DEMOGRAPHIC TRANSITION: THE IMPACT ON BRAZILIAN LABOR MARKET

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Demographic changes are affecting direct and/or indirectly the world economy. In Brazil, according to the United Nations (2015) data, the population over 65 years old represented 7.8% of the total population in 2015, and the forecast is that by the year 2030 this frame will reach 13.5%. With this relative increase in the elderly population and fall of the young population, the hypothesis is that an impact occur in the labor market. To capture these changes in the economy, a computable general equilibrium model will be used, which will allow us to capture the sectoral impacts that demographic changes causes in the Brazilian labor market. The MID-BR (Labour market-Immigration-Demography- Brazil) model divided the work force in three skill levels (low, medium and high) and four age groups (young, adult, mature and old) in 62 sectors of the Brazilian economy. With imperfect substitutability between workers was possible to carry out simulations in order to capture the effects that the demographic transition causes in the Brazilian economy. The results shows that even if the labor growth were homogeneous, as the simulation was carried out, the young workers would be the segment with lower wage losses. The opposite would be the case of older workers, such as the mature and the elderly, who are the fastest growing in the country.

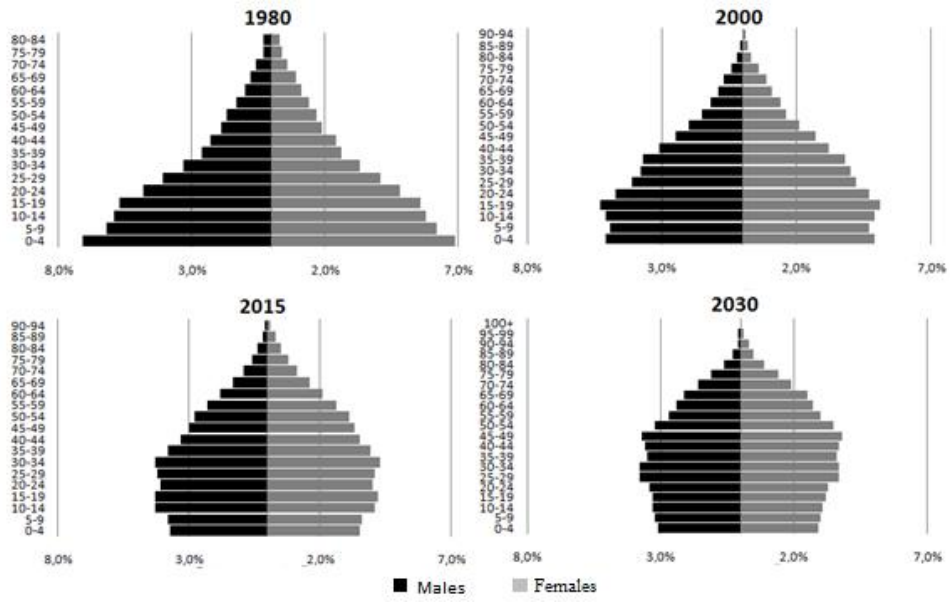
Keywords: demographic transition, labour market, computable general equilibrium

1. INTRODUCTION

A demographic transition is a challenges of many coutries. In Brazil, according to the United Nations (2015) data, the population over 65 years old represented 7.8% of the total population in 2015, and the forecast is that by the year 2030 this frame will reach 13.5%. With a relative increase in the elderly population and a fall in the young population, the hypothesis is that an impact will occur in the labor market.

The Figure 1 show the population pyramids for Brazil in different year. We can see in 1980 an expansive pyramid, which represents greater numbers of people in the younger age categories. This occurs in many developing countries where birth rates are high, but conditions are harsh, and life expectancy is short. In 2030, the previsions show a stationary pyramid, which roughly equal numbers of people in all age categories, with a tapering towards the older age categories.

Figure 1 – Population pyramid (Brazil)

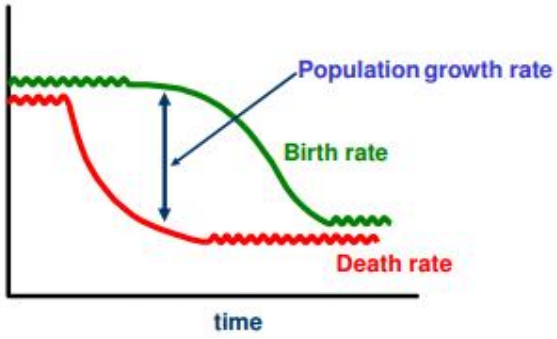


Source: United Nations (2015).

As a result of these rapidly declines in the projected younger age categories, the process of transition demographic will be strong impact in economy. Demographic transition is one of the major issues in population studies. The subject in this theory is that how populations with high birth and death rate and consequently low natural population growth (old balance) will shift to a new situation with low birth and death

rates and yet low natural population growth (new balance) (Hosseini, 2012). The Figure 2 shows the process of demographic transition.

Figure 2- Demographic Transition



Source: Bloom (2014).

To capture these changes in the economy, a computable general equilibrium model was used. It was possible analyze the age groups that wages decrease and the sectors that increase labor factor.

2. DESCRIPTION OF THE MODEL

The model used was called MID-BR (Labor Market-Immigration-Demography-Brazil) which follows the ORANI models (Dixon et al., 1982) of the Johansen type (1960), in which the solutions of the equations are given in form of growth rate. The model is composed of 62 Brazilian productive sectors that produce one or more of the 128 products from the combination of different inputs and the Brazilian input matrix of the year 2011 was used. The matrix was estimate by Betarelli Junior, Perobelli e Vale (2015) using National accounts in IBGE (2015).

The final demand is made up of investors, families, foreign consumers, government and stock variation. The margins, which have the function of facilitating the flow of domestic production, are composed of 4 types and there are three types of indirect taxes. For production, capital, land and labor are used, which may be Brazilian or foreign, as primary inputs and intermediate inputs may be of domestic or imported origin. In the composition of the primary factor there is also an imperfect substitution via price, following Armington's hypothesis (1969), controlled by a technology by function CES (Constant Elasticity of Substitution) between capital, labor and land.

There is also a substitution between the labor factor that also follows the CES function among workers of different schooling and age group, being, in this way, possible to capture the effect in the Brazilian economy of Brazilian demographic change

It was necessary to calibrate the model with the different substitution elasticities between Brazilian workers of different age groups and schooling for the 62 sectors analyzed. To do this, the first step was to subdivide the work force into three qualification levels (low, medium and high) and four age groups (young, adult, mature and elderly) in order to calculate the elasticity of substitution of Brazilian workers in 62 sectors using the econometric methodology proposed by Das (2003).

In order to find the workers' elasticity of substitution, the RAIS-Migra database was used, which is a database extracted from the Annual Social Information Relation (RAIS) of the Ministry of Labor and Employment (MTE). The variables used were the worker's income, main activity, besides age and schooling, and the years chosen were between 1997 and 2008, the latter being available. Due to the large number of information contained in the database, a random sample of 10% was used, with the withdrawal of individuals who in one year did not have any of the mentioned variables. In Appendix, we reports results[1] in Figures 3, 4 and 5.With diferentes elasticity by age groups, we can see the demographic effects in simulation used in model MID-BR.

How demographics transitions are a process slow, we decided to do long run simulation. So, we will analyse the effect in economy with increase labour force by different groups.

3. SIMULATION RESULTS

As a first result it was possible to perceive that the workers present different degrees of substitution, for the different sectors, schooling and age group. In general, it was observed that the young workers have the lowest elasticity of substitution, while the mature ones obtained the highest elasticities. These results show the greater vulnerability of mature workers to being replaced by other age groups. In addition, the result points out that there is an imperfect substitutability among workers and that the demographic transition tends to deepen this effect over the years

[1] More details in Pereira (2017).

After the MID-BR (Labor Market-Immigration-Demography-Brazil) model was calibrated, it was possible to carry out simulations in order to capture the effects that the demographic transition causes in the Brazilian economy. Two studies were carried out, the first being the addition of 1% of the Brazilian labor factor in a homogeneous way. Table 1 shows the effect of the variation in the labor price according to the age groups.

Table 1 - Effects on labor prices after the 1% increase in the Brazilian labor factor (values in percentage variation)

Age Groups	Variation in the price of labor
Young	-1.59
Adult	-1.71
Mature	-1.89
Elderly	-2.10

Source: Own elaboration.

As observed, the uniform increase of workers did not lead to similar variations in the labor price among the age groups, showing, in this case, that the share of older workers had the greatest negative impact on wages. These results take into account the substitution elasticities among the workers calculated in this article. With the demographic transition that the country undergoes, this result shows that even if the labor growth were homogeneous, as the simulation was carried out, the young workers would be the segment with lower wage losses. The opposite would be the case of older workers, such as the mature and the elderly, who are the fastest growing in the country

The second study had as main objective to compare the influence of workers' schooling on the economy. For this, three simulations were performed and a separate shock of 1% in the labor factor was given in each one of the schooling. It was observed that the increase of 1% of workers with low schooling added 0.2% to the Brazilian GDP. When the increase was for workers of average schooling, the GDP increased by 0.31% and 0.34% for the high. It should be noted that the percentage of low-educated workers, according to RAIS, is 43.3%, 43.7% for the average and 13% for high-income workers. In this way, it was observed that a lower absolute number of highly educated workers leads to greater economic growth in the Brazilian economy. Table 2 shows the effect of the variation in the labor force according to the qualification groups.

Table 2 – Effects on economy after the 1% increase in the Brazilian labor factor by qualification (values in percentage variation)

	Qualification		
	Low	**Medium**	**High**
Aggregated factors (prices)			
Primary fator	-0.40	-0.56	-0.42
Land	-0.16	1.19	1.21
Capital	-0.42	-0.43	-0.07
Age groups:			
Young	-0.43	-0.78	0.25
Adult	-0.44	-0.78	-0.46
Mature	-0.43	-0.48	-0.95
Elderly	-0.38	-0.41	-1.48
Aggregated factors			
Primary fator	0.20	0.31	0,35
Age groups:			
Young	0.20	0.62	0.16
Adult	0.19	0.38	0.40
Mature	0.22	0.27	0.48
Elderly	0.24	0.19	0.55
Real Expenditure-side GDP			
Consumption	0.08	0.15	0.23
Investment	0.04	0.05	0.05
Government	0.02	0.04	0.07
Stocks	0.00	0.01	0.00
Exports	0.04	0.05	0.01
Imports	0.00	0.00	-0.03
GDP	0.20	0.31	0.34

Source: Own elaboration.

The paper shows the new distribution of workers by sector after increase of labor force by qualification. In Figure 6, the distribution after increase 1% to low skills. The Figure 7, the new distribution when shocks happens in medium skills and Figure 8 to high qualification.

In Figure 6, when increase labor force with low qualification, the primary sectors concentration the higher growth rates. To medium skills, the growth rates are more homogeneous, and for high qualification, the terciary sectores concentration the higher growth rates.

In Figures 9, 10 and 11 we analyze the wage of workers by sector. In Figure 9, the shocks happens in low skills. In Figure 10 to medium and Figure 11 to high

qualification. Every results of this figures have to be analized simultaneals with elasticity of substituion that are shows in Figures 3, 4 and 5. This happen because the shocks affects the distribution of labour fator, and his distribution depends some factores like the elasticity of differentes qualification and age groups.

4. CONCLUSIONS

A demographic transition is a challenges of many coutries. The changes of demographic may provided favorable potential conditions for economic growth. But some age groups are be affedted by diferentes ways.

This paper used a Computable Geral Equilibriun models to analizy how a demographic transition will affect the brazilian labour Market. Whith diferentes elasticities of substituion by age groups, the MID-BR (Labor Market-Immigration-Demography-Brazil) model captures the effects of demographics changes in economy.

The results of simulation shows that the young workers would be the segment with lower wage losses. The opposite would be the case of older workers, such as the mature and the elderly, who are the fastest growing in the country.

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Appendix:

Figure 3- Elasticity of substitution between low skilled by age groups

Sectors	Age groups			
	Young	Adult	Mature	Elderly
1. Agriculture	0,552 **	0,315 ***	0,585 ***	0,489
2. Livestock	0,501 ***	0,261 ***	0,528 ***	0,489
3. Forestry and fishery	0,484	0,338 ***	0,530 ***	0,489
4. Mining and quarrying	0,462 ***	0,529	0,524 ***	0,507 *
5. Meat products.	0,484	0,529	0,543 ***	0,489
6. Manufacture and refining of sugar	0,484	0,403 ***	0,594 *	0,524 ***
7. Manufacture of food products	0,490 ***	0,513 ***	0,606 ***	0,601 **
8. Manufacture of beverages	0,549 ***	0,529	0,521 ***	0,470 ***
9. Manufacture of tobacco products	0,420 ***	0,406 ***	0,452 ***	0,326 ***
10. Manufacture of textiles	0,474 ***	0,529	0,541 ***	0,495 ***
11. Manufacture wearing apparel	0,487 ***	0,399 ***	0,523 ***	0,489
12. Manufacture leather products	0,501 ***	0,448 ***	0,528 ***	0,489
13. Manufacture of wood and of products of wood and cork	0,475 ***	0,424 ***	0,540 ***	0,489
14. Manufacture of paper and paper products	0,523 ***	0,450 **	0,560 ***	0,481 ***
15. Printing and reproduction of recorded media	0,507 ***	0,515 **	0,592 ***	0,489
16. Manufacture of coke and refined petroleum products	0,523 ***	0,439 ***	0,387 ***	0,442 ***
17.Manufacture of biofuels	0,438 ***	0,460 ***	0,608 ***	0,489
18. Manufacture of chemicals and chemical products	0,487 ***	0,572 ***	0,559 ***	0,423 ***
19. Manufacture of other chemical products	0,569 ***	0,367 ***	0,562 ***	0,392 ***
20. Manufacture of cleaning products and cosmetics	0,510 ***	0,529	0,574 ***	0,629 *
21. Manufacture of basic pharmaceutical products	0,460 ***	0,529	0,664 ***	0,573 ***
22. Manufacture of rubber and plastic products	0,494 ***	0,529	0,540 ***	0,558 **
23. Manufacture of other non-metallic mineral products	0,521 ***	0,428 ***	0,555 ***	0,489
24. Manufacture of basic metals	0,488 ***	0,441 ***	0,488 ***	0,399 ***
25. Metallurgy of nonferrous metals	0,612 ***	0,529	0,549 ***	0,489
26. Manufacture of fabricated metal products, except equipment	0,533 ***	0,529	0,572 ***	0,489 ***
27. Manufacture of computer, electronic and optical products	0,500 ***	0,481 ***	0,552 ***	0,461 ***
28. Manufacture of electrical equipment	0,444 ***	0,440 **	0,537 ***	0,535 ***
29. Manufacture of machinery and equipment n.e.c.	0,515 ***	0,400 *	0,539 ***	0,489 ***
30. Manufacture of motor vehicles, trailers and semi-trailers	0,644 *	0,461 ***	0,498 ***	0,574 ***
31. Repair and installation of machinery and equipment	0,474 ***	0,525 ***	0,515 ***	0,471 ***
32. Manufacture of other transport equipment	0,548 ***	0,497 **	0,590 ***	0,494 ***
33. Manufacture of furniture; other manufacturing	0,487 ***	0,443 ***	0,573 ***	0,489
34. Electricity, gas, steam and air conditioning supply	0,539 ***	0,377 ***	0,473 ***	0,409 ***
35. Water collection, treatment and supply	0,484	0,432 **	0,593	0,489
36. Construction	0,496 ***	0,372 **	0,614 ***	0,489
37. Wholesale and retail trade and repair of motor vehicles and motor	0,501 ***	0,391 ***	0,574 ***	0,489
38. Wholesale trade, except of motor vehicles and motorcycles	0,505 ***	0,429 ***	0,561 ***	0,489
39. Land transport	0,482 ***	0,529	0,565 ***	0,593 *
40. Water transport	0,414 ***	0,517 ***	0,573 ***	0,495 **
41. Air transport	0,385 ***	0,363 ***	0,518 ***	0,348 ***
42. Warehousing and support activities for transportation	0,456 *	0,468 **	0,553 ***	0,395 ***
43. Accommodation	0,506 ***	0,529	0,542 ***	0,489
44. Food service	0,489 ***	0,368 ***	0,539 ***	0,602 *
45. Publishing activities	0,475 ***	0,489 **	0,550 ***	0,469 ***
46. Motion picture, video and television programme production	0,409 ***	0,514 ***	0,583 ***	0,557 ***
47. Telecommunications	0,326 ***	0,341 ***	0,455 ***	0,316 ***
48. Computer programming, consultancy and related activities	0,510 ***	0,529 ***	0,609 ***	0,490 ***
49. Financial service activities	0,566 ***	0,520 ***	0,666 ***	0,558 ***
50. Real estate activities	0,447 ***	0,635 ***	0,574 ***	0,551 **
51. Legal and accounting activities; management consultancy activities	0,556 ***	0,501 **	0,653 ***	0,582 ***
52. Architectural and engineering activities; testing and analysis	0,567 **	0,531 **	0,581 ***	0,489
53. Scientific research and development	0,542 ***	0,595 ***	0,590 ***	0,638 ***
54. Non-real estate rents	0,540 ***	0,529	0,558 ***	0,489
55. Administrative and support service activities	0,476 ***	0,529	0,546 ***	0,489
56. Surveillance and security activities	0,468 ***	0,641 ***	0,497 ***	0,489
57. Public administration and defence; compulsory social security	0,368 ***	0,481 ***	0,476 ***	0,511 **
58. Education	0,484 ***	0,349 ***	0,538 ***	0,408 ***
59. Human health	0,492 ***	0,541 ***	0,586 ***	0,542 **
60. Artistic activities	0,658 ***	0,529	0,592 ***	0,489
61. Social work activities	0,448 ***	0,529	0,622 ***	0,489
62. Activities of households as employers	0,521 ***	0,565 *	0,433 ***	0,601 **

σ=1/1-ρ; ***, ** and * represent respectively statistical significance at the 1%, 5% and 10% levels.

Source: Own elaboration.

Figure 4- Elasticity of substitution between medium skilled by age groups

Sectors	Age groups			
	Young	Adult	Mature	Elderly
1. Agriculture	0,292 ***	0,397 ***	0,401 ***	0,484 *
2. Livestock	0,590 *	0,488 ***	0,818 *	0,509
3. Forestry and fishery	0,471 ***	0,466 ***	0,701 *	0,317 ***
4. Mining and quarrying	0,507 ***	0,285 ***	0,423 ***	0,572 *
5. Meat products.	0,379 ***	0,483	0,591 **	0,338 ***
6. Manufacture and refining of sugar	0,458 ***	0,483	0,591 **	0,497 ***
7. Manufacture of food products	0,500 **	0,659 **	0,736 **	0,509
8. Manufacture of beverages	0,490	0,531 **	0,543 ***	0,426 ***
9. Manufacture of tobacco products	0,490	0,483	0,518 ***	0,693 ***
10. Manufacture of textiles	0,459 *	0,585 ***	0,584	0,443 **
11. Manufacture wearing apparel	0,501 *	0,432 ***	0,720 ***	0,509
12. Manufacture leather products	0,517 **	0,460 ***	0,584	0,374 ***
13. Manufacture of wood and of products of wood and cork	0,452 ***	0,508 ***	0,734 **	0,541 *
14. Manufacture of paper and paper products	0,428 **	0,483	0,538 ***	0,386 ***
15. Printing and reproduction of recorded media	0,416 **	0,511 **	0,629 ***	0,509
16. Manufacture of coke and refined petroleum products	0,515 ***	0,532 ***	0,549 ***	0,747 **
17.Manufacture of biofuels	0,483 ***	0,643 **	0,722 ***	0,362 ***
18. Manufacture of chemicals and chemical products	0,661 **	0,304 ***	0,383 ***	0,424 ***
19. Manufacture of other chemical products	0,526 *	0,483	0,553 ***	0,446 *
20. Manufacture of cleaning products and cosmetics	0,508 **	0,454 ***	0,661 ***	0,649 *
21. Manufacture of basic pharmaceutical products	0,373 ***	0,483	0,685 *	0,509
22. Manufacture of rubber and plastic products	0,489 **	0,502 **	0,584	0,509
23. Manufacture of other non-metallic mineral products	0,490	0,422 **	0,584	0,509
24. Manufacture of basic metals	0,490	0,469 ***	0,526 ***	0,360 ***
25. Metallurgy of nonferrous metals	0,392 ***	0,483	0,561 ***	0,439 ***
26. Manufacture of fabricated metal products, except equipment	0,490	0,486 **	0,664 **	0,509
27. Manufacture of computer, electronic and optical products	0,490	0,374 ***	0,584	0,536 *
28. Manufacture of electrical equipment	0,490	0,529 *	0,688 *	0,509
29. Manufacture of machinery and equipment n.e.c.	0,417 **	0,419 **	0,611 ***	0,580 *
30. Manufacture of motor vehicles, trailers and semi-trailers	0,511 ***	0,497 *	0,665 **	0,333 ***
31. Repair and installation of machinery and equipment	0,465 *	0,483	0,584	0,427 **
32. Manufacture of other transport equipment	0,428 ***	0,413 ***	0,493 ***	0,450 ***
33. Manufacture of furniture; other manufacturing	0,492 ***	0,481 ***	0,750 ***	0,509
34. Electricity, gas, steam and air conditioning supply	0,490	0,378 ***	0,366 ***	0,419 ***
35. Water collection, treatment and supply	0,581 ***	0,448 ***	0,464 ***	0,509
36. Construction	0,501 **	0,334 ***	0,584	0,509
37. Wholesale and retail trade and repair of motor vehicles and motor	0,490	0,483	0,653 ***	0,509
38. Wholesale trade, except of motor vehicles and motorcycles	0,449 **	0,443 ***	0,743 ***	0,509
39. Land transport	0,490	0,462 **	0,700 *	0,509
40. Water transport	0,337 ***	0,481 ***	0,620 **	0,381 ***
41. Air transport	0,412 ***	0,431 ***	0,542 ***	0,418 ***
42. Warehousing and support activities for transportation	0,489 ***	0,462 **	0,452 *	0,481 **
43. Accommodation	0,490	0,483	0,666 ***	0,509
44. Food service	0,430 ***	0,500 ***	0,603 ***	0,514 *
45. Publishing activities	0,383 ***	0,483	0,548 ***	0,401 ***
46. Motion picture, video and television programme production	0,211 ***	0,415 ***	0,503 ***	0,533 *
47. Telecommunications	0,445 ***	0,347 ***	0,553 ***	0,601 *
48. Computer programming, consultancy and related activities	0,379 ***	0,511 ***	0,623 ***	0,591 ***
49. Financial service activities	0,472 ***	0,428 ***	0,524 ***	0,421 ***
50. Real estate activities	0,474 ***	0,637 **	0,620 ***	0,509
51. Legal and accounting activities; management consultancy activities	0,490	0,483	0,682 ***	0,509 **
52. Architectural and engineering activities; testing and analysis	0,465 **	0,576 *	0,584	0,500 **
53. Scientific research and development	0,459 **	0,588 ***	0,631 **	0,579 **
54. Non-real estate rents	0,507 ***	0,602 **	0,758 **	0,483 **
55. Administrative and support service activities	0,490	0,357 *	0,746 ***	0,509
56. Surveillance and security activities	0,458 ***	0,483	0,552 ***	0,555 *
57. Public administration and defence; compulsory social security	0,464 ***	0,385 ***	0,517 ***	0,509
58. Education	0,377 ***	0,291 ***	0,521 ***	0,509
59. Human health	0,444 ***	0,483	0,629 ***	0,509
60. Artistic activities	0,510 **	0,483	0,720 ***	0,509
61. Social work activities	0,377 ***	0,483	0,635 ***	0,509
62. Activities of households as employers	0,443 ***	0,417 ***	0,573 ***	0,593 ***

σ=1/1-ρ; ***, ** and * represent respectively statistical significance at the 1%, 5% and 10% levels.

Source: Own elaboration.

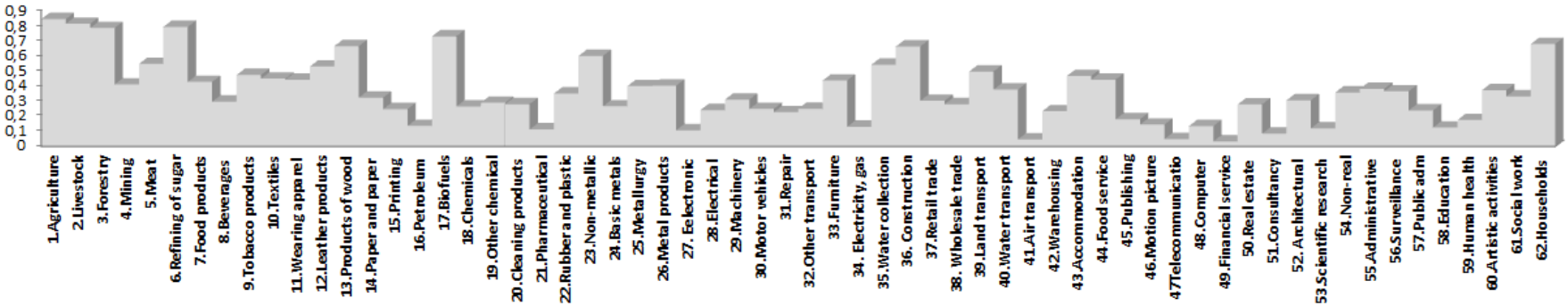
Figure 5- - Elasticity of substitution between High skilled by age groups

Sectors	Age groups			
	Young	Adult	Mature	Elderly
1. Agriculture	0,357 ***	0,360 ***	0,491 ***	0,484 *
2. Livestock	0,314 ***	0,549 *	0,515	0,518 ***
3. Forestry and fishery	0,436 ***	0,456 ***	0,515	0,325 ***
4. Mining and quarrying	0,411 ***	0,475 ***	0,541 *	0,448 *
5. Meat products.	0,448 ***	0,350 ***	0,595 **	0,507
6. Manufacture and refining of sugar	0,454 ***	0,494 ***	0,622 **	0,621 *
7. Manufacture of food products	0,496 **	0,501	0,515	0,507
8. Manufacture of beverages	0,519 ***	0,501	0,591 **	0,527 ***
9. Manufacture of tobacco products	0,463 ***	0,645 *	0,549 *	0,507
10. Manufacture of textiles	0,532 ***	0,333 ***	0,515	0,410 ***
11. Manufacture wearing apparel	0,373 ***	0,556 **	0,515	0,476 ***
12. Manufacture leather products	0,459 ***	0,444 ***	0,492 **	0,542 ***
13. Manufacture of wood and of products of wood and cork	0,469 ***	0,495 ***	0,586 **	0,441 ***
14. Manufacture of paper and paper products	0,476 ***	0,368 ***	0,515	0,301 ***
15. Printing and reproduction of recorded media	0,567 **	0,521 ***	0,515	0,547 **
16. Manufacture of coke and refined petroleum products	0,435 ***	0,518 ***	0,635 ***	0,518 ***
17.Manufacture of biofuels	0,502 ***	0,487 ***	0,585 **	0,403 ***
18. Manufacture of chemicals and chemical products	0,445	0,531 **	0,515	0,483 **
19. Manufacture of other chemical products	0,445	0,480 **	0,515	0,454 ***
20. Manufacture of cleaning products and cosmetics	0,591 **	0,521 **	0,580 *	0,507
21. Manufacture of basic pharmaceutical products	0,305 ***	0,501	0,515	0,397 ***
22. Manufacture of rubber and plastic products	0,503 ***	0,532 **	0,515	0,381 **
23. Manufacture of other non-metallic mineral products	0,469 ***	0,501	0,515	0,462 **
24. Manufacture of basic metals	0,462 ***	0,489 ***	0,515	0,603 ***
25. Metallurgy of nonferrous metals	0,406 ***	0,412 ***	0,538 **	0,506 ***
26. Manufacture of fabricated metal products, except equipment	0,476 ***	0,405 ***	0,515	0,587 *
27. Manufacture of computer, electronic and optical products	0,535 ***	0,537 **	0,515	0,361 ***
28. Manufacture of electrical equipment	0,627 *	0,513 **	0,515	0,507
29. Manufacture of machinery and equipment n.e.c.	0,507 ***	0,449 ***	0,515	0,430 *
30. Manufacture of motor vehicles, trailers and semi-trailers	0,498 **	0,455 *	0,515	0,511 ***
31. Repair and installation of machinery and equipment	0,445	0,501	0,515	0,456 ***
32. Manufacture of other transport equipment	0,497 ***	0,504 ***	0,639 *	0,532 **
33. Manufacture of furniture; other manufacturing	0,445 **	0,416 ***	0,515	0,507
34. Electricity, gas, steam and air conditioning supply	0,531 ***	0,436 ***	0,515	0,437 ***
35. Water collection, treatment and supply	0,521 ***	0,501 ***	0,515	0,507
36. Construction	0,399 ***	0,386 ***	0,515	0,522 *
37. Wholesale and retail trade and repair of motor vehicles and motor	0,466 ***	0,501	0,515	0,507
38. Wholesale trade, except of motor vehicles and motorcycles	0,449 **	0,501	0,515	0,507
39. Land transport	0,419 ***	0,368 ***	0,559 **	0,507
40. Water transport	0,388 ***	0,525 ***	0,604 *	0,507
41. Air transport	0,445	0,464 ***	0,605 **	0,507
42. Warehousing and support activities for transportation	0,456 ***	0,459 ***	0,515	0,507
43. Accommodation	0,399 ***	0,501	0,520 **	0,567 *
44. Food service	0,341 ***	0,488 ***	0,407 ***	0,499 **
45. Publishing activities	0,445	0,423 ***	0,396 ***	0,507
46. Motion picture, video and television programme production	0,328 **	0,354 **	0,470 ***	0,507
47. Telecommunications	0,547 ***	0,355 ***	0,522 ***	0,534 ***
48. Computer programming, consultancy and related activities	0,516 ***	0,563 **	0,515	0,584 **
49. Financial service activities	0,388 ***	0,501	0,515	0,444 **
50. Real estate activities	0,311 ***	0,394 ***	0,364 ***	0,507
51. Legal and accounting activities; management consultancy activities	0,285 ***	0,317 ***	0,491 ***	0,507
52. Architectural and engineering activities; testing and analysis	0,452 ***	0,376 ***	0,476 ***	0,507
53. Scientific research and development	0,445	0,575 **	0,515	0,487 ***
54. Non-real estate rents	0,532 ***	0,617 *	0,633 **	0,602 ***
55. Administrative and support service activities	0,514 ***	0,615 *	0,653 ***	0,507
56. Surveillance and security activities	0,445	0,521 **	0,541 ***	0,615 *
57. Public administration and defence; compulsory social security	0,445	0,418 ***	0,515	0,507
58. Education	0,495 *	0,501	0,515	0,507
59. Human health	0,451 **	0,501	0,515	0,507
60. Artistic activities	0,329 ***	0,501	0,515	0,513 *
61. Social work activities	0,442 *	0,501	0,515	0,507
62. Activities of households as employers	0,401 ***	0,530 ***	0,467 ***	0,507

σ=1/1-ρ; ***, ** and * represent respectively statistical significance at the 1%, 5% and 10% levels.

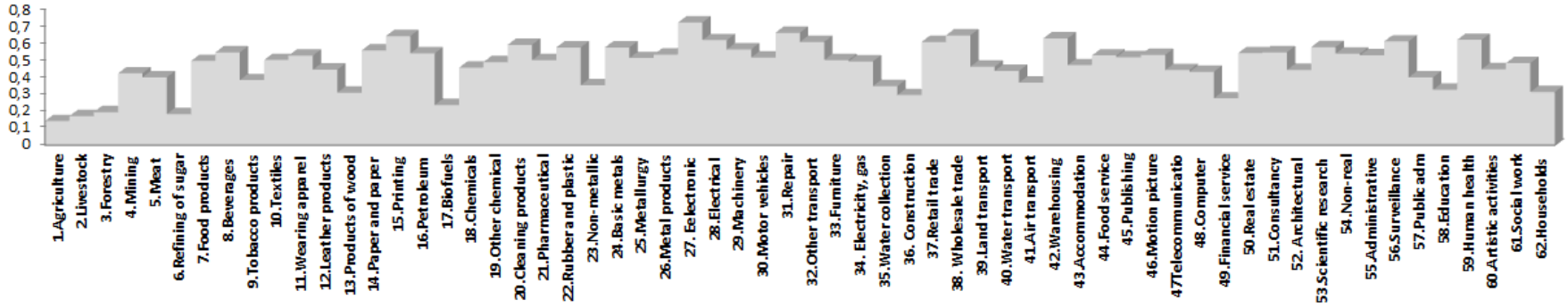
Source: Own elaboration.

Figure 6- Effects on sectors after the 1% increase in the low qualification labor factor (values in percentage variation)



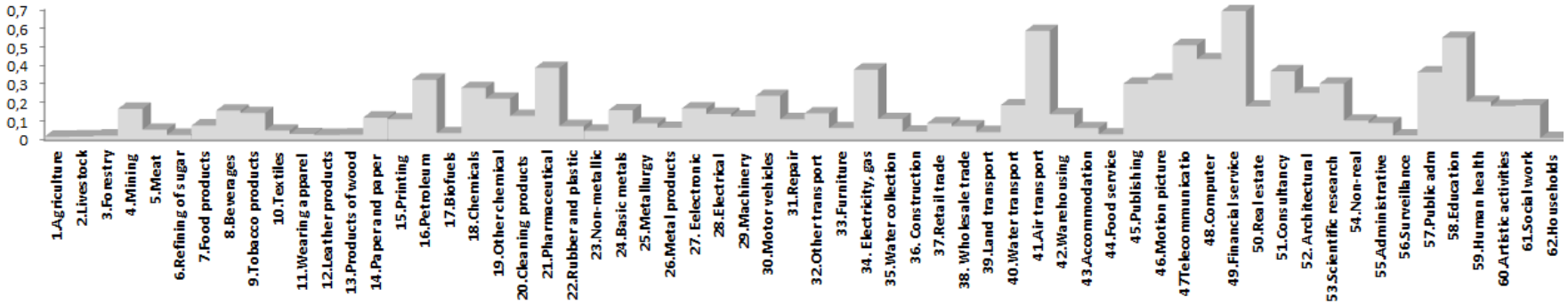
Source: Own elaboration.

Figure 7- Effects on sectors after the 1% increase in the medium qualification labor factor (values in percentage variation)



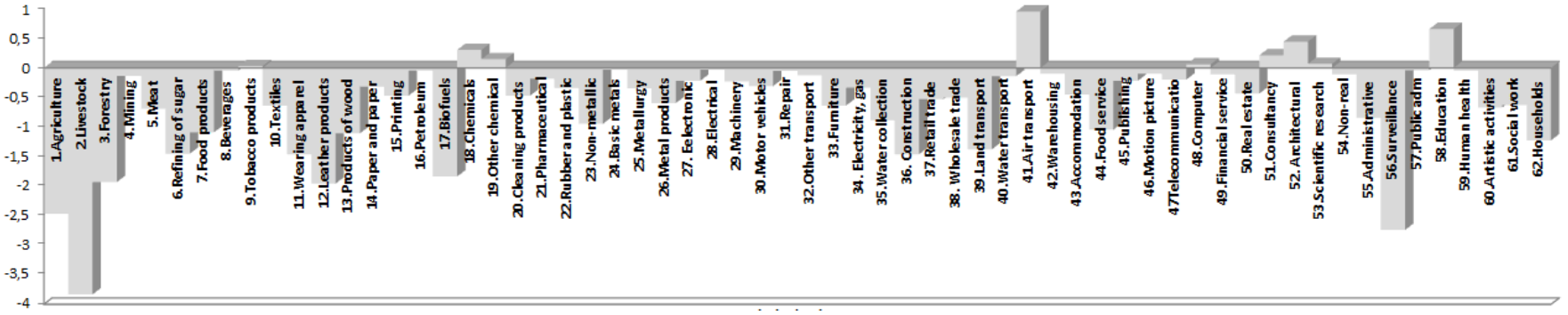
Source: Own elaboration.

Figure 8- Effects on sectors after the 1% increase in the high qualification labor factor (values in percentage variation)



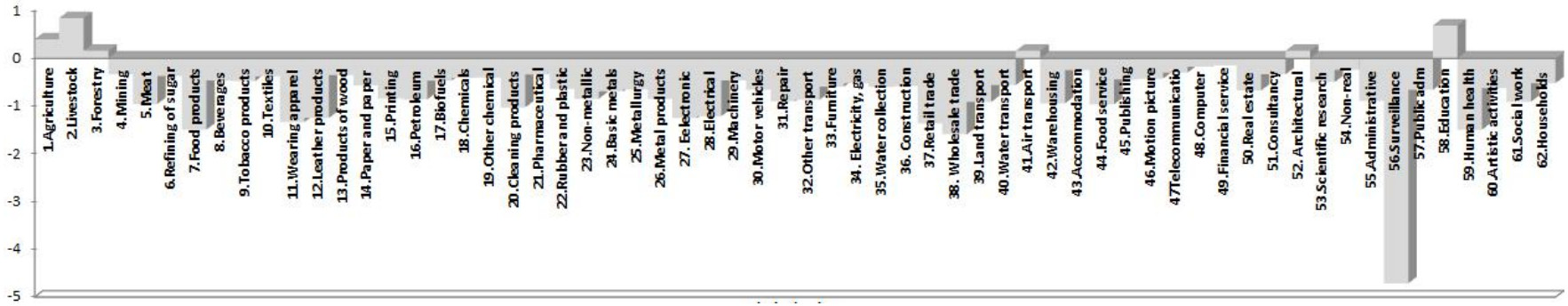
Source: Own elaboration.

Figure 9- Effects on wages by sectors after the 1% increase in the low qualification labor factor (values in percentage variation)



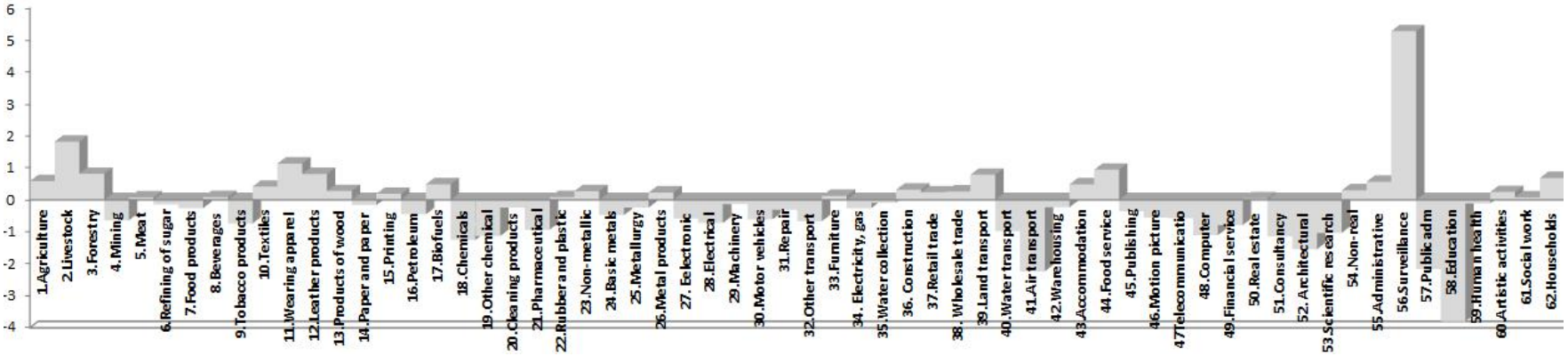
Source: Own elaboration.

Figure 10- Effects on wages by sectors after the 1% increase in the medium qualification labor factor (values in percentage variation)



Source: Own elaboration.

Figure 11- Effects on wages by sectors after the 1% increase in the high qualification labor factor (values in percentage variation)



Source: Own elaboration.