiene and cleaning; and other sectors related to investment demand, such as machinery and equipment; metal products and to a lesser extent. On the other hand, the major loss of participation was with other industries (reduction of 2.47%) where there was a relative loss in the total of employees.

## 4.2. Decomposition Simulation

For the decomposition simulation are used two types of shock variables: results obtained in historical simulation for the variables that make swap with observed macroeconomic aggregates; and variables that are exogenous and receive shock in both simulations. View of the amount of shocks, it was decided to use the average of the historical period to display the results. Accordingly, the historical shocks vector contains average changes between 2006 and 2013 for all macroeconomic and labor market variables.

From estimates of endogenous variables swaps, results were broken down into six parts: i) changes in total factor productivity; ii) changes in domestic demand; iii) changes in the external market; iv) changes the labor market (by job type and industry); v) changes in the distribution of labor income; and vi) population growth. Among the changes in domestic demand, we incorporated government consumption and investment shifts. For changes in the external market, we included exports shifts, import prices and exchange rate. Changes in the labor market comprised labor factor usage disaggregated by sex work, qualification and sector. Finally, for changes in income distribution we used labor income variations between households.

The simulation results of decomposition to the macroeconomic variables are shown in Figure 4. The component that stands out are changes in the external market, i.e., exports shift, and changes in relative prices between domestic and imported goods. On the other hand, changes in domestic demand operate in the opposite direction, as they are below the levels that the model would have predicted. Therefore, shift parameters, technological and preference changes accommodates those differences.

<< Figure 4Figure 3 around here >>

In its turn, labor market changes, represented by the change in sectorial labor use had positive influence on almost all aggregates except exports. This result stems from the relative increase of jobs in certain sectors, especially in services, with important positive changes especially for high-skilled workers. On the other hand, export sectors showed reductions in the use of labor, negatively affecting the total volume exported. These relationships are clear isolating the contribution of each sector's labor usage shock by gender and qualification on the national GDP, as illustrates Table 6.

<< Table 6Figure 4Figure 3 around here >>

Total effect of changes in the labor market was 1.11%, which corresponds to the simple summation of each of these shocks. Namely, given the variation in average 3.56% period, the contribution of work represents 31.17% of the average GDP in the period. However, the overall effect is positive, as shown in the last column, for different sectors of work changes in composition produce adverse effects, especially to areas where the relative use of labor factor was reduced during 2006-2013.

With regard to gender composition, the significant increase of female labor, especially for high-skill occupations, contributed 1.01% to the result of GDP growth, or 28.37% growth over the period. For men, reducing the use of unskilled workers, would have resulted in a negative contribution of -1.79%, but was overcome by increased use of medium and high-skilled workers, which together contributed positively in 1.83 % to GDP. In short, women's contribution to economic growth in the period was 0.92% higher than for men, when counted all direct and indirect effects incorporated into the simulations and the CGE model.

Results also shows that decreases in labor usage in several sectors lead to a negative impact on GDP. This result could be indicating that the labor market was a 'restriction' for most industrial sectors and some service sectors, to the extent that variations in the use of labor, mainly unskilled, have created barriers to growth production. This is an interesting result because it indicates that the growth of qualification in the labor market tends to generate shortage of labor supply in less skilled segments, hence creating obstacles to the expansion of some sectors, especially the most dependent on this type of labor. By its turn, the sectors that benefited from the labor market conditions were mostly services, in which women's participation increased during the period.

Finally, due to the link between labor income and households consumption, it is possible to identify the contribution of changes in the labor market on the consumption of each representative household, as Table 7. Household consumption would have risen in all deciles, but the highest rates are concentrated in the higher deciles, with changes in the labor market playing a major role to explain such variations. The first decile for example, would raise consumption by 1.13%, and 0.88% variation explained by displacements of labor income among families. On the other hand, without the offsets between families, reducing the use of low-skilled workers would overcome the positive effect of the increase in other types of workers and the consumption of the first decile would have fallen 0.12%.

<< Table 7 around here >>

Thus, one can say that the shift of labor income among families involved in increased labor income for the first decile, and can be interpreted as a reflection of the increase in the level of

qualification of these families. For all other deciles, even with the adverse effect on the use of low-skilled workers (for both men and women), the increase in other types induces increases in consumption, especially for the higher deciles, in which these workers are concentrated. Whereas the isolated effects on the use of male and female workers, it can be said that the increase in women's work contributed positively to income and consequently the consumption of all deciles.

## 5. Final Remarks

Women have gained participation in the Brazilian economy; despite the difficulties of finding work remain, as well as the vulnerability of employment, concentration in informal jobs in unpaid work and in sectors and occupations with lower wage levels. In the face of advances in women's work, despite the persistent difficulties, the main objective of this paper was to analyze the importance of women's work for the Brazilian economy in a general equilibrium context.

The proposed model and simulations contribute to the literature in two ways:

1. Methodologically, with the construction of a Computable General Equilibrium Model for the analysis of gender issues in Brazil; and,
2. Empirically, by showing the importance of women's work for the Brazilian economy; isolating the effects of changes in the labor market by gender and qualification on economic behavior, and household consumption.

Main results show that analyzing the GDP in terms of income in the period 2006-2013, the work factor loses contribution (considering the factors labor and capital, as well as taxes and estimated technical change). However, while women's contribution to total labor input increased from 34.71% to 42.38%, reflecting not only the increase in employment in women, such as increasing its contribution to the national income.

Considering the average growth of the Brazilian economy of 3.56% annual between 2006 to 2013, changes in the use of labor explain 1.11% of GDP growth. This percentage, the significant increase of female labor contributed 1.01 percentage points of GDP, or 28.37% of the average growth in the period, mainly due to the increase in female high qualification work. For men, the contribution was only 0.09%, mainly due to the reduction in employment of low-skilled.

Regardless of the overall positive effect, for various sectors changes in labor composition produce negative effects, indicating that the low growth of labor may have been a constraint to the expansion of these sectors. The positive impacts of the expansion work were concentrated in sectors related to domestic demand, in which the women work with high qualification gained importance in

the period (such as clothing items and accessories, leather goods and footwear, perfumery, hygiene and cleaning and most service sectors).

Conversely, industry sectors linked to exports and related services were the most negatively affected. These results are consistent with the models proposed by Akbulut (2011), Rendall (2014), Ngai and Petrongolo (2014) in which the expansion of services and the participation of women are directly related. That is, while the service sector creates job opportunities for women, the increase in the share of income of families with women's work encourages the demand for services.

In short, the main findings highlight that the increased participation of women, especially of higher qualification, played key role in strengthening domestic demand, allowing the expansion of sectors related to household consumption, especially services. In this sense, the result strengthens the argument that encourage gender equality in the labor market is "smart economics", as proposed by the World Bank, generating positive results not only directly for women and for the economy as a whole.

Currently (2014-2015) front of low unemployment and growth recovery expectations for the Brazilian economy, the continued increase in female participation becomes essential. To make this happen, public policies are necessary to support the women's work, and encourage equal distribution of labor within the family. It is worth mentioning the importance of increasing the use of highly qualified labor, showing that the rise of educational levels has contributed positively to the short-term behavior of the Brazilian economy. However, for those results remain it is necessary to educate more and better. As suggested by Betrão and Alves (2013), two points are needed: raise the level of education of men without interrupting the advancement of women, and; improving the quality of education in general.

From the developments of this thesis, two paths for future work can be traced. Empirically, the changes incorporated into the model allow future work take into account gender differences in the labor market and its consequences for consumption and well-being of families in the analysis of public policies. Following the argument of "gender mainstreaming", even policies not directly linked to gender issues may contain gender biases, demanding that the differences between men and women are explicitly taken into account both in the formulation and in the evaluation of any public policy. Methodologically, the model can advance in the specification and supply of labor, so that aspects of individual decision to participate in the labor market can be considered endogenously.

## **References:**

ADAMS, P. D.; HORRIDGE, M.; WITTEWER, G. A Dynamic Multi-Regional Applied General Equilibrium Model of the Australian Economy, based on the MMR and MONASH Models. Melbourne: Center of Policy Studies, 2002.

- AKBULUT, R. Sectoral changes and the increase in women's labor force participation. *Macroeconomic Dynamics*, v. 15, n. 2, pp. 240-264, 2011.
- BELTRÃO, K. I.; ALVES, J. E. D. A reversão do hiato de gênero na educação brasileira no século XX. *Cadernos de Pesquisa*, v.39, n.136, pp. 125-156, 2009.
- BLECKER, R. A.; SEGUINO, S. Macroeconomic effects of reducing gender wage inequality in an export-oriented, semi-industrialized economy. *Review of Development Economics*, v. 6, n.1, pp. 103-119, 2002.
- BRAUNSTEIN, E. Neoliberal Development Macroeconomics: A Consideration of its Gendered Employment Effects. United Nations Research Institute for Social Development, 2012.
- COSTA, J.; SILVA, E.; VAZ, F. The role of gender inequalities in explaining income growth, poverty and inequality: evidence from Latin American countries. International Policy Centre for Inclusive Growth, 2009. (Working Paper No. 52)
- CORONG, E. L. Tariff elimination, gender and poverty in the Philippines: A computable general equilibrium (CGE) microsimulation analysis. Melbourne: Center of Policy Studies, 2014.
- DOMINGUES, E. P.; RESENDE, M. F. C.; MAGALHÃES, A. S.; BETARELLI JR., A. B. Cenário macroeconômico para a economia brasileira 2010-2025: repercussões no estado de Minas Gerais e seus municípios. Belo Horizonte: UFMG/CEDEPLAR, 2010. (Texto para Discussão, 383).
- DUFLO, E. Women Empowerment and Economic Development. *Journal of Economic Literature*, v. 50, n. 4, pp. 1051-1079, 2012.
- GALOR, O.; D. N. WEIL. The gender gap fertility and growth. *American Economic Review*, v. 86, n. 3, pp. 374-87, 1996.
- HARRISON, J.; HORRIDGE, M.; JERIE, M.; PEARSON, K. GEMPACK manual, GEMPACK Software, 2014.
- HORRIDGE, J.M. ORANIG-RD: A Recursive Dynamic Version of ORANI-G. Melbourne: Centre of Policy Studies, 2002.
- INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). Download. Estatísticas. Sistema de Contas Nacionais. Disponível em: <<http://ibge.gov.br/home/download/estatistica.shtm>>. Acesso em: março 2014a.
- INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). Download. Estatísticas. Pesquisa Nacional por Amostra de Domicílios. Disponível em: <<http://ibge.gov.br/home/download/estatistica.shtm>>. Acesso em: janeiro 2014b.
- INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). Download. Estatísticas. Pesquisa de Orçamento Familiar. Disponível em: <<http://ibge.gov.br/home/download/estatistica.shtm>>. Acesso em: janeiro 2014c.
- INSTITUTO DE PESQUISA EM ECONOMIA APLICADA (IPEA). IPEADATA: Banco de Dados do Instituto de Pesquisa em Economia Aplicada. Macroeconômico. 2014. Disponível em: <<http://www.ipeadata.gov.br>>. Acesso em: agosto de 2014.
- INTERNATIONAL LABOR OFFICE (ILO). The gender divide in skills development: progress, challenges and policy options for empowering women. Geneva: ILO – Skills and Employability Branch, 2014.
- INTERNATIONAL LABOUR OFFICE (ILO). World Development Indicators. Disponível em: <<http://data.worldbank.org/country/brazil>>. Acesso em: janeiro de 2015.
- KABEER, N.; ASSAAD, R.; DARKWAH, A.; MAHMUD, S.; SHOLKAMY, H.; TASNEEM, S.; TSIKATA, D.; SULAIMAN, M. Paid work, women's empowerment and inclusive growth: Transforming the structures of constraint. UN Women, 2013.
- KABEER, N.; NATALI, L. Gender Equality and Economic Growth: Is there a Win-Win? IDS Working Papers, pp. 1-58, 2013. (Working Paper 417)
- NGAI, L. R.; PETRONGOLO, B. Gender Gaps and the Rise of the Service Economy. IZA Discussion Paper Series, 2014. (IZA DP No. 8134)



- ÑOPO, H. New century old differences: gender and ethnic gaps in Latin America and Caribbean. Inter-American Development Bank: New York, 2012.
- OLIVETTI, C.; PETRONGOLO, B. Gender gaps across countries and skills: Demand, supply and the industry structure. *Review of Economic Dynamics*, v.17, n. 4, pp. 842-859, 2014.
- RENDALL, M. Structural change in developing countries: has it decreased gender inequality? *World Development*, v.45, pp. 1-16, 2013.
- RENDALL, M. The Service Sector and Female Market Work. Institute for Empirical Research in Economics University of Zurich, 2014. (Working Paper No. 492).
- SEGUINO, S. Gender inequality and economic growth: A cross-country analysis. *World Development*, v.28, n. 7, pp. 1211-1230, 2000.
- STANDING, G. Global feminization through flexible labor: A theme revisited. *World development*, v. 27, n. 3, pp. 583-602, 1999.
- UNITED NATIONS. 2005 World Summit Outcome. New York: United Nations, 2005. Disponível em: <<http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N05/487/60/PDF/N0548760.pdf?OpenElement>>. Acesso em: novembro de 2014.
- WITTWER, G. WAYANG: a general equilibrium model adapted for the Indonesian economy. Centre for International Economic Studies, 1999.
- WORLD BANK. World Development Report 2012: Gender Equality and Development. Washington DC: World Development Group, 2011.
- WORLD BANK. Gender at work: a companion to the World Development Report on Jobs. The World Bank Group, 2014.

Figures:

Figure 1 – CGE Model basic structure

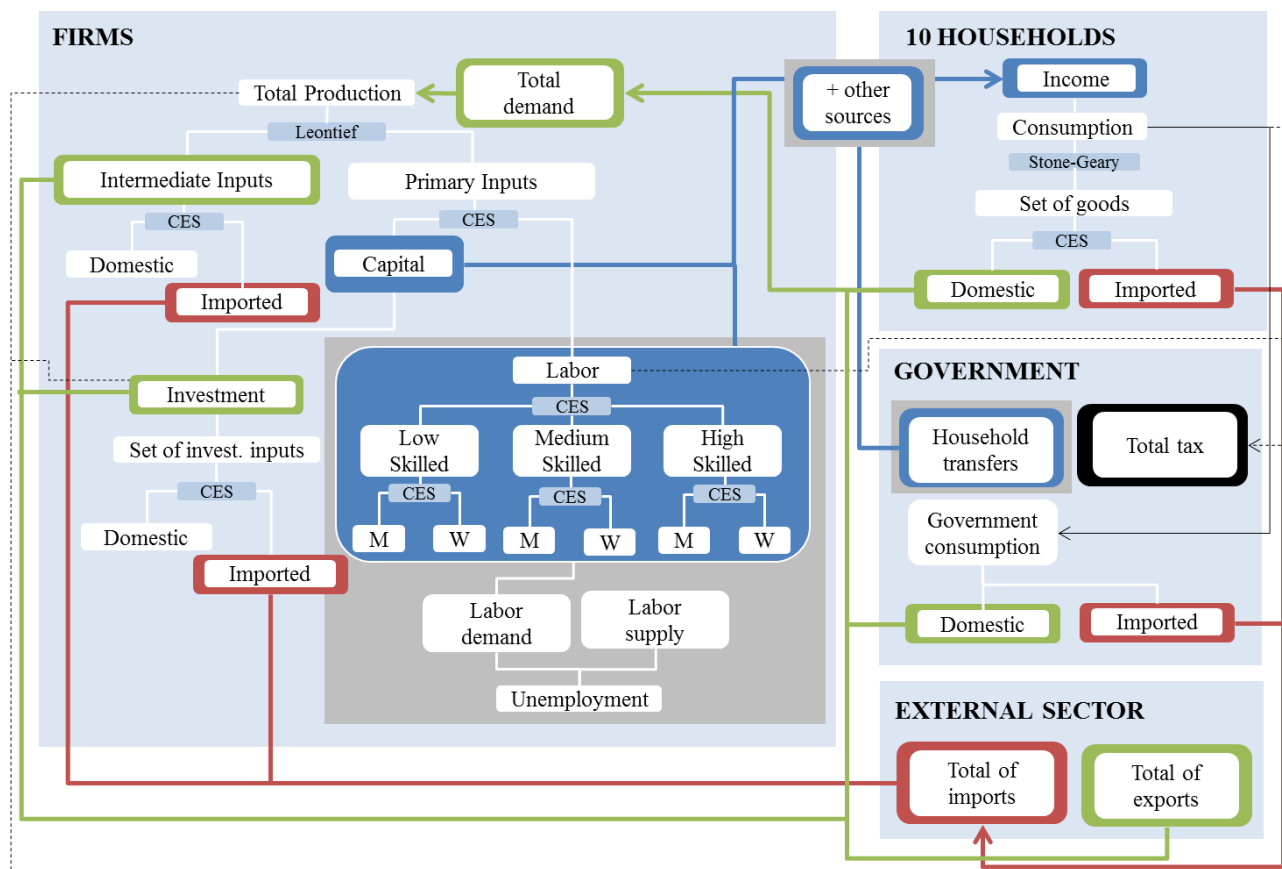
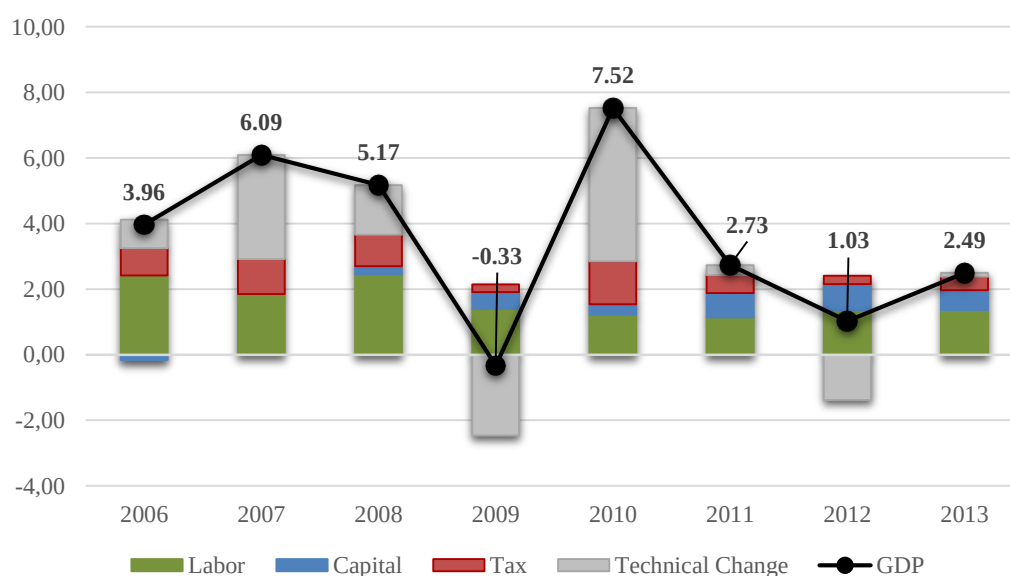
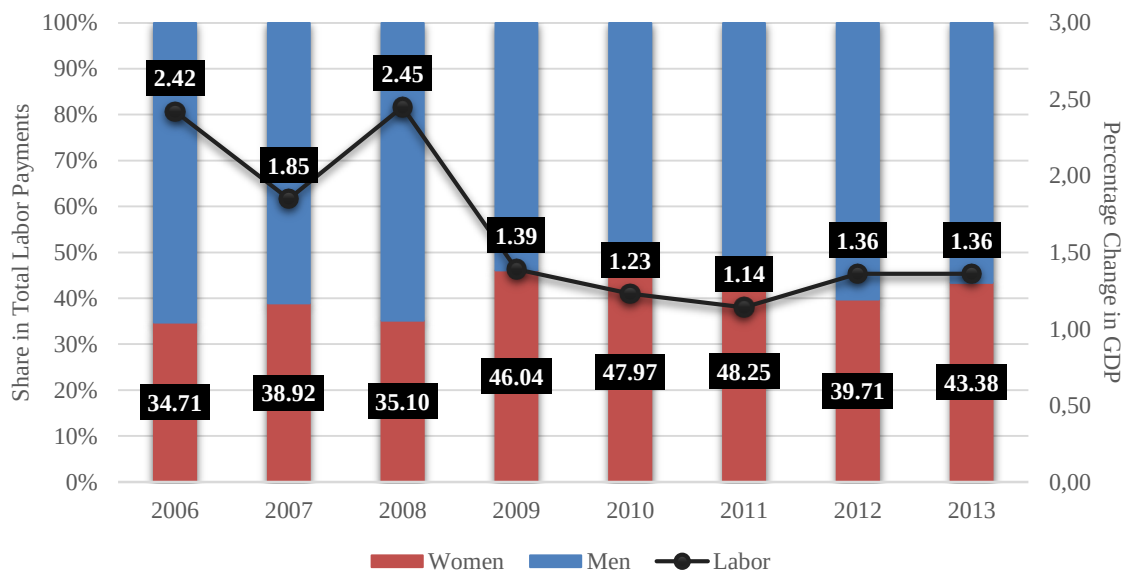


Figure 2 – Historical simulation results for GDP decomposition from the income side between 2006 and 2013



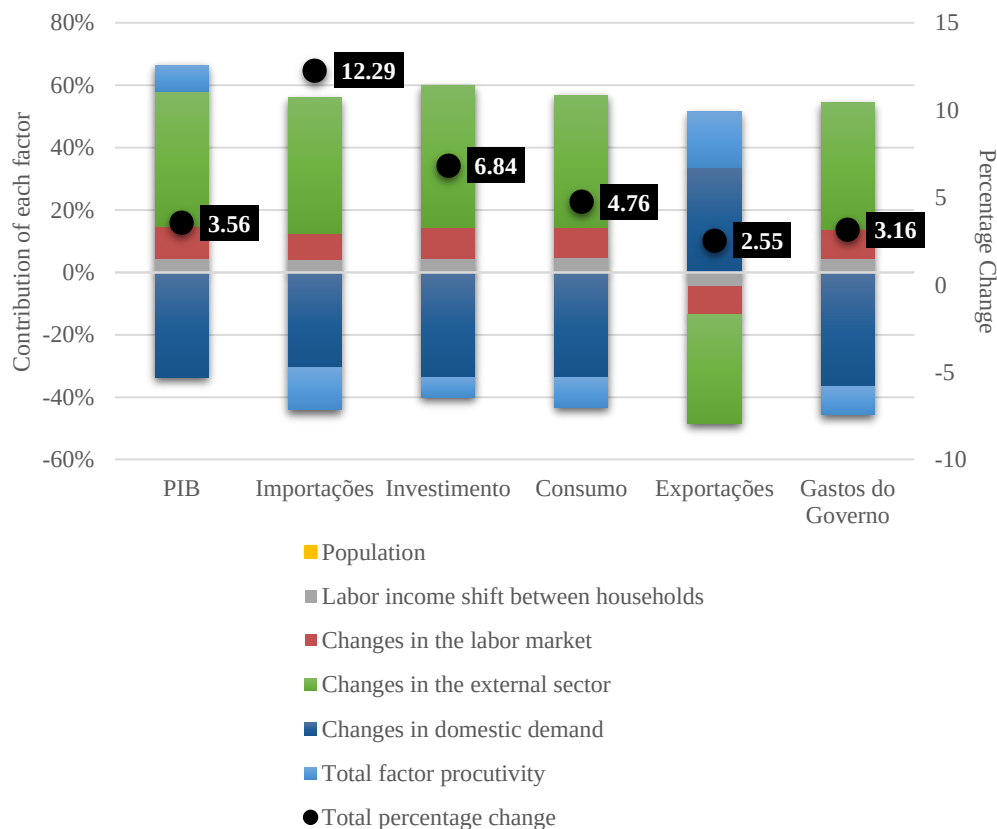
Source: Simulation results

Figure 3 – Historical simulation results for the contribution of labor (as a production factor) on GDP, by gender, between 2006 and 2013



Source: Simulation results

Figure 4 – Decomposition simulation results for macroeconomic aggregates on average percentage change for the period 2006-2013



Source: Simulation results

## Tables:

Table 1 – Swaps in historical and decomposition simulations

| Variables exogenous for historical simulations and endogenous for decomposition simulation |                                 | Variables exogenous for decomposition simulations and endogenous for historical simulation |                                     |
|--------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------|-------------------------------------|
| Variable                                                                                   | Description                     | Variable                                                                                   | Description                         |
| <i>x0gdpinc</i>                                                                            | GDP from income side            | <i>aprimtot</i>                                                                            | Primary factor productivity         |
| <i>x5tot</i>                                                                               | Government consumption          | <i>f5tot2</i>                                                                              | Shift in government consumption     |
| <i>x3tot</i>                                                                               | Household consumption           | <i>f3tot_h</i>                                                                             | Shift in household preferences      |
| <i>x2tot_i</i>                                                                             | Investment                      | <i>invslack</i>                                                                            | Investment slack                    |
| <i>x4</i>                                                                                  | Exports                         | <i>f4q</i>                                                                                 | Shift in exports                    |
| <i>p3tot</i>                                                                               | Consumer Price Index            | <i>phi</i>                                                                                 | Exchange rate                       |
| <i>x1lab</i>                                                                               | Labor usage                     | <i>a1lab</i>                                                                               | Technological change in labor usage |
| Exogenous and shocked in both simulations                                                  |                                 |                                                                                            |                                     |
| Variable                                                                                   | Description                     |                                                                                            |                                     |
| <i>q</i>                                                                                   | Population Growth               |                                                                                            |                                     |
| <i>xhoulab</i>                                                                             | Income shift between households |                                                                                            |                                     |

Source: Authors

Table 2 – Observed variables in the period 2006-2013 which received shock on historical simulation  
(annual percentage change)

|         | GDP   | Household Consumption | Government Consumption | Investment | Exports | Consumer Price Index | Import's prices | Population |
|---------|-------|-----------------------|------------------------|------------|---------|----------------------|-----------------|------------|
| 2006    | 3.96  | 5.20                  | 2.58                   | 9.77       | 5.04    | 3.14                 | 6.84            | 1.18       |
| 2007    | 6.09  | 6.07                  | 5.13                   | 13.85      | 6.20    | 4.46                 | 8.20            | 1.14       |
| 2008    | 5.17  | 5.67                  | 3.17                   | 13.57      | 0.55    | 5.90                 | 21.9            | 1.09       |
| 2009    | -0.33 | 4.44                  | 3.11                   | -6.72      | -9.12   | 4.31                 | -11.14          | 1.05       |
| 2010    | 7.53  | 6.94                  | 4.23                   | 21.33      | 11.52   | 5.91                 | 3.84            | 1.01       |
| 2011    | 2.73  | 4.09                  | 1.93                   | 4.72       | 4.49    | 6.50                 | 14.30           | 0.97       |
| 2012    | 1.03  | 3.22                  | 3.33                   | -4.01      | 0.48    | 5.84                 | 0.93            | 0.93       |
| 2013    | 2.49  | 2.55                  | 1.89                   | 5.18       | 2.53    | 5.91                 | -1.14           | 0.90       |
| Average | 3.56  | 4.76                  | 3.16                   | 6.84       | 2.55    | 5.24                 | 2.06            | 1.03       |

Source: Prepared from Ipeadata database (IPEA, 2014)

Table 3 – Average annual percentage change in hours worked by sector, gender and skills between 2005 and 2013, used as a shock in the historical simulation

| Nº | Sector                                               | Skill | Men   |        |       | Women  |        |       |
|----|------------------------------------------------------|-------|-------|--------|-------|--------|--------|-------|
|    |                                                      |       | Low   | Medium | High  | Low    | Medium | High  |
| 1  | Agriculture                                          |       | -3.91 | 6.21   | 8.20  | -5.13  | 6.32   | 9.86  |
| 2  | Mining                                               |       | -3.22 | 7.36   | 12.69 | -11.00 | 5.26   | 11.06 |
| 3  | Food and Beverage                                    |       | -3.40 | 6.38   | 7.97  | -2.76  | 4.30   | 10.09 |
| 4  | Textiles                                             |       | -2.42 | 5.53   | 7.37  | -4.04  | 2.83   | 11.13 |
| 5  | Articles of apparel and accessories                  |       | -0.08 | 6.18   | 5.14  | -1.45  | 4.60   | 9.04  |
| 6  | Leather goods and footwear                           |       | -8.29 | -0.77  | 5.98  | -5.87  | 1.94   | 2.89  |
| 7  | Perfumery, hygiene and cleaning                      |       | 1.41  | -1.87  | -1.88 | -2.04  | -1.58  | 5.75  |
| 8  | Metal products - except machinery and equipment      |       | -3.72 | 2.97   | 7.77  | -5.17  | 2.79   | 2.51  |
| 9  | Machinery and equipment                              |       | -1.83 | 0.76   | 4.04  | -8.38  | 1.18   | 2.03  |
| 10 | Electricity, gas, water, sewage and urban sanitation |       | -3.84 | 1.66   | 5.06  | -0.90  | -0.56  | 4.94  |
| 11 | Other industries                                     |       | -3.89 | 3.28   | 4.55  | -2.11  | 1.76   | 6.19  |
| 12 | Construction                                         |       | 3.63  | 12.15  | 11.01 | 4.02   | 9.73   | 10.39 |
| 13 | Retail                                               |       | -2.75 | 2.22   | 5.46  | -0.75  | 4.34   | 8.88  |
| 14 | Transportation, storage and mailing                  |       | 0.58  | 8.95   | 10.56 | -0.70  | 5.07   | 9.48  |
| 15 | Information Services                                 |       | 0.66  | 1.78   | 4.36  | 3.40   | -0.55  | 5.31  |
| 16 | Financial intermediation and insurance               |       | -5.44 | 1.10   | 5.97  | 1.32   | 2.49   | 6.74  |
| 17 | Real estate and rents                                |       | -3.18 | 4.74   | 12.02 | -1.85  | 5.60   | 15.17 |
| 18 | Maintenance and repair services                      |       | -0.64 | 6.36   | 12.55 | 1.18   | 4.69   | 9.16  |
| 19 | Accommodation and food services                      |       | -0.44 | 4.96   | 12.59 | 2.48   | 10.23  | 12.02 |
| 20 | Business services                                    |       | -3.30 | 4.06   | 7.20  | 2.69   | 8.37   | 9.51  |
| 21 | Private education                                    |       | -3.24 | 1.59   | 6.28  | -0.86  | 2.42   | 6.61  |
| 22 | Private health services                              |       | -4.96 | 4.68   | 3.40  | -4.10  | 3.94   | 6.50  |
| 23 | Other services                                       |       | -2.52 | 3.70   | 4.34  | -2.77  | 5.81   | 11.35 |
| 24 | Public education                                     |       | -4.07 | 3.24   | 9.10  | -7.24  | 0.43   | 7.81  |
| 25 | Public Health                                        |       | 1.66  | 8.94   | 9.21  | -2.03  | 7.90   | 12.04 |
| 26 | Public administration and social security            |       | -3.04 | 3.47   | 7.98  | -1.90  | 3.30   | 6.92  |

Source: Prepared from Nacional Household Survey (IBGE, 2014b)

Table 4 – Average annual percentage change in labor income by gender, skills and representative household between 2005 and 2013

| Household | Low-skilled |        | Medium-skilled |       | High-skilled |       |
|-----------|-------------|--------|----------------|-------|--------------|-------|
|           | Men         | Women  | Men            | Women | Men          | Women |
| H01       | -3.73       | -4.00  | 23.16          | 18.15 | 100.84       | 57.20 |
| H02       | -3.85       | -3.12  | 2.85           | 13.07 | 25.90        | 63.07 |
| H03       | -0.96       | -0.95  | 17.92          | 18.64 | 76.89        | 17.10 |
| H04       | -0.60       | -3.11  | 13.08          | 8.31  | -3.04        | 86.11 |
| H05       | -1.95       | 5.74   | 14.73          | 15.31 | 6.65         | 47.86 |
| H06       | 5.15        | -19.09 | 12.70          | -8.16 | 14.59        | 15.99 |
| H07       | -7.33       | 10.70  | 0.69           | 16.28 | 19.36        | 23.25 |
| H08       | -4.56       | 0.13   | 0.30           | 7.54  | -10.55       | 29.79 |
| H09       | -2.06       | 5.27   | 6.69           | -2.83 | 30.31        | -3.93 |
| H10       | -5.15       | 9.95   | 1.71           | 2.70  | 5.10         | 3.74  |

Source: Prepared from Nacional Household Survey (IBGE, 2014b)

Table 5 – Changes in sectorial composition between 2005 and 2013 (in % of total production)

| Nº Sector                                              | 2005(A) | 2013(B) | (B)-(A) | Difference in 2013 |
|--------------------------------------------------------|---------|---------|---------|--------------------|
| 1 Agriculture                                          | 5.13    | 5.13    | 0.00    | 28.18              |
| 2 Mining                                               | 2.82    | 2.52    | -0.31   | 14.35              |
| 3 Food and Beverage                                    | 6.79    | 6.65    | -0.15   | 25.50              |
| 4 Textiles                                             | 0.89    | 0.82    | -0.07   | 17.51              |
| 5 Articles of apparel and accessories                  | 0.74    | 0.81    | 0.07    | 40.11              |
| 6 Leather goods and footwear                           | 0.62    | 0.68    | 0.06    | 41.23              |
| 7 Perfumery, hygiene and cleaning                      | 0.46    | 0.49    | 0.03    | 36.38              |
| 8 Metal products - except machinery and equipment      | 1.40    | 1.41    | 0.02    | 29.79              |
| 9 Machinery and equipment                              | 1.60    | 1.82    | 0.22    | 45.78              |
| 10 Electricity gas, water, sewage and urban sanitation | 3.50    | 3.48    | -0.02   | 27.57              |
| 11 Other industries                                    | 22.20   | 19.74   | -2.47   | 14.00              |
| 12 Construction                                        | 4.43    | 5.66    | 1.23    | 63.96              |
| 13 Retail                                              | 7.77    | 8.28    | 0.51    | 36.71              |
| 14 Transportation, storage and mailing                 | 4.82    | 4.42    | -0.40   | 17.68              |
| 15 Information Services                                | 3.70    | 3.70    | 0.00    | 28.20              |
| 16 Financial intermediation and insurance              | 5.26    | 5.44    | 0.17    | 32.48              |
| 17 Real estate and rents                               | 4.65    | 4.55    | -0.11   | 25.34              |
| 18 Maintenance and repair services                     | 0.67    | 0.74    | 0.06    | 40.46              |
| 19 Accommodation and food services                     | 1.84    | 1.90    | 0.06    | 32.69              |
| 20 Business services                                   | 3.69    | 3.45    | -0.24   | 20.04              |
| 21 Private education                                   | 0.95    | 0.94    | -0.01   | 27.25              |
| 22 Private health services                             | 1.74    | 2.03    | 0.29    | 49.92              |
| 23 Other services                                      | 2.89    | 3.93    | 1.04    | 74.23              |
| 24 Public education                                    | 2.09    | 2.09    | 0.00    | 28.31              |
| 25 Public Health                                       | 1.55    | 1.54    | -0.01   | 27.56              |
| 26 Public administration and social security           | 7.78    | 7.78    | 0.00    | 28.10              |

Source: Simulation results.

Table 6 – Decomposition simulation results for changes in the labor market on the national GDP (average % for the period 2006-2013)

| Nº    | Sector                                               | Men   |        |       |       | Women |        |      |       | Total |
|-------|------------------------------------------------------|-------|--------|-------|-------|-------|--------|------|-------|-------|
|       |                                                      | Low   | Medium | High  | Total | Low   | Medium | High | Total |       |
| 1     | Agriculture                                          | -0.30 | 0.01   | 0.00  | -0.29 | -0.02 | 0.00   | 0.00 | -0.02 | -0.31 |
| 2     | Mining                                               | -0.02 | 0.04   | 0.02  | 0.04  | 0.00  | 0.00   | 0.00 | 0.01  | 0.05  |
| 3     | Food and Beverage                                    | -0.07 | 0.02   | 0.00  | -0.04 | -0.02 | 0.00   | 0.00 | -0.02 | -0.06 |
| 4     | Textiles                                             | -0.01 | 0.00   | 0.00  | -0.01 | -0.01 | 0.00   | 0.00 | -0.01 | -0.01 |
| 5     | Articles of apparel and accessories                  | 0.00  | 0.00   | 0.00  | 0.00  | -0.02 | 0.00   | 0.00 | -0.02 | -0.02 |
| 6     | Leather goods and footwear                           | -0.04 | 0.00   | 0.00  | -0.04 | -0.02 | 0.00   | 0.00 | -0.02 | -0.07 |
| 7     | Perfumery, hygiene and cleaning                      | 0.00  | 0.00   | 0.00  | -0.01 | 0.00  | 0.00   | 0.00 | 0.00  | -0.01 |
| 8     | Metal products - except machinery and equipment      | -0.04 | 0.00   | 0.00  | -0.03 | 0.00  | 0.00   | 0.00 | 0.00  | -0.04 |
| 9     | Machinery and equipment                              | -0.02 | -0.02  | 0.00  | -0.04 | 0.00  | 0.00   | 0.00 | 0.00  | -0.04 |
| 10    | Electricity, gas, water, sewage and urban sanitation | -0.05 | 0.00   | 0.01  | -0.05 | 0.00  | 0.00   | 0.00 | 0.00  | -0.06 |
| 11    | Other industries                                     | -0.13 | 0.06   | 0.02  | -0.04 | -0.01 | 0.01   | 0.01 | 0.01  | -0.03 |
| 12    | Construction                                         | -0.24 | 0.06   | 0.01  | -0.17 | 0.00  | 0.00   | 0.00 | 0.00  | -0.17 |
| 13    | Retail                                               | -0.28 | -0.02  | 0.02  | -0.28 | -0.06 | 0.04   | 0.02 | 0.00  | -0.28 |
| 14    | Transportation, storage and mailing                  | -0.01 | 0.03   | 0.00  | 0.01  | 0.00  | 0.00   | 0.00 | 0.00  | 0.01  |
| 15    | Information Services                                 | -0.01 | -0.01  | 0.01  | -0.01 | 0.00  | -0.01  | 0.00 | 0.00  | -0.01 |
| 16    | Financial intermediation and insurance               | -0.02 | -0.04  | 0.04  | -0.02 | 0.00  | -0.01  | 0.02 | 0.01  | -0.01 |
| 17    | Real estate and rents                                | -0.03 | 0.01   | 0.01  | 0.00  | 0.00  | 0.00   | 0.01 | 0.01  | 0.00  |
| 18    | Maintenance and repair services                      | -0.03 | 0.01   | 0.00  | -0.03 | 0.00  | 0.00   | 0.00 | 0.00  | -0.03 |
| 19    | Accommodation and food services                      | -0.02 | 0.00   | 0.00  | -0.02 | 0.00  | 0.01   | 0.00 | 0.01  | -0.01 |
| 20    | Business services                                    | -0.04 | 0.03   | 0.07  | 0.06  | 0.00  | 0.03   | 0.04 | 0.08  | 0.14  |
| 21    | Private education                                    | 0.00  | 0.00   | 0.00  | -0.01 | 0.00  | 0.00   | 0.00 | 0.00  | -0.01 |
| 22    | Private health services                              | -0.01 | 0.00   | -0.01 | -0.01 | -0.02 | 0.00   | 0.01 | -0.01 | -0.03 |
| 23    | Other services                                       | -0.03 | 0.00   | 0.00  | -0.03 | -0.15 | 0.00   | 0.00 | -0.16 | -0.18 |
| 24    | Public education                                     | -0.02 | 0.01   | 0.15  | 0.14  | -0.13 | -0.07  | 0.38 | 0.19  | 0.33  |
| 25    | Public Health                                        | 0.00  | 0.06   | 0.18  | 0.24  | -0.03 | 0.12   | 0.35 | 0.44  | 0.68  |
| 26    | Public administration and social security            | -0.37 | 0.29   | 0.80  | 0.72  | -0.06 | 0.12   | 0.48 | 0.54  | 1.26  |
| Total |                                                      | -1.79 | 0.55   | 1.33  | 0.09  | -0.58 | 0.25   | 1.34 | 1.01  | 1.11  |

Source: Simulation results

Table 7 – Simulating decomposition results for the effect of changes in the labor market on consumption, on average percentage change for the period 2006-2013

|     | Consumption | Labor<br>income<br>changes<br>between<br>households | Changes in<br>labor<br>usage | Men           |                  |                | Women         |                  |                |
|-----|-------------|-----------------------------------------------------|------------------------------|---------------|------------------|----------------|---------------|------------------|----------------|
|     |             |                                                     |                              | Low-<br>Skill | Medium-<br>skill | High-<br>skill | Low-<br>Skill | Medium<br>-skill | High-<br>skill |
| H01 | 1.13        | 0.88                                                | -0.12                        | -8.26         | 1.80             | 4.24           | -2.87         | 0.79             | 4.18           |
| H02 | 1.64        | 1.33                                                | 0.00                         | -8.34         | 1.92             | 4.30           | -2.96         | 0.84             | 4.24           |
| H03 | 2.33        | 1.96                                                | 0.12                         | -8.44         | 2.01             | 4.40           | -3.08         | 0.88             | 4.35           |
| H04 | 3.28        | 2.45                                                | 0.65                         | -8.24         | 2.09             | 4.51           | -3.07         | 0.92             | 4.44           |
| H05 | 3.66        | 2.61                                                | 0.97                         | -8.25         | 2.21             | 4.59           | -3.08         | 0.97             | 4.53           |
| H06 | 1.83        | 0.26                                                | 1.36                         | -7.72         | 2.19             | 4.42           | -2.84         | 0.93             | 4.38           |
| H07 | 6.04        | 4.19                                                | 1.80                         | -8.03         | 2.41             | 4.70           | -2.95         | 1.01             | 4.66           |
| H08 | 4.21        | 1.69                                                | 2.58                         | -7.86         | 2.51             | 4.84           | -2.76         | 1.06             | 4.79           |
| H09 | 5.16        | 1.67                                                | 3.76                         | -7.73         | 2.70             | 5.13           | -2.59         | 1.10             | 5.15           |
| H10 | 6.25        | 0.75                                                | 6.17                         | -7.58         | 2.69             | 6.48           | -2.44         | 1.07             | 5.95           |

Source: Simulation results