

Trade, employment and gender: Evidence from Senegal

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1. Introduction

Since 2001, Senegal has developed a National Strategy for Development and Export Promotion Senegalese (STRADEX) whose objective is to make optimal use of its potential, taking into account international demand. Based on this strategy, a matrix of action called the "Integrated Framework for trade development in Senegal" has been developed in March 2007. Through the Integrated Framework (IF), Senegal is trying to implement a strategy of export promotion. As an adjunct to the Integrated Framework, policy makers are also trying to improve the efficiency of markets with an adequate institutional and legal framework and regulations and effective monitoring mechanisms. This justifies the implementation of the Procurement Regulatory Agency (MRA) in 2002. Similarly, a sustaining program and trade capacity building (PRDCC) was launched in 2004. The main objective of the IF is to set trade as an engine for growth, in line with the National Strategy for Poverty Reduction. Indeed, trade and trade integration are considered a pillar of the component "wealth creation" of the PRSP. Indeed, growth induces a greater demand for factors (labor, capital). Therefore, it generates returns to factors (wages, dividends, interest). Periods of economic activity contraction should lead to lower factors demand. In particular, labor which is the most mobile factor is generally released to facilitate the adjustment of firms due to shocks. The period 2000-2008 is characterized, in Senegal, with good growth path in contrast with periods of falling growth rate (2002, 2006 and 2008). This evolution of economic activity has an impact on that of the employed population. The later decreases during phases of reduced growth. The growth rate of the employed population rose from 2.87% in 2001 to 2.39% in 2002 and of 3.32% to 3.2% between 2005 and 2006. Between 2007 and 2008, the growth rate of the employed population declined by 3.24% to 0.47%. The development of trade is expected to support growth and consequently generate jobs. The segmentation of the labor market with regard to gender has a different profile depending on each export-oriented sector. The impact of increased exports on the demand for female labor will depend on how intensive this type of labor is employed by the sector. There are few studies that try to establish the link between trade and gender in Senegal. The objective of this research is to evaluate the effects of trade on the structure of employment by gender. Using a static general equilibrium model, we will try to assess the impact of an increase of exports of sectors traditionally oriented towards foreign markets on the labor market, segmented between men and women.

In the first section, we analyze the general trends of foreign trade and employment in Senegal. Section 2 presents a sectoral analysis of the relationship between trade and employment, focusing on sectors sensitive to gender. The methodology and results are presented in a third section and the conclusion and policy implications are drawn in Section 4.

2. Overview of trade and employment trends

Structure and performance of Senegalese economy

Between 1985 and 1991, despite the adjustment program in the medium and long term (PAMLT), economic activity in real terms grew by 2.9% annually. This rate of growth is only slightly above the population growth (2.4%). The decline in grain production and the one of industry hardly hit by the dismantling of tariffs, the absence of a recovery in exports have exacerbated the budget deficit and current account imbalances.

With the currency adjustment that occurred in 1994, the situation has changed significantly and the domestic economic activity recorded a favorable trend in subsequent years. GDP growth is estimated at 2.9% in 1994, 4.8% in 1995 and stands at 5.5% in 2000.

In the period after 2000, the growth rate still recorded significant levels but remained relatively instable. While 2003 was marked by strong GDP growth, it is otherwise in the years 2002, 2006 and 2008 where it has been marked by contraction in activity under the influence of climate and energy shocks. Consequently, the growth rate of GDP has fallen during these periods below that of the population, making more difficult the efforts against poverty.

The trend of domestic saving is in contrast with the one of investment. Domestic saving rate has diminished shifting from 9.4% to 7.4. Consequently, investment has mainly been financed by an increasing recourse to external savings.

Table 1.1: Trend of some macroeconomic indicators, 2001-2008

	2001	2002	2003	2004	2005	2006	2007	2008
Constant GDP growth (%)	4.6	0.7	6.7	5.8	5.3	2.3	4.7	2.5
GDP Share (%)								
Primary sector	16.3	13.6	15.1	13.7	14.6	13.0	11.8	13.0
Agriculture	9.3	6.8	8.3	7.2	8.1	6.6	5.2	6.7
Secondary sector	21.7	22.3	21.4	21.7	20.5	20.1	20.3	21.1
Tertiary sector	43.8	44.9	44.7	45.8	45.4	46.6	47.4	46.3
Public administration	18.2	19.1	18.8	18.8	19.4	20.4	20.6	19.6
Investment, savings and consumption (% of GDP)								
Investment rate	18.4	17.2	22.3	21.6	24.5	24.8	26.4	27.6
Domestic saving rate	9.4	6.8	10.2	9.0	9.1	7.4	6.4	7.4
Public	3.1	6.0	5.8	6.4	6.4	3.7	4.9	4.0
Private	6.3	0.8	4.4	2.6	2.7	3.7	1.5	3.4
Gross national saving rate	13.4	11.2	15.9	15.2	16.7	15.6	17.2	17.6
Final consumption	90.6	93.2	89.8	91.0	90.9	92.6	93.6	92.6
Public finances								
Rate of fiscal pressure	16.1	16.9	17.1	17.4	18.5	18.8	19.3	18.3
External exchanges (% of GDP)								
Exports	28.7	28.5	26.6	27.1	27.0	25.6	23.2	28.4
Imports	37.8	39.0	38.7	39.8	42.4	43.1	43.2	48.5
Current Balance	-5.04	-6.03	-6.40	-6.39	-7.78	-9.21	-11.63	-14.18

Sources: République du Sénégal, 2010a.

Analysis of the sectoral composition of GDP shows that the tertiary sector has consistently provided nearly than half of GDP (50.79% during the period 1994-2000, against 63% in 1960-1979). The contribution of secondary sector, which was estimated at 12.5% between 1960 and 1979, reached 20.4% during the period 1994-2000. By contrast, the primary sector share declines from 23.3% to 19.3% during the same periods.

Driving factors of growth

From a sectoral supply side, the locomotives of growth are mainly secondary and tertiary sectors as highlighted by the growth rate of GDP (Table 1.2).

In terms of demand, final consumption is estimated at about 9/10ths of GDP in 2008, maintaining the gross domestic savings rate at a low level. Hence, consumption has contributed to drive growth. In the period 1990-2008, the rate of growth of gross fixed capital formation was much stronger, with a growth rate of 4.9% and 6.8%, respectively, over the sub-periods 1990 - 2000 and 2001-2008. Therefore, one can notice the increasing role played by investment with in

the growth process. This is mainly due to the fiscal effort devoted to public investment. The structure of the demand has been modified with the investment rate shifting from 18.4% en 2001 to 27.6% in 2008. So growth is more and more driven by investment. If foreign demand is growing faster than consumption during the final sub-period 1990-2000, it is otherwise in the years 2001-2008. During this period, net exports have contributed less to drive the economic growth.

Table 1.2: Composition of GDP growth by sector, 1990-2008

Sectoral GDP growth	1990-2000	2001-2008
Primary	1.8%	1.1%
Secondary	3.7%	4.7%
Tertiary	3.1%	5.7%
GDP growth (demand side)		
Intermediate consumption	3.2%	4.6%
Final consumption	2.3%	4.7%
Public	1.0%	4.3%
Private	2.5%	4.8%
Gross Fixed Capital Formation	4.9%	6.8%
Public	5.3%	9.8%
Private	5.5%	6.0%
Exports of goods and services	3.1%	2.7%

Source: Notes d'analyse des comptes nationaux du Sénégal, 1990-2008

Trends and structure of trade

Analysis of the effects of trade on employment requires a good understanding of the structure of foreign trade of Senegal. In particular, it is important to assess export intensity of the sectors and the relative share of the later in total exports. This analysis will be conducted based on the input-output tables for 1996 and 2005 periods. Table 1.3 confirms that fishing, mining, canneries, oil refining, chemicals and tourism play a important role in exports as expressed by their relative weight in total exports (6.6%, 2.5%, 10.6%, 11.1%, 14.5% and 11.6%). These sectors are, moreover, traditionally more oriented towards the international market as shown by the structure of their production. At least, one third of the production of these branches is oriented toward the external market. The foreign sales of fishing, mining, canneries (46.9%), refined petroleum (52.4%), chemicals (82.9%) and tourism (64.8%) represent respectively 51%, 36%, 47%, 52%,

83% and 65% of their production. Therefore, a negative shock on export demand and world prices for those products will affect these sectors.

A comparative analysis of the structure of production and foreign trade conducted through data of the input-output tables for 1996 and 2005 demonstrates that exports have registered a slight change in its structure. Traditional export sectors such as fisheries, oil, chemicals have seen their relative share in the Senegalese exports consolidated. By contrast, for mining, canneries, and tourism, the relative share of exports has decreased. In addition, for some sectors that are previously turned toward the world market such as oil extraction and transportation, their relative importance in exports has significantly been reduced at a the point that where they are almost turning into local substitutes for imports. Despite their previous status of non-tradable services, telecommunications and other market services showed a slight quiver in their exports.

Tableau 1.3 : Relative weight of sectors in exports (in %)

	Exportations du secteur/Exportations totales		Exportations du secteur/Production du secteur	
	1996	2005	1996	2005
Mil/sorgho	0,00	0,00%	0,00	0,00%
Mais	0,00	0,00%	0,00	0,00%
Riz	0,02	0,00%	0,77	0,00%
Légumes	0,06	0,08%	3,14	0,31%
Fruits	0,06	0,04%	1,00	0,14%
Autres types d'agriculture	0,00	0,27%	0,17	1,07%
Arachide	0,32	0,03%	2,18	0,19%
Coton	0,00	0,09%	0,00	0,62%
Autagrent	0,00	0,52%	0,00	3,94%
Elevage	0,02	0,17%	0,07	0,89%
Fôret	0,20	0,10%	3,87	2,04%
Pêche	5,02	6,34%	34,62	51,15%
Industries Extractives	4,74	2,37%	61,18	34,56%
Conserveries	11,71	10,15%	38,81	46,94%
Huileries	7,01	2,00%	36,15	30,31%
Travail de grain	0,13	0,13%	0,76	1,19%
Fabrication de céréales	0,02	0,31%	0,11	2,24%
Fabrication de sucre	0,18	0,29%	3,07	6,90%

Autres industries alimentaires	0,15	2,80%	1,59	23,79%
Boissons	0,02	0,25%	0,64	6,93%
Tabac	0,04	0,74%	1,44	9,81%
Textiles	1,69	1,29%	10,10	8,98%
Cuirs	0,09	0,27%	8,62	4,67%
Bois	0,05	0,33%	0,98	4,02%
Papier	0,83	0,87%	26,31	12,61%
Pétrole	5,11	10,67%	126,86	52,42%
Chimie	10,85	13,93%	50,87	82,90%
Caoutchouc	0,51	1,55%	15,82	32,35%
Verre	0,25	2,77%	4,34	26,83%
Métallurgie	1,29	2,49%	36,43	40,57%
Machines	1,15	1,46%	160,80	58,29%
Construction de matériels de transport	1,22	4,25%	203,05	413,73%
Fabrication de produits divers	0,08	0,46%	1,31	4,26%
Eau-électricité et gaz	0,00	0,00%	0,00	0,00%
Construction	0,00	0,00%	0,00	0,00%
Commerce	0,00	0,00%	0,00	0,00%
Hotellerie-restauration	12,21	11,12%	62,46	64,85%
Transports	10,05	5,84%	51,22	17,87%
Telecommunication	2,94	4,82%	23,51	14,11%
Immobilier	0,00	0,00%	0,00	0,00%
Services non-marchands	1,75	0,00%	2,38	0,00%
Services marchands	4,08	11,25%	9,06	18,44%
Total	100%	100%		-

Source : calculs des TES de 1996 et 2005.

Most major sectors traditionally export-oriented experienced a slowdown. Indeed, in 2000, the contribution of fisheries sector growth fell by 0.5% (Table 1.3). The best performance recorded by the sector during the period 2000-2008 was a slight increase in its contribution to growth of around 0.1%. Similarly, poor performance are identified for the canning industry whose contribution to growth down half the time during the period 2000-2008. Similarly, the contribution to the growth of extractive industries has fluctuated in a proportion between - 0.2% and + 0.2%. Apart from the period 2005-2006, the contribution to the growth of refined oil is relatively significant. However, there is a mixed behavior of the chemical sector, where every

other year at least, the contribution to growth of the sector has declined. Apart from the 2006 period, growth in the tourism sector, meanwhile, remained flat over the period 2000-2008.

Tableau 1.4: Growth contribution of export-oriented sectors (%), 2000-2008

	2000	2001	2002	2003	2004	2005	2006	2007	2008
pêche	-0,5	0,0	-0,1	0,0	0,0	0,1	-0,2	0,1	0,0
activités extractives	0,0	-0,1	0,1	0,2	0,1	-0,2	-0,2	0,0	0,0
Transformation et conservation de viande, poisson	0,0	0,1	-0,2	-0,3	-0,1	0,2	-0,1	0,2	-0,1
raffinage pétrole et cokéfaction,	0,0	0,1	0,0	0,2	0,0	-0,1	-0,1	0,1	0,0
fabrication de produits chimiques	-0,1	0,1	0,4	0,2	0,0	-0,1	-0,7	0,2	-0,1
services d'hébergement et restauration	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0

Sources : comptes nationaux

Trends in aggregate employment, and employment by sex

The employed population increased from an estimated amount of 3 124 846 à 3 519 279 between 2001 and 2005. Among the export-oriented sectors, fisheries, mining and tourism are the largest providers of employment with a workforce estimated to be 78 026, 32 109 and 24 838 in 2005 (table 1.5)¹.

Table 1.5 : Employment in key sectors, 2001-2005

	Fisheries	Mining	Canneries	Refined petrol	chemical	tourism	Total
Année							
2 001	71 118	31 962	16 935	670	8 026	24 247	3 124 846
2 002	78 398	32 038	13 705	1 215	5 679	24 589	3 232 103

¹ See also annex

2 003	76 065	33 177	13 973	1 135	5 688	23 877	3 413 587
2 004	77 663	33 886	14 429	1 192	5 931	24 607	3 425 948
2 005	78 026	32 109	14 875	221	5 854	24 838	3 519 279

Source : République du Sénégal (2000-2010).

To better understand the evolution of employment and its male-female composition during the 2000s, an analysis of the evolution of the workforce in key export sectors is conducted using data adjusted for the sample of firms followed by CUCI of the National Agency of Statistics and Demography (ANSD). This analysis shows that in the mining sector, men are pulling the labor market. Indeed, the fluctuations in the number of employees in this sector match those of the total. The size of the workforce behaves in saw tooth fashion. Declines were recorded in the periods 2000-2001, 2006, 2009, contrasting with periods of stagnation (2004-2005) and rising otherwise. As for the women, except for the periods 1999, 2003 and 2007 where a contrast is noted with the appearance of men and totals, they recorded the same trend as during other recent periods.

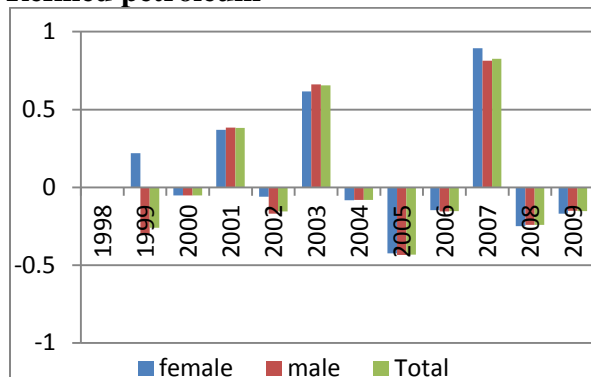
In the metal sector, the evolution of the total amount of labor is determined by the number of men. They increase in 1999 and then decline in 2000. They then pack down between 2001 and 2008 and decrease in 2009 and 2010. If the trend for women behave almost like those of men between 1999 and 2002, they recorded a sharp rise in 2003 and stagnate, for against, between 2009 and 2010. In the tourism sector, the total is, again, driven by the numbers of men. They increases in the periods 1999, 2000, 2005 and 2009 and then decline during other times. In 2010, tourism is one of the export sector that has most felt the ebb of global demand, has freed many workers to the point where the numbers have fallen sharply. The development of the amount of women followed the same trend as the total labor, with the exception of 2003-2007. In 1999 and 2009, the female labor force has even recorded an increase more than proportional to that of men.

In the refined petroleum sector, except for the period 1999, the number of women is rough equal to the number of men and the total workforce. The later increases during 2001, 2003 and 2007. They decrease during the other years. However, the number of women increased in 1999, by contrast to men whose workforce is reduced and pull the total workforce. In the canneries, the total amount of labor is drawn by men. The male labor increases during the periods 2002, 2005, 2007 and 2009 while in the periods 1999, 2001, 2004 and 2004, it suffered a

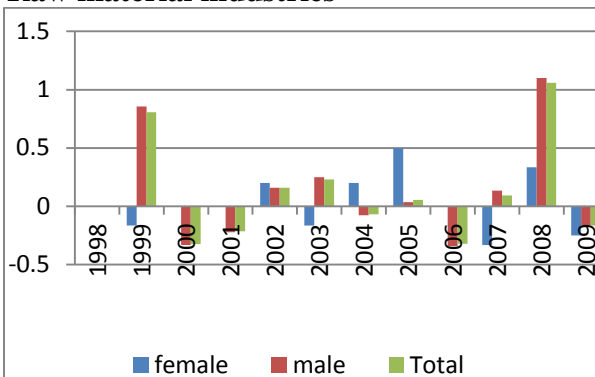
fall and decline in 2010. For women, periods of increased contrast with periods of decline. Number of women has seen a sharp increase in 2009 followed by a fall in 2010. In the fishing sector, labor is driven by the men. Except for the years 2008, 2009 and 2010 where they fall and then rise before falling, the number of staff people is stable. However, the number of women recorded fluctuations with periods of high amplitude decreases in the years 2000, 2002, 2004 and 2008 in contrast to periods of high growth (1999, 2003, 2005 and 2010). In the chemical sector, labor is also driven by the male labor force. It increases in 2000 and 2005 and then declines in 2001, 2003 and 2008. In 2010, the number of men has suffered a sharp drop. During other periods, it is almost stagnant. As for the actual women, they increase in 2001 and 2005 and then decline during the years 2000 and 2010. They remain stable in other periods. Overall, the tourism and fishing stand out as areas that have relatively more jobs created for women than for men during the 2000s.

Graph 1: Trends in aggregate employment and employment by sex, 1998-2010

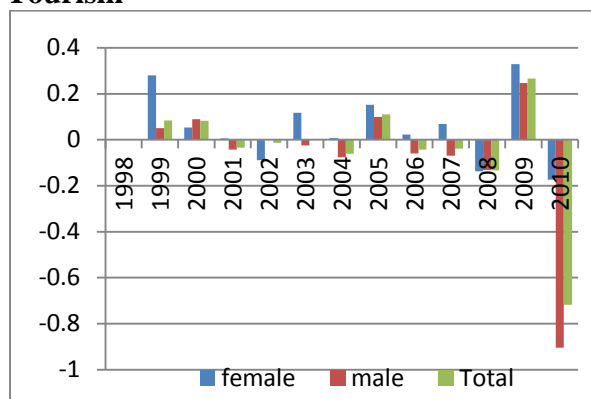
Refined petroleum



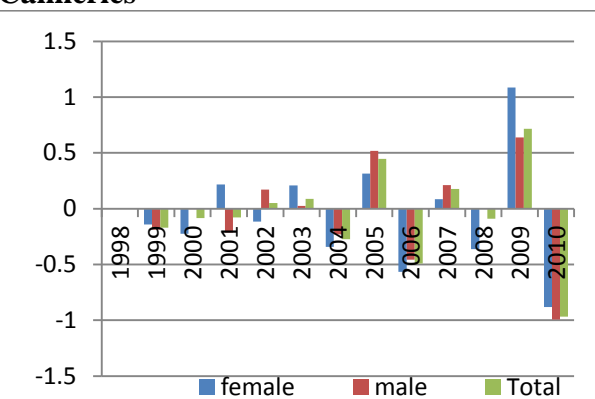
Raw material industries



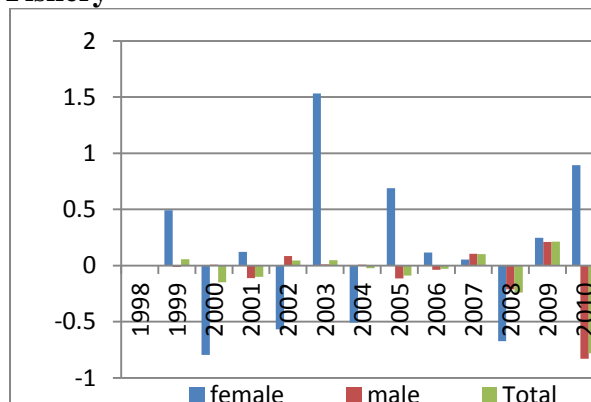
Tourism



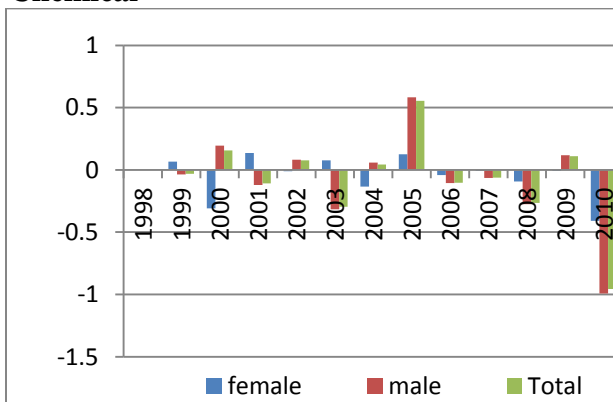
Canneries



Fishery



Chemical



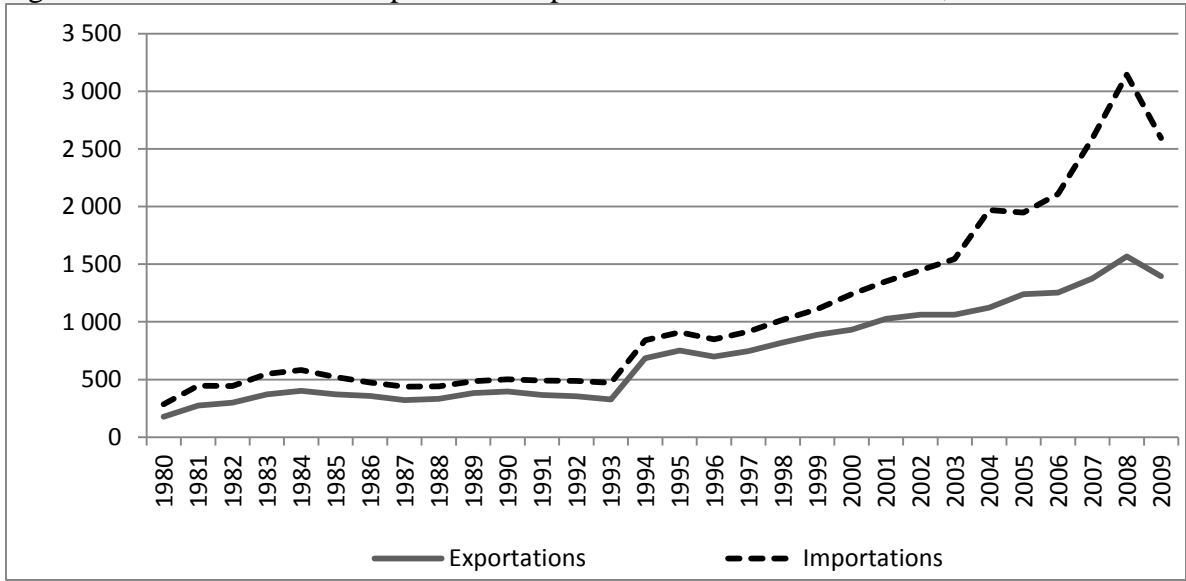
Source : République du Sénégal (2000-2010).

Trends in exports

The volume of foreign trade has undergone a relative slowdown until 1993. The parity change occurred in 1994 caused a sharp inflection in the shape of such exchanges. Due to the depreciation of the real exchange rate, export volumes grew strongly (Figure 2). This increase in

exports was mainly driven by the chemical, tourism, oil refining, canning, fishing and extractive industries which are mainly phosphates (Table 1.4). However, the increase in imports was more than proportional to that of foreign sales of Senegalese farmers (Figure 2). This increase in imports is mainly due to external market purchases of crude oil, machinery, chemicals, transport equipment, metal products, oil, rice, grain products, other food products (Table 2.1). The general rise in world prices for export and import, observed in 2008, was pro-oriented sectors in foreign markets but has also promoted a surge in imports, which outlined the sheltered producers use in the branches of import-substitution.

Figure 2: Evolution of total exports and imports in billions of CFA francs, 1980-2009



Key drivers of exports

The period before 2003, Senegal's exports were mainly directed towards the European Union. France was the top destination for Senegalese exports, followed by Spain and Italy. These foreign sales were mainly driven at the beginning of the 2000s by the fish products, horticultural products and crude oil peanut. However, since 2003, a shift occurred in favor of Africa, which supersedes the European Union as the first destination of exports. This trend was consolidated in 2005. This dynamism of Senegalese exports oriented toward Africa is primarily due to sales of petroleum products and to a lesser extent, hydraulic cement. However, it has experienced a decline from 2008 thanks to the global economic crisis that has led to a general decline in global demand. This drop in exports to Africa was made in favor of Asia, whose growth has recorded a better performance during this crisis. Overall, sales to Africa are mainly oriented towards West Africa. Mali is the first customer of Senegal in the West African sub-region. This country is followed by the Gambia and Guinea. The supply to the Asian countries has experiencing an upward trend and is mainly driven by sales of chemicals and phosphoric acid to India.

Table 1.5: Mayor customers of Senegal (en %), 2001-2009

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Europe	42,3	34,2	32,1	29,8	24,9	28,81	30,30	16,31	28,21
Afrique	28,6	32,3	37,5	39,4	43,1	43,84	51,75	48,84	45,31
Amérique	0,7	0,5	0,9	0,5	1,5	1,02	1,66	1,19	0,44
Asie	13,5	22,3	15,2	17,5	16,6	10,45	10,37	16,36	12,66
Divers	14,9	10,7	14,3	12,8	13,9	15,89	5,93	17,29	13,37
Total	100	100	100	100	100	100	100	100	100

Source : République du Sénégal (2005, 2009)

Fishing has great potential in Senegal. The craft segment of this sector is relatively more important as it polarized 52 000 13 903 fishermen, most of which are units of canoes. Industrial fishing in trawlers, mobilized 5200 fishermen. In total, the fishery provides to about 15% of the labor force an income-earning (Republic of Senegal, 2005, 2009). The fishing sector is a protected industry in Senegal. The MFN tariff rates applied to fishery products was 16.6% according to common external tariff (TEC). A single rate of 18% VAT applies to imports of fishery products. As for imports, they are free of tarif. The fishery products from WAEMU or ECOWAS origin benefit from preferences while additional fees are applied to non-member countries of the region.

In the hydrocarbons sector, Law No. 98-31 of April 14, 1998 ended the monopoly of the SAR on refining, storage, distribution and export of petroleum products. This law specifies the procedures for granting and revoking licenses, the conditions for exercising the importation, distribution and storage. The procedure for developing the retail price for all products and their periodicity for four weeks are set. Since this law, all of this sub-sector was liberalized, each segment (refining retail) requesting a license.

A new mining code was adopted by Senegal in 2003 that allows any natural or legal justification of technical and financial capacity to access the mineral resources which the state remains the sole owner. By the granting of these mining claims, the ownership of mineral resources of the State is transferable for a given period.

Tariff protection in the manufacturing sector is 12.2% on average. Among the most protected industries, there are those of beverages, clothing, building materials and certain food processing industries. In the field of chemistry, it should be noted that Senegal has a production of phosphate, phosphoric acid and fertilizers mainly carried out by the Chemical Industries of Senegal (ICS). This company was majority owned by the state until 2007. The latter then entered into an agreement to recapitalize with the Indian Farmers Fertilizer Cooperative (IFFCO) in 2007 to play down its stake in the ICS. Suddenly, the IFCO is the majority shareholder arrogating 85% stake in ICS and has a full transfer of phosphate mines in Taiba and phosphoric acid plants of Darou. Following the recapitalization of 100 million USD, a program of revision, modernization and upgrading of production equipment of ICS, was initiated in 2008 to encourage the return to full capacity of the ICS end of 2009. In addition, the operating concession phosphates of Matam, whose industrial development is for the production of phosphoric acid and fertilizers was granted in 2008. It is clear that, like cement, the new mining will contribute to an increase in production capacity in phosphates. This sector, more oriented toward the external market will, undoubtedly, induced an increase in foreign sales of Senegal.

2. Sectoral analysis of trade and employment

Sectors sensitive to imports competition

An analysis of the rate of import penetration as well as their relative weight depending on the product categories is also necessary to evaluate the sectors most exposed to competition from producers in the world. It appears from this analysis that the sectors of mining, metallurgy, and

other food products, transportation equipment, oil mill, chemicals, refined petroleum, grain products, rice, metallurgy, machinery, manufacture of sugar, paper and rubber industries are most vulnerable (Table 2.1). The relative importance of these products in imports is expressed by the fact that the supply of the domestic market in these products depends, at least 40% of the global market. On rice markets, mining, chemistry, metallurgy, machinery and construction of transport equipment, the rate of import penetration is relatively high. In fact, imports reach out to a proportion of between 72% and 95% of the supply of good. As a result, lower prices on imports of these products promote a surge in imports and submit large sectors of the economy to competition from outside producers.

Tableau 2.1 : Relative weight of imports (in %)

	Importations du produit/Importations totales	Importations du produit/Produit composite
Mil/sorgho	0,01%	0,27%
Mais	0,30%	18,25%
Riz	3,44%	71,78%
Légumes	0,37%	17,40%
Fruits	0,31%	15,64%
Autres types d'agriculture	1,19%	24,27%
Arachide	0,00%	0,00%
Coton	0,00%	0,00%
Autagrent	0,55%	35,79%
Elevage	0,08%	0,73%
Fôret	0,15%	5,36%
Pêche	1,47%	29,03%
Industries Extractives	12,47%	82,39%
Conserveries	2,21%	24,50%
Huileries	2,74%	50,07%
Travail de grain	7,29%	52,49%
Fabrication de céréales	0,22%	2,72%
Fabrication de sucre	1,53%	39,53%
Autres industries alimentaires	4,85%	47,70%
Boissons	0,67%	25,51%
Tabac	0,00%	0,12%
Textiles	2,25%	22,42%
Cuirs	0,40%	10,94%

Bois	1,32%	22,10%
Papier	2,20%	38,08%
Pétrole	6,38%	52,63%
Chimie	8,59%	83,44%
Caoutchouc	1,61%	45,59%
Verre	2,17%	32,59%
Métallurgie	6,47%	74,97%
Machines	11,91%	95,05%
Construction de matériels de transport	7,50%	84,76%
Fabrication de produits divers	0,78%	11,17%
Eau-électricité et gaz	0,00%	0,00%
Construction	0,00%	0,00%
Commerce	0,00%	0,00%
Hotellerie-rrestauration	0,00%	0,00%
Transports	2,99%	15,81%
Telecommunication	1,02%	5,55%
Immobilier	0,00%	0,00%
Services non-marchands	0,00%	0,00%
Services marchands	4,53%	13,31%
Total	100%	-

Source : calculs à partir du TES de 2005.

Sectors sensitive to gender

The examination of the structure of the labor certifies that it is in the canneries and tourism that the male/female ratio is lowest. Indeed, in the canning industry, a female employee, there are a number of men between 1 and 5 during the period 1998-2009. In the tourism sector, a woman is hired, on average, associated with a number of men between 3 and 6. Therefore, these two sectors are proving quite sensitive in terms of gender in the labor market. However, the export sector which polarizes most men is that of mining. In this branch, a female employee is associated with a number of men in a range between 11 and 42.

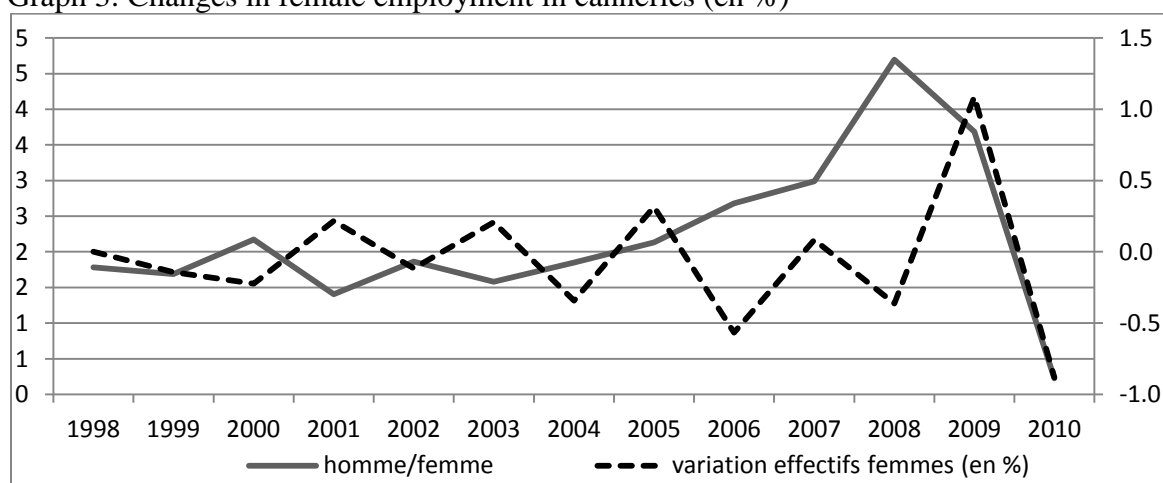
Table 2.2: Changes in the ratio of male-female workers employed in the main exports sectors, 1998-2009

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Industries extractives	19	42	28	22	21	31	24	17	11	19	29	33
Tourisme	6	5	5	5	5	4	4	4	4	3	3	3
Pétrole raffiné	11	6	6	6	5	6	6	6	5	5	5	5
Chimie	14	13	22	17	18	12	14	20	19	18	14	16
Conserveries	2	2	2	1	2	2	2	2	3	3	5	4
Pêche	6	4	20	16	40	16	33	17	15	16	38	36

Changes in female employment

In areas where the female labor force is relatively more prevalent, the trend of women staff does not affect in the same way the male/female ratio. Indeed, an increase in the numbers of women in the sectors of canneries is observed at least half a time during the 2000s. During these periods, the increase in female labor force has resulted in an overall improvement of women in the workforce as reflected by the decline in the ratio between men and women. In the tourism sector, the number of women behaves differently from the male-female ratio. Indeed, the ratio between men and women fall, despite a checkered development of female labor force during the period. Enrollment by gender appears to evolve almost significantly during the period 2004-2009.

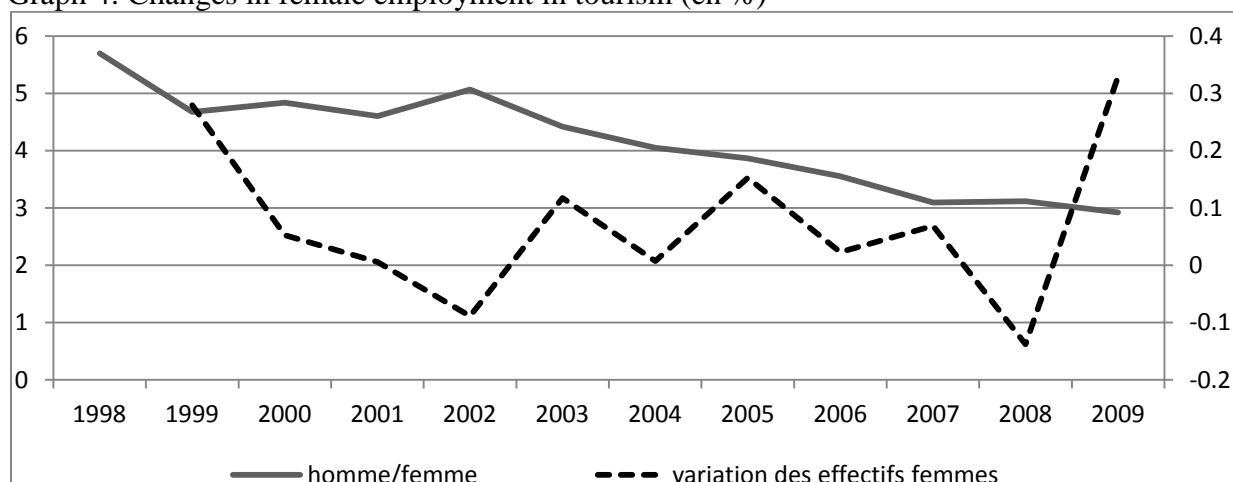
Graph 3: Changes in female employment in canneries (en %)



avec ratio homme/femme en ordonnées à gauche et variation effectifs femmes en ordonnées à droite.

Source : République du Sénégal (2000-2010)

Graph 4: Changes in female employment in tourism (en %)



avec ratio homme/femme en ordonnées à gauche et variation effectifs femmes en ordonnées à droite.

Source : République du Sénégal (2000-2010)

Impact of export growth on the relative wage rate of women

An analysis focused on the canning industry, relatively more sensitive in terms of gender, certify that the wages earned by women capped at 50% of men between 2001 and 2004. However, in the period 2005-2009, the salary received by women is, except the years 2007 and 2009, relatively more important than the one received by men (table 2.3).

Table 2.3: Trends of wages in canneries and tourism and relative wages

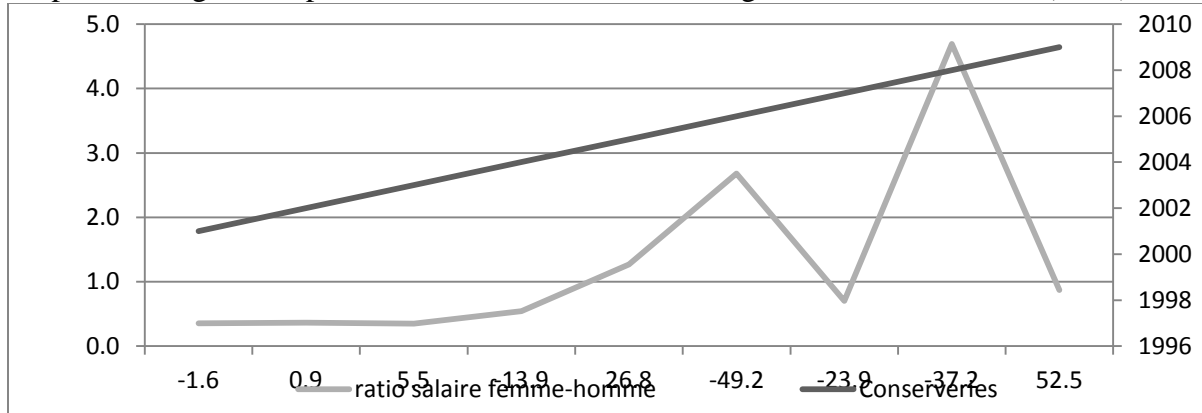
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Canneries													
Female (in '000)	673	733	742	592	785	642	952	1069	1052	987	7104	1067	5036
Male (in '000)	1174	1294	1349	1667	2141	1828	1746	841	393	1409	1513	1225	2394
Tourism													
Female (in '000)	1543	1578	1624	1929	1649	1861	1890	1917	2110	2031	1997	2238	1378
Male (in '000)	1507	1869	1909	2216	1944	2013	2159	2207	2377	2610	2306	2659	2651
Relative female/male Wage													
Canneries	0,57	0,57	0,55	0,36	0,37	0,35	0,55	1,27	2,68	0,70	4,69	0,87	2,10
Tourism	1,02	0,84	0,85	0,87	0,85	0,92	0,88	0,87	0,89	0,78	0,87	0,84	0,52

Source: République du Sénégal (2000-2010)

Periods of rising exports are usually followed by a relative increase in the relative wage of women. This trend suggests that good prospects for the sectors that use relatively more women are generally beneficial to that class of labor. Apart from the canning industry, tourism is also relatively intensive in women labor. This feature also makes it a sensitive area in terms of the gender aspect. In this sector, the average wage for women is quite equal to the one distributed to

men. Indeed, the relative wage between woman and man is close to unity since it varies between 0.8 and 0.9.

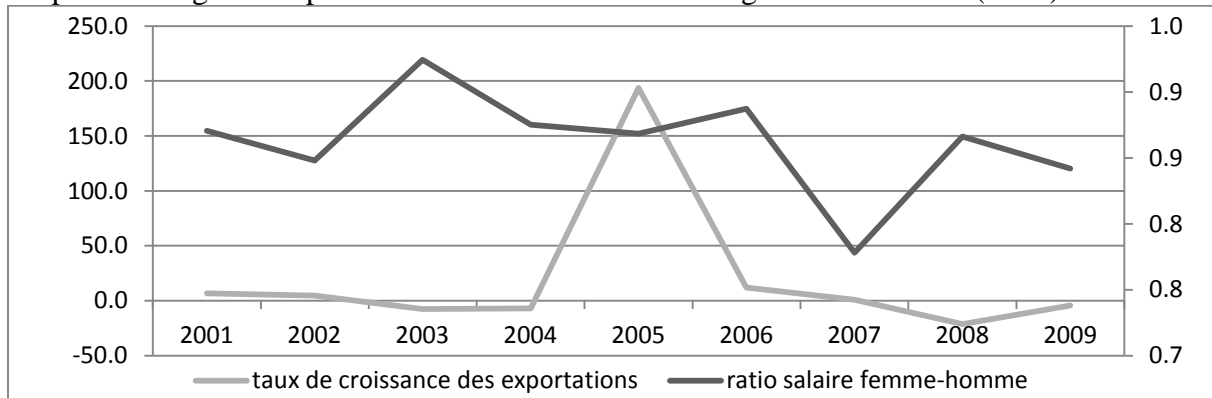
Graph 5: Changes in exports and male-female relative wage rate in the canneries (en %)



avec variation effectifs femmes en ordonnées à gauche et ratio homme/femme en ordonnées à gauche.

Sources : République du Sénégal (2000-2009)

Graph 6: Changes in exports and male-female relative wage rate in tourism (en %)



avec variation effectifs femmes en ordonnées à gauche et ratio homme/femme en ordonnées à gauche.

Sources: République du Sénégal (2000-2009)

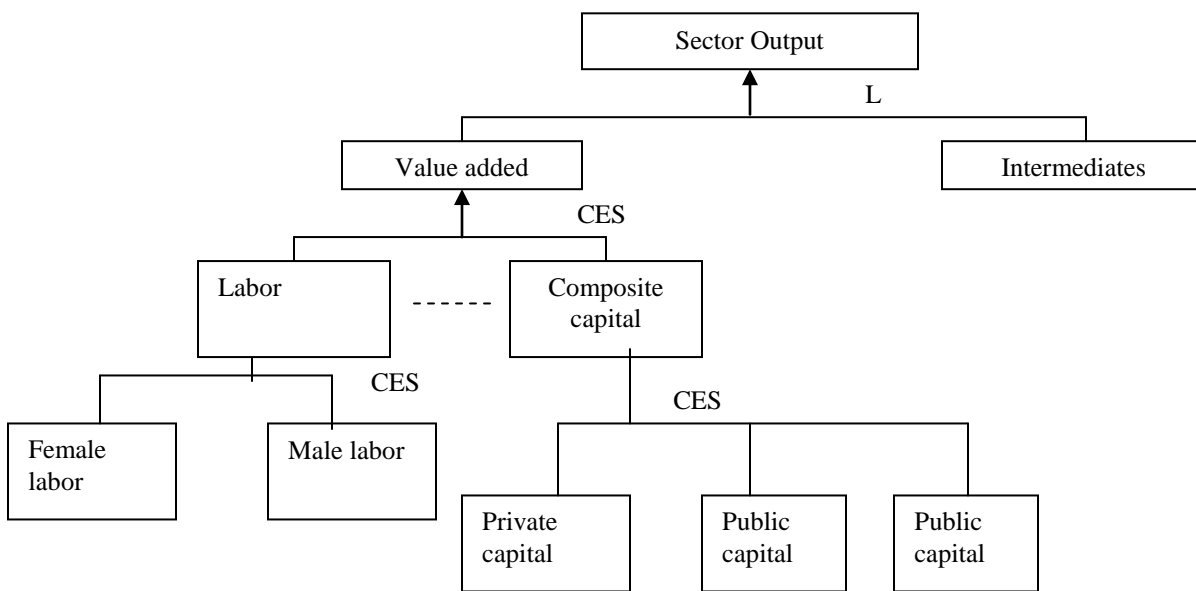
3. Empirical analysis

To better capture the impact of trade on changes in labor market by gender, we use the computable general equilibrium model of PEP (Decaluwé et al., 2009). A general equilibrium framework can help us better take in account all the interactions that characterize the economy.

The model

The model identifies 12 productive sectors or activities that combine primary inputs with intermediate commodities to determine a level of output. The four factors identified in the model include private capital, public capital, land and labor. Producers in the model make decisions in order to maximize profits subject to constant returns to scale, with the choice between factors being guided by a constant elasticity of substitution (CES) function. This specification allows producers to respond to changes in relative labor and private returns to capital factors by smoothly substituting between available factors so as to derive a final value-added composite. Profit maximization implies that factors generate income where marginal revenue equals marginal cost based on endogenous relative prices.

Figure 3.1: Production Technology¹



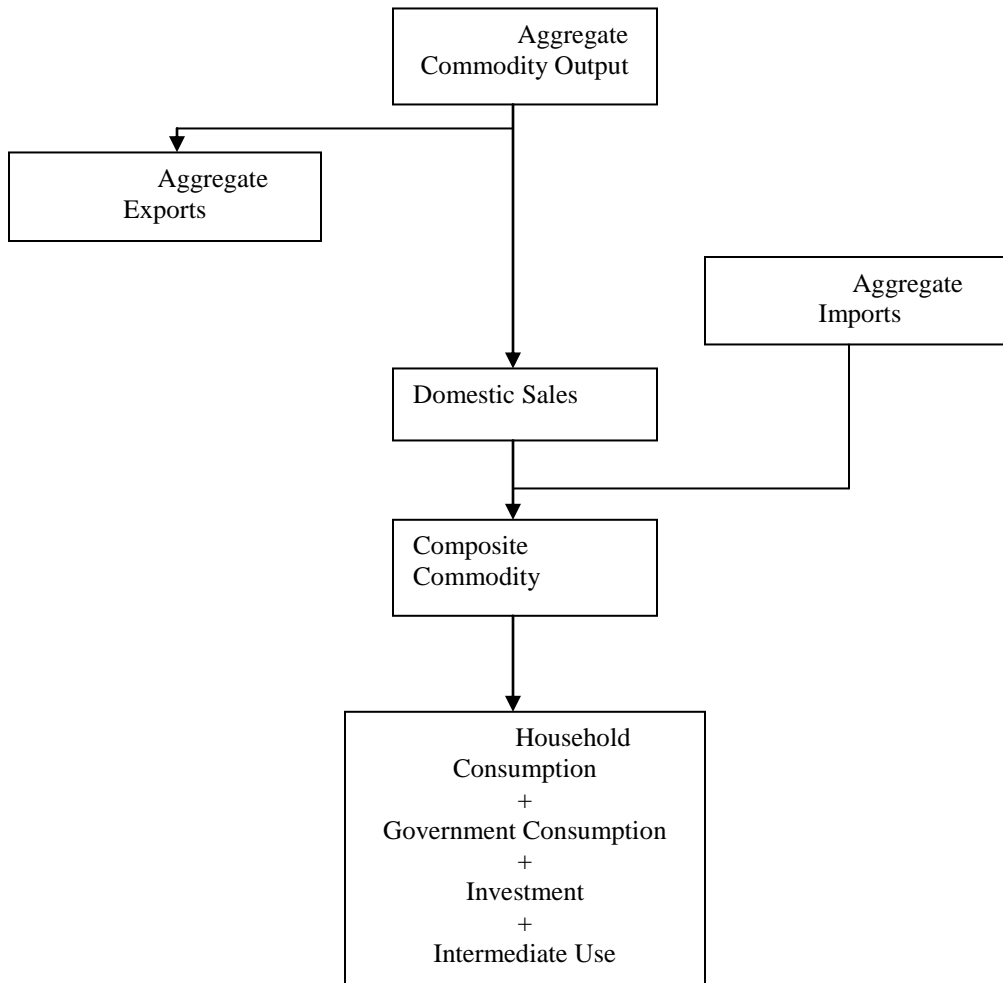
¹ 'CES' is a constant elasticity of substitution aggregation function. 'Leontief' is fixed shares.

Figure 3.2 traces the flow of one commodity from its market supply to its final demand. The supply of a particular commodity from each producer is combined to derive aggregate commodity outputs. This aggregation is regulated by a CES function which allows demanders to substitute between the various producers supplying a particular commodity, in order to maximize consumption subject to relative supply prices.

Substitutions between domestic and foreign market production are possible. Producers' decision is dictated by a constant elasticity of transformation (CET) function, which distinguishes between exported and domestic goods, and by doing so, captures any differences in time or quality between the two products. Profit maximization drives producers to sell in those markets where they can achieve the highest returns. These returns are based on domestic and export prices (where the latter are determined by the world price times the exchange rate adjusted for any taxes). The final ratio of exports to the consumption of domestic goods is determined by the endogenous interaction of relative prices for these two commodity types.

Domestically produced commodities that are not exported are supplied to the domestic market. Substitutions between imported and domestic goods are possible with a CES Armington specification (Armington, 1969). Such substitution can be performed both in final and intermediates usage. Under the small country assumption, Senegal is assumed to face an infinitely elastic global supply at fixed global prices. The final ratio of imports to domestic goods is determined by the cost of minimizing decision-making of domestic consumers based on the relative prices of imports and domestic goods (both of which include relevant taxes).

Figure 3.2: Commodity Flows¹



¹ 'CES' is a constant elasticity of substitution aggregation function. 'CET' is constant elasticity of transformation function.

The final composite good, containing a combination of imported and domestic goods, is supplied to both final and intermediate demand. Intermediate demand, as described above, is determined by technology and by the composition of sectorial production. Final demand is contingent to institutional incomes and the composition of aggregate demand.

Simulations and results

Three simulations are performed based on this tool. In the first one, we increase the volume of total exports by 10%. In the second and third simulation, exports, respectively, bound for West Africa and the rest of world (excluding West Africa), are also each one increased by 10%.

The results show that it is the sales to West Africa that drives more total exports as reflected by trends of since the 2000s. Indeed, a marginal increase of sales in the West African market by 10% leads to a more sustained increase in total exports (+0.75%). However, when sales to rest of the world (out of West Africa) increase in the same proportion, total exports rose only by 0.56%.

Tableau 3.1 : changes in exports (in %)

Hausse de 10% des exportations à destination de l'Afrique de l'Ouest	0.750
Hausse de 10% des exportations hors de l'Afrique de l'Ouest	0.562
Hausse de 10% des exportations totales	10.000

Sources: simulations

The increase in exports differently affects the GDP. Increases in exports have a small effect on economic activity. GDP increases only by 0.33% when total exports increased by 10%. With an increase of exports toward West Africa by 10%, GDP grew by 0.03%. However, increased exports (excluding West Africa) led to resources reallocation to the detriment of the rest of the economy as the GDP recorded a small contraction.

Table 3.2: change in GDP (en %)

Hausse de 10% des exportations à destination de l'Afrique de l'Ouest	0.03
Hausse de 10% des exportations hors de l'Afrique de l'Ouest	-0.05
Hausse de 10% des exportations totales	0.33

Sources : simulations

The value added of canneries, chemical and oil industries that are export-oriented to West African market increases when sales to this market rise. Conversely, tourism, fisheries and extractive industries saw their value increase as exports to the rest of the world (excluding West Africa) are increasing.

Tableau 3.3 : changes in value added (%)

	AGRI	PECH	EXTRACT	CONSERV	AUTALIM	CUIR	CHIM	PETROL	AUTIND	TOURISM	AUTSM	SNM
Hausse de 10% des exportations à destination de l'Afrique de l'Ouest	0,05	-0,63	-0,33	2,57	-0,30	-0,07	6,30	7,08	-0,23	-0,51	-0,18	-0,74
Hausse de 10% des exportations hors de l'Afrique de l'Ouest	-0,11	5,46	2,78	-0,09	-0,33	-0,07	-0,33	-0,27	-0,25	6,68	-0,22	-0,30
Hausse de 10% des exportations totales	-0,18	5,36	-3,15	2,61	-0,40	-1,47	4,65	5,05	2,88	6,65	1,16	-8,29

Sources: simulations

The weight of export sectors in employment is relatively low (tableau 3.4).

Tableau 3.4: Relative weight of sectors in labor demand (%)

	Agriculture	Pêche	Extraction	Conserve	Autres industries alimentaires	Cuir	Chimie	Pétrole	Autres industries	Tourisme	Autres services marchands	Services marchands	Total
LD	21,98	3,80	1,09	0,71	3,61	0,04	1,77	0,27	9,13	1,65	29,47	26,47	100
KD	9,85	1,38	1,15	4,15	4,46	0,3	2,10	0,42	15,92	0,59	50,06	9,63	100

Source : MCS

Sectors oriented toward the foreign market are relatively more capital-intensive. Only fisheries and tourism tend to use more intensively labor (Table 3.5). This will have an impact on the demand of this factor when exports tend to increase. Increasing exports for fish and tourism will benefit to labor whereas rising demand for other export oriented sectors will induce more capital demand instead of labor.

Tableau 3.5: Structure of the value added (%)

	Agriculture	Pêche	Extraction	Conser veries	Autres industries alimentaires	Cuir	Chimie	Pétrole	Autres industries	Tourisme	Autres services marchands	Services marchands
Labour	47,70	57,36	31,58	7,64	28,26	6,09	29,12	24,13	21,82	57,63	22,28	57,24
Capital	43,91	42,64	68,42	92,36	71,74	93,9	70,88	75,87	78,18	42,37	77,72	42,76
Land	8,40											
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source : MCS

The expansion of export sectors appears to induce a reallocation effect to the detriment of other sectors of the economy. Indeed, when total exports increased by 10%, the total demand for labor undergo a slight decrease. The observation of the labor market shows that demand for female labor grew more than male. Indeed, the real wage rate paid in the market of women labor recorded an increase of lesser magnitude than the one observed in the labor market of men. The increase in exports to the West Africa has more influence on the labor market than the one of the rest of the world. Indeed, the demand for labor is progressing in both segments with a more than proportional increase in female labor whose wage rate has increased lesser. When exports out of West Africa are increasing, the labor market is very slightly affected.

Table 3.6: Changes in labor demand and wage rate (en %)

	Demande de travail totale	Segment homme	Segment femme	Taux de salaire moyen	Taux de salaire masculi n	Taux de salaire féminin
Hausse de 10% des exportations à destination de l'Afrique de l'Ouest	-0.001	0.004	0.007	1.581	1.790	0.762
Hausse de 10% des exportations hors de l'Afrique de l'Ouest	0.000	0.002	0.002	0.813	0.950	0.277
Hausse de 10% des exportations totales	-0.025	0.043	0.100	18.937	20.535	12.786

Sources: simulations

Conclusions and policy implications

The aim of this research is to evaluate the effects of trade on the labor market by gender. A static computable general equilibrium model is used to assess the impact of a marginal increase in exports on the labor market. General trends of foreign trade and employment were first analyzed. Senegal's exports are driven by exports to the West Africa region.

An analysis of the relationship between trade and employment was also conducted. This analysis shows that the fishing and tourism industries are relatively more gender-sensitive. The results of simulations show that an increase in exports leads to a much smaller proportional response of economic activity. As a result, the impact on labor demand is relatively moderate. Significantly, however, a marginal increase in exports leads to a relatively larger increase in female labor (compared to male labor demand).

The increase in exports to West Africa has a stronger influence on the evolution of the labor market by gender. On the other hand, exports beyond the region to the international market have little effect on female employment and on the sex structure of the labor force.

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Annex**Table A1: Population employed by sectors**

Année	2 001	2 002	2 003	2 004	2 005
agriculture vivriere	675 576	693 831	706 195	715 140	727 587
agriculture industrielle ou d'exportation	316 664	322 623	328 693	334 878	342 264
elevage et chasse	575 036	585 856	596 880	608 111	619 554
sylviculture, exploitation forestiere,	85 955	87 573	89 221	90 899	92 734
peche	71 118	78 398	76 065	77 663	78 026
activites extractives	31 962	32 038	33 177	33 886	32 109
Transformation et conservation de viande, poisson	16 935	13 705	13 973	14 429	14 875
fabrication de corps gras alimentaires	35 762	36 744	38 415	39 524	40 457
travail de grains, fabrication de produits	18 592	18 524	18 814	19 331	19 834
transformation des céréales	60 939	62 063	63 544	65 244	66 918
fabrication de sucre, transformation	7 321	5 484	5 596	5 876	5 425
fabrication de produits alimentaires n.c.a	28 777	29 847	30 625	31 491	32 203
fabrication de boissons	4 426	4 121	4 181	4 303	4 822
fabrication de produits a base de tabac	678	293	349	366	272
egrenage de coton et fabrication des textiles	80 805	81 731	84 295	86 608	88 760

fabrication du cuir; fabrication	8 684	8 414	8 498	8 732	9 014
travail du bois et fabrication d'articles	42 406	42 830	43 966	45 141	46 236
fabrication de papier, carton,	2 435	1 727	1 679	1 763	1 640
raffinage petrole, cokefaction,	670	1 215	1 135	1 192	221
fabrication de produits chimiques	8 026	5 679	5 688	5 931	5 854
fabrication de produits en caoutchouc	2 287	3 535	3 366	3 534	738
fabrication de verre, poterie	3 335	3 137	3 298	3 410	3 602
metallurgie, fonderie, fabrication	26 702	28 687	29 081	29 932	27 806
fabrication de machines	1 172	709	563	592	97
fabrication d'equipements, d'appareils	0	0	0	0	91
construction de materiels de transports	3 583	2 700	2 857	2 956	3 007
fabrication de produits divers	12 195	12 341	12 789	13 155	13 535
electricite, gaz et eau	29 607	28 095	28 999	29 946	28 457
construction	68 696	66 040	70 898	73 112	76 272
commerce	471 154	568 159	608 599	653 967	702 010
services de la reparation	44 286	45 425	46 585	47 832	48 785
services d'hebergement et restauration	24 247	24 589	23 877	24 607	24 838
transports	46 637	38 135	38 821	40 037	38 516

postes et telecommunications	14 871	9 412	9 514	9 856	6 522
services financiers	2 950	3 174	4 681	3 373	5 422
activites immobilieres	1 267	758	666	700	612
activites des services aux entreprises	118 085	116 017	118 741	122 047	125 653
activites d'administration publique	63 671	50 800	96 940	53 046	56 293
education et formation	74 715	66 714	105 531	71 531	77 359
activites de sante et action sociale	18 833	17 007	26 916	18 184	21 564
activites a caractere collectif ou personnel	23 787	33 969	29 876	33 623	29 293
Total	3 124 846	3 232 103	3 413 587	3 425 948	3 519 279

Source : république du Sénégal (1996-2005)