

Women's Changing Participation in the Labor Force of Moroccan Economy: An Analysis of the Sensitivity on the Results of CGE Model

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ABSTRACT: Via an unconditional sensitivity analysis, we wish to check that the variability of the model as a whole is not too important in the event of simultaneous modification of all the parameters. To do this, the Gaussian quadrature method is implemented as developed by Arndt (1996), De Vuyst and Preckel (1997) and Piet (2002). From the methodological point of view, an unconditional sensitivity analysis allows to give evidence of the robustness of the results. A part from this analysis, we appreciate the reel effect, on the women's participation in the labor market, of increasing commercial opening of the Moroccan economy. To do this, we build before a static multi-sector computable general equilibrium (CGE) model, which differentiates the work of men and women. The model is then calibrated on real data of the Moroccan economy before being used for analytical purposes. It highlights an improvement of the employment demand of womens in the main exporting sectors in particular the agriculture, food industry and that of the leather and textile industry.

Keywords: Commercial opening; feminization; labor market; Computable General Equilibrium Model.

JEL Classifications: F14; F16; J11; D58

1. Introduction

The agricultural sector represents in 2012, 21,2% of the total GDP of Morocco. In addition, 12,8% of its production are exported. It still occupies solely nearly 60% of the active population of which about half are women which works mainly in the breeding and horticulture sectors.

The manufacturing industry contributes, as for it, to a total value of 26,7% in total GDP, 60% of total exports and 83% of the total imports. These figures testify a high degree of dependence of the sector with the regard of the foreign trade. Within the employment, the formal industrial sector employs 1,3 million people, that is represent 13,4% of the total work force of the country.

We should note that the industry occupies more than 202.000 women, of which 86% work in the urban industrial. They are particularly present in the manufacture of clothing, fabrics, shoes, electricals appliance and agro-alimentary products which, thereafter, are exported by transnational companies.

It is necessary to insist on the singularity of the under-sectors of the agribusiness industry and of textile-leather. On a side, these under-sectors gather the greatest of number indeed; companies; their share in the industrial added-value is respectively of 15,5% and 17,5%. On the other, these two dies headlights are prone to several handicapping factors relating to the level of the production costs, of the structure of fabric of the actors and the flexibility of the handiwork, the latter being less marked than that several directly competitor countries. Let us retain finally that the "textile and leather" are provider of the three quats female employment in Morocco and illustrate for this reason, perfectly, the situation of the Moroccan workers.

Suppression with the world level of the quantitative restrictions on exports of textiles and clothing coming into effect on January 1, 2005 will without any doubt has already important consequences for these under-sectors and the whole Moroccan economy.

The agreement of free trade concluded also with Turkey, producer important and diversified textiles, is a decisive element of this strategy, as it will allow the Moroccan companies to supply in textiles while complying with the rules of origin of the European Union. Agreements concluded with the European Union and the United States could be advantageous with the sector; in particular, this last country is for now an almost unexploited market for Morocco.

A study of the United Nations, based on computable general equilibrium model, implies that Morocco could record in the long run a reduction of 11% and 18%, respectively, of its textile exportations of products and clothing following the elimination of the quotas. The whole would correspond to a reduce of 0,22% of the GDP.

Moroccan agribusiness industries constitute the natural prolongation of the agricultural activities and halieutics. This sector holds a place privileged in the Moroccan economy, since it counts some 1745 establishments and contributes by 25,5% in the total production. Its degree of external dependence is however weak, since the national market absorbs 88% of its production.

Other manufacturing industries, among which the mines, the metal workings, electric and electronic, chemistry and the parachimy, ensure 42,4% of the industrial production and generate 13,4% of the total GDP. Their exports account for 35% of the industry as a whole. The employment is primarily male here. Consequently, the proportion of the women is weak and does not exceed 10% of the total of manpower of the sector.

The construction industries ensure, for their part, 16% of the industrial added-value. The proportion of the women is there, in a way little surprising, almost negligible.

In general, the impact of the Moroccan secondary industry (all at least its "emerged" part) on the growth remains weak, a share equivalent for 26,7% of the GDP.

The services represent 42,7% of the Gross domestic product and occupies 30,2% of the active population to work. The increase in the employment was there three times that of the secondary industry and more of once and half that of the agriculture, which illustrates the potential of this sector in terms of expansion. However, its feminization is not very visible yet, although the one witnesses an increase in the number of women in the Moroccan administration (table 1).

Table 1. Feminization of the Moroccan administration

Years	1970	1981	1985	2007
Feminization rate	1,5	13,3	20,9	32,1

Source : Ministry of Economic and Finance

Also let us announce that the trade, transport and tourism take there a choice place with 51,4% of the added-value released by the entire service sector. Exports, they, account for 21,8% of the total of exports. To finish this view of the Moroccan economy, here a table which details the share of the different sectors in the principal large aggregates of the economy (table 2).

Table 2. Sectoral distribution of the principal aggregates of the Moroccan economy (Shares in %)

	P	D	w	wf	wm	M	X	X/P	M/D
AGR	14,6	14,9	5,3	11,6	3,4	16,8	13,1	12,6	19,6
IAA	11,3	11,6	4,1	10,8	2,1	6,2	9,7	12,0	9,4
ITC	7,1	3,5	5,9	18,2	2,3	16,3	29,4	57,8	81,1
AIM	18,8	18,5	12,8	5,6	14,9	60,7	21,0	15,7	57,2
BTP	7,1	8,3	4,7	0,0	6,1	0,0	0,0	0,0	0,0
CTT	16,8	18,5	14,9	6,6	17,3	0,0	4,9	4,9	0,0
ASM	15,0	14,0	25,0	11,0	29,1	0,0	19,5	19,5	0,0
SNM	9,2	10,8	27,4	36,3	24,8	0,0	0,0	0,0	0,0
Total	100	100	100	100	100	100	100	14	17,4

Note: P is the production, D is the domestic demand, W is the wage rate, wf the female wage rate, wm is the male wage rate, M are the imports and X exports.

2. Presentation of the model

The model used is a static multi-sector general equilibrium model. It registered in the line of the models belt by Shoven and Whalley (1970) like Decaluwé and Savard (2001). Three agents, namely explicitly there the consumers, the producers and the public authorities, are introduced. However, to take into account the foreign trade and more generally the degree of opening of the Moroccan economy, we add a fourth agent to it: the rest of the world.

2.1 Behavior of the companies

For each of the 8 sectors of the Moroccan economy, subscripted by I , the behavior of the companies is summarized by that of a representative firm. Each one of them uses a technology with constant returns and operates in perfect competition. The production, of sector I is a combination, in fixed proportions, added-value and intermediate consumptions. Thus, we specify a production function of the Leontief type.

$$Y_i = \min \left[\frac{CI_i}{oi_i}, \frac{VA_i}{v_i} \right], \quad (1)$$

Where CI_i represent the total intermediate consumption of sector I and VA_i the added-value of this same sector. Parameters oi_i et v_i and are the technical coefficients of the Leontief Function. They respectively represent the quantities of intermediate goods and added-value necessary to the production of one unit of good I . Of course, there are the restrictions¹: : $0 < oi_i < 1$, $0 < v_i < 1$ et $v_i + oi_i = 1$.

Then, the added-value is modelled in the form of a function on two levels. On the first level, we finds a combination, traditional, of capital K_i and of incorporated work L_i , combination which is formalized with the Cobb-Douglas Function with an elasticity of technical substitution equalizes to a unity, is:

$$VA_i = A_i K D_i^{\alpha_i} L D_i^{1-\alpha_i}, \quad (2)$$

A_i is a parameter of scale specific to sector I and α_i the productivity of the capital factor and $1 - \alpha_i$ the productivity of the capital factor

One of the singularities among another of the model resides in the differentiation of work according to it is exerted by men and women; moreover, work is sectorielly substitutable with variable degrees. On the second floor thus, a function with Constant Elasticity of Substitution (CES) makes it possible to take account of this differentiated substitutability. Which is written:

$$CL_i = \left[\gamma_i LM_i^{\frac{\theta_i-1}{\theta_i}} + (1-\gamma_i) LF_i^{\frac{\theta_i-1}{\theta_i}} \right]^{\frac{\theta_i}{\theta_i-1}}, \quad (3)$$

where β_i is the share of male's work in the total work related of sector I and θ_i is the elasticity of substitution of the two types of work in this same sector.

The women's labour demand relative to that of men is, for the companies, a decreasing function of the female wage relative, which can be put as follow:

$$\frac{LF_i}{LM_i} = \left[\left(\frac{wm_i}{wf_i} \right) \left(\frac{1-\gamma_i}{\gamma_i} \right) \right]^{\theta_i}, \quad (4)$$

In order to take account of the possibility for a producer of selling at the same time on the local market and the external markets, we supposes that the transformation of the products is imperfect, taking into account that they are intended for the local market or to export. This behavior is modelled with a Constant Elasticity of Transformation function (CET).

¹ The strict positivity of the coefficients means that sector I production requires at the same time intermediate inputs and value-added.

In a formal way we have:

$$TP_i = H_i \left[\phi_i x r_i^{\frac{\varepsilon_i-1}{\varepsilon_i}} + (1-\phi_i) x m_i^{\frac{\varepsilon_i-1}{\varepsilon_i}} \right]^{\varepsilon_i}, \quad (5)$$

Where the index r and m respectively indicates the reste of the world and Morocco and ε_i the constant elasticity of transformation, with $-\infty < \varepsilon_i < 0$.

With Producer I, while maximizing his profit, can affect his production in variable proportions TP_i , either for exports $x r_i$, either for the local sales $x m_i$. At the optimum, the share of the local production relative to the exported production is thus:

$$x m_i = \frac{1-\phi_i}{\phi_i} \left(\frac{q r_i}{q m_i} \right)^{\varepsilon_i} x r_i, \quad (6)$$

With $q m_i$ and $q r_i$ the prices for the producer of good I for saling respectively on the domestic markets and abroad. We should note that in this case, the taxes on export are included.

2.2 The behavior of the households

It is supposed that there exists a representative household whose decisions of consumption depend on its income, prices and its preferences. These last are expressed by a utility function which one specifies as being of Cobb-Douglas type. It writing in the following way:

$$U_h = \prod_{i=1}^8 x_{ih}^{\mu_{ih}}, \quad (7)$$

With x_{ih} is the quantity of the composite good (a composite good is a basket made up of domestic and imported products) demanded per h, the Moroccan consumer, and μ_{ih} the constant share of the income spent for the acquisition of this composite good I. Of course, we have $\mu_{ih} \geq 0$ and $\sum_{i=1}^8 \mu_{ih} = 1$.

The representative consumer is supposed to make a distinction between the goods according to their geographic origin of production. Thus, the Moroccan consumer consider as imperfectly substitutable two intrinsically identical goods, since one is produced in Morocco and the other abroad². In other terms, we suppose that on the market, the elasticity of substitution between goods is constant. Consequently, the demand function of the representative household takes the form of a CES function, which would mean:

$$x_{ih} = \left[\beta_{ih,m}^{\frac{1}{\sigma_i}} x_{ih,m}^{\frac{\sigma_i-1}{\sigma_i}} + (1-\beta_{ih,r})^{\frac{1}{\sigma_i}} x_{ih,r}^{\frac{\sigma_i-1}{\sigma_i}} \right]^{\sigma_i}, \quad (8)$$

The notations are transparent: σ_i is the elasticity of substitution between the local and imported goods of the same sector (which means of a same composite good), $\beta_{ih,m}$ indicate the parameter of preferences for the local goods, while $x_{ih,m}$ and $x_{ih,r}$ represents the quantities of good I product respectively in Morocco and in the rest of the world.

The price of the imported goods I includes, in addition to the producing price, $q_{ih,r}$ a share relating to the tariff barriers and another to the VAT. Also, we have the following relation between the two prices:

$$p_{ih,m} = q_{ih,m} (1 + \tau_i^{va}), \quad (9)$$

² This assumption is known as the Armington assumption (see Armington, 1969). It makes it possible to take into account the difference of prices between identical goods, but locally produced or imported. It represents an alternative at the same time compared to "traditional" work (local and foreign products are perfectly homogeneous, the elasticity of substitution being infinite) and "structuralist" (the differentiated products are perfectly complementary, the elasticity of substitution being zero).

$$p_{ih,r} = q_{ih,r} e_i (1 + \tau_i^{dd})(1 + \tau_i^{va}), \quad (10)$$

Where τ_i^{dd} the rate, *ad valorem*, of the tariff barriers, τ_i^{va} the rate of the value added tax (an internal tax on the consumption of few goods included) and e_i is a fixed nominal exchange rate between the Moroccan currency, the dirham, and the dollar (all flows in currencies are thus expressed in dollars).

The representative household determines the quantities to consume from each good by maximizing its utility (equation (1)) under a budgetary constraint. The overall expenditure is equal to the sum of the related spending with the purchase of the goods coming from the two areas (Morocco and the rest of the world are indexed per m and r with $M = \{m, r\}$) should not exceed the resources of the household, W^h .

The constraint of budget is writing thus:

$$\sum_{k \in M} p_{ih,k} x_{ih,k} W^h, \quad (11)$$

For the households income, it is made up of a constant share λ^h , capital incomes, male's and female's wages, wm and wf , transfers of the State T^E also of those received from the rest of the world T^r . Ultimately, we have:

$$W^h = \lambda^h \sum_i r_i KD_i + wm \sum_i LD_{im} + wf \sum_i LD_{if} + T^E + T^r, \quad (12)$$

The income of the representative households is not entirely consumed. Indeed, a part is devoted to transfers to the rest of the world TRM^v and another to saving E. implicitly, like the investment is exogenic, it adjust to saving so that $I=E$.

2.3. Public authorities

The behavior of the public authorities is not explicitly modelled³. The State is satisfied to raise four types of taxes (taxes indirect, customs duties, tax on the household income, income, tax on the company's income) which the product is used to finance its different expenditure. Its receipts are thus composed of the incomes of the indirect taxation:

$$RTI = \sum_i \tau_i^{va} [q_{ih,m} x_{ih,m} + (1 + \tau_i^{dd}) e_i x_{ih,r}], \quad (13)$$

Of incomes related to the customs duties

$$RDD = \sum_i \tau_i^{dd} e_i q_{ih,r} x_{ih,r}, \quad (14)$$

And of those related to the direct taxes on the households and the companies

$$RTD = \tau_{dh} W^h + \tau_{dc} W^c, \quad (15)$$

Let us note in addition that the public expenditure is consisted of the consumer expenditure and of the investment, of the debt service and transfers carried out in favour of various agents.

3. Calibration, Scenarios and Simulations

Thus we have already announced, the countable framework of the model is provided by the social accounting matrix of the Moroccan economy built starting from the data of the input-output table (IOT) 2005 published by The High Commission for Planning in 2002 (for brevity, we will not describe all the operations which make it possible to pass from IOT to the matrix in question). In addition, volumes of male's and female's work per sector are obtained by disaggregating the labor demand total of the corresponding sector.

Apart from those relating to the labor market, all the parameters were calibrated as usual now⁴. Let us note simply that the elasticity of substitution between female's work and male's work, in the

³ In the sense where the public authorities do not adopted an optimizing behavior.

⁴ See Decaluwé and Savard (2001).

absence of econometric estimates specific to Morocco, was fixed, like Fontana and Wood (2000), to 0,5⁵ (table 3). The following table provides the values retained for the various parameters:

Table 3. Parameters by branch and product

	Parameters by branch					Parameters by product
	σ_i	ε_i	PmL	PmK	θ_i	PmC
AGR	0,60	0,9	0,05	0,29	0,5	0,20
IAA	0,6	0,9	0,04	0,04	0,5	0,25
ITC	0,6	0,9	0,06	0,04	0,5	0,07
AIM	0,6	0,9	0,13	0,14	0,5	0,15
BTP	0,6	0,9	0,05	0,04	0,5	0,02
CTT	0,6	0,9	0,15	0,26	0,5	0,14
ASM	0,6	0,9	0,25	0,19	0,5	0,19

Source: Commissariat for Planning

Note: PmL is the marginal productivity of labour, PmK is the marginal productivity of the capital and PmC is the marginal propensity to consume per product.

Three principal scenarios were considered. The first corresponds to the maintenance in the state of the commercial relations between Morocco and the European Union. The second considers a suppression partial (25%) of tariff barriers, distributed in a uniform way on all the sectors, the public saving remaining constant. The third supposes the total dismantling of all those barriers, but always with constant public saving. This way, it is possible to compare a reference state (scenario 1) with the final state corresponding to an intermediate stage (Sim 1) or to the ultimate stage of constitution of a free exchange zone with the rest of the world, in particular the Europe (Sim 2).

Let us note that the total removal of the customs duties and other barriers means the free access to the Moroccan national market of all the goods coming from the foreigner, industrialists like agricultural. On the other hand, for the rest of the world, it affects only the Moroccan agricultural produce, the industrial goods profiting from the free access since the Seventies.

To appreciate the gain or the loss of well-being consecutive to a modification of the prices and incomes, we built an indicator of equivalent variation within the meaning of Hicks (VEH)⁶. The principle in is simple. That is to say the indirect utility function of monetary $\mu(Q; p, W)$ which measures the sum (monetary) of which the consumer, confronted with the vector of the prices Q , need to be at least as well as if the vector of the prices were equal to p and its income equal to W . The function μ is thus identically equal to the expenditure function $E(Q; v(p, W))$:

$$\mu(q; p, w) = e(q; v(p, w)), \quad (16)$$

Where $v(p, W)$ represent the level of utility associated with the income W . if we consider the two states $\mu(Q; p', w')$ and $\mu(Q; p_0, w_0)$, the equivalent variation is then defined by:

$$\Delta V = \mu(p_0; p', w') - \mu(p_0; p_0, w_0) = \mu(p_0; p', w') - w_0 \quad (17)$$

This measurement of the difference of the utility takes as bases the current prices and answers the question of knowing which variation of the income at these current prices would be equal to the modification under consideration in terms of its impact on the utility. On the whole, a gain (resp. a loss) of well-being is measured by a positive equivalent variation (respectively negative).

In a practical way, simulations considered consist of a shock related to the reduction of the customs duties, 25% or 100%, on all the imported goods. In order to neutralize the effect of the degradation of the public saving consecutive to the losses of customs receipts on the labor market, in particular female, we supposed that the shortfall due to the dismantling of the tariff barriers is compensated by taking away corresponding to the title of the indirect taxation, primarily the value-added tax. An alternative consist to be supposed, following Dessus and Suwa-Eisenmann (1998), that these budgetary losses are counterbalanced by an increase in the tax household income. Nevertheless, in the case of Morocco, the income taxes seem capped; in any case, it is what arises from the

⁵ This value translates the weak substitutability between men's work and that of women.

⁶ For more details on this point, see Hicks (1946, additional note A) and Shoven and Whalley (1992).

observations of the last mission of the technical assistance of the IMF. For these reasons, the public saving is maintained constant due to the levies on the receipts of the indirect taxation, in particular the VAT. When the customs duties are lower by 25%, the sectors where the female employment demand increases more, consecutively with liberalization, are those of agribusiness industries, the textile and leather. Like we have announced, it concerns there the principal exporting sectors of the Moroccan economy. Such an assertion is perfectly in agreement with the theory of Heckscher, Ohlin and Samuelson, since the fall of the production costs allows *in fine* to increase exports significantly and to thus limit the losses pulled by the increased competition of the products imported on the domestic market.

In contrast, the sectors which lost more of female's employment are the sectors of the "non-tradables goods", such as communication, transport and tourism as well as the other commercial services which are protected sectors.

The gains or the losses in the movement of the two types of work, female and male, influence, at the same occasion, on the sense of variation of the values-added generated by the sectors. In particular, the creation of the value-added is operating in the sectors gaining of work. The magnitude of the labor demand impact on the values-added depends itself on the value of the marginal productivity of these factors (table 4).

Table 4. Reallocation of female and male's work and effects on the values-added (Sim 1)

	AGR	IAA	ITC	AIND	BTP	CTT	ASM
Lf	+ 2,8%	+ 4,3%	+ 5,5 %	- 3,1%	-	- 5,4%	- 4,7%
Lm	+ 3,6%	+ 3,8%	+ 3,7%	- 6,3%	+ 1,6%	- 4,9%	- 3,8%
Total V	+ 2,6%	+ 4,7%	+ 4,5 %	- 5,4%	+ 3,6%	- 3,7%	- 3,5%

The increase in the uniform female wage rate can be explained by the rise of the values-added in the agricultural sector, the agribusiness industry, the industry of the textile and leather and that of the Buildings and Public Works sector (BTP) which are carried on the falls recorded in other industries, the BTP, the trade, transport and tourism also in the other commercial services. Following the increase in this uniform wages rate, the well-being of the households recorded a gain equal to a positive equivalent variation in an order of 0,1% of the GDP.

As for simulation 2 (table 5), when the customs duties are abolished, it is proved that the branches where the demand for female labor increases more are primarily agribusiness industries, textile and leather. They are not protected sectors and consequently, exporters, of the Moroccan economy.

The sectors which lost more female labor are those of the "non-tradables goods" such as Buildings and Public Works, communications, transport and tourism as well as the other commercial services. They are sectors excellently protected.

Table 5. Reallocation of female and male's work and effects on the values-added (Sim 2)

	AGR	IAA	ITC	AIND	BTP	CTT	ASM
Lf	+ 4,7%	+ 6,4%	+ 7,7%	- 5,1%	-	- 7,4%	- 6,5%
Lm	+ 5,6%	+ 5,8%	+ 5,5%	- 7,4%	+ 2,4%	- 6,7%	- 4,6%
V totale	+ 4,6%	+ 6,7%	+ 5,5%	- 6,4%	+ 4,4%	- 5,7%	-5,6%

Following the increase in the uniform wage rate, the well-being of the households recorded a gain much more important than simulation 1, which is confirmed by an "equivalent variation" of Hicks positive in the order of 0,2% of the GDP.

It should be noted that in two simulations, a tendency to the standardization of the female's and male's wages rate is observed. Obviously, this is not valid only under a hypothesis of imperfect substitution between female's labor and male's labor.

5. Sensitivity Analysis

In general, the sensitivity analysis consists in studying the robustness of simulations obtained. Indeed, when a computable general equilibrium model is calibrated, it is not possible to fix, with certainty, the value of each one of its parameters. It is particularly the case of elasticities which we

evaluate in a more or less *ad hoc* way. The uncertainty on their true values generates consequently an uncertainty on the out-put results.

5.1. Overview of the analytical method

The sensitivity analysis consists in measuring the sensitivity of the final results by evaluating the impact of the modifications of the parameter's values on the values of the out-put variables. While referring us to Abdelkhalek and Dufour (1998, 2002) and Dawkins (2005), we can distinguish two great types of procedures:

i) Systematic sensitivity analysis and conditional (for example Harrison (1986), Harrison, Jones, Kimbell and Wigle (1993)) study the effect on the final solution of unilateral perturbations (we can say one by one) of each parameter, the clause *ceteris paribus* are applying.

ii) Systematic sensitivity analysis and unconditional (Wigle (1991), Harrison, Jones, Kimbell and Wigle (1993)) examine a grid of values of the parameters by taking account of their possible interactions. This last approach is thus more rigorous, since it takes into account the cross effects between the various variables (Piet, 2002).

Several projections were made recently out of matter of unconditional analysis. Thus, Harrison and Vinod (1992) developed an approach by sampling of Monte Carlo resting on the specification *a priori* of a distribution for each parameter. Arndt (1996), De Vuyst and Preckel (1997) and Dawkins (2005), as for them, extended the preceding procedure by using the Gaussian quadrature method, usually used on occasion of numerical calculation of integrals. The latter presents the favours of being more sparing in calculations and especially to be based on properly exact replications, and not approximated of model, contrary to the approche of Harrison and Vinod which underestimates the variability of the parameters (De Vuyst and Preckel (1997)).

Via an unconditional sensitivity analysis, we wish to check that the variability of the model as a whole is not too important in the event of simultaneous modification of all the parameters. To do this, the Gaussian Quadrature Method is implemented. For more precise details see Arndt (1996), De Vuyst and Preckel (1997) and Piet (2002).

Every model can be summarized with the vector function $F(Z, \varpi) = 0$ where Z is the vector of the output variables and ϖ that of the parameters. The vector of the solutions, that we note z^* , is thus a function of ϖ : $z^* = z^*(\varpi)$. So the uncertainty relating to the vector of the parameters refers directly on that of the solutions of the model. The unconditional sensitivity analysis precisely consists in estimating the error relating to the vector of solutions of the model compared to the error relating to the parameters, the whole while taking of account the effects of interaction between those latter. It consequently amounts to estimate the moments (we stoped generally with the expectation and the variance) of the vector z^* and this, according to the hazard ϖ . So, we show that the expectation of the solutions of the model is a function of the potential values of the vector of the parameters:

$$E[z^*(\varpi)] = \int_{\omega} z^*(\varpi) g(\varpi) d\varpi \quad (18)$$

Where $F(\varpi)$ represents the density of the random vector absolutely continuous ϖ and ω indicates the area of integration, in this case all the values which can take the parameters. (Without going into the details, let us note simply that the Gaussian Quadrature Method make it possible to evaluate the integral (22).) Following Arndt (1996) and Piet (2002), there will be recourse, to estimate the distribution of the parameters, with a quadrature with order 3, which bases itself on the formula of Stroud.

5.2. Application of the unconditional procedure

We carry out first of all the calculation of the squarture for all the twenty and one elasticities of the model (three elasticities for each of the seven sectors). We evaluate also forty-two points of squarture: $K = 1, \dots, 42$. Lastly, we obtain the values of three elasticities for each of the seven sectors and of the forty-two points of squarture, that is to say a matrix with dimension 42×21 .

The following stage results in simulating the model once again. We concentrate then at the first two time of the vector thus generated. The first one between them (i.e the expectation) is to be compared with the solution given by the central values, or calibrated, of the parameters and the second one, the variance, with the variability of the parameters, which is posed equal to 20% in this case. The table 6 hereafter indexes all the results concerning the output variable "Wellbeing of the households".

Table 6. Output Values obtained by the Gaussian Quadrature Method (Variable “wellbeing”)

1	299377,8	15	344127,1	29	378286
2	302371,6	16	347568,3	30	380177,4
3	305395,3	17	351044	31	382078,3
4	308449,3	18	354554,5	32	383988,7
5	311533,7	19	358100	33	385908,6
6	314649,1	20	361681	34	387838,2
7	317795,6	21	363489,4	35	389777,4
8	320973,5	22	365306,9	36	391726,3
9	324183,3	23	367133,4	37	393684,9
10	327425,1	24	368969,1	38	395653,3
11	330699,4	25	370813,9	39	397631,6
12	334006,3	26	372668	40	399619,8
13	337346,4	27	374531,3	41	401617,8
14	340719,9	28	376404	42	403625,9
Theoretical Average (sim 1)=296416,2			Theoretical Average (sim 2)=296781,4		
Empirical Average= 357688,8			Standard Deviation (SD)=31432,04, Average = 0,087875		

It arises from the examination of this table that the model is relatively stable. Indeed, a variation of 20% of all the parameters generates an increase of 8,8% of the wellbeing of the households. That means that, even if an uncertainty remains as for the true value of certain parameters, it deteriorates only in a tiny measurement the direction and the value of the results.

It is finally possible to define a confidence interval on the variable “Wellbeing”. To do this we used the Bienaymé-Tchebychev Inequality, which is stated as follows: if Z is a random variable admitting a moment in order 2, then for any $K > 0$.

$$P(|Z-E(Z)| \geq k) \leq \frac{\text{Var}(Z)}{k^2}$$

Consequently, *mutatis-mutandis*, by considering a level of significance it follows that the “true average” μ of the level of wellbeing is included in the following interval:

$$P(217121,6 < \mu < 498\ 256,1) \geq 0,95$$

It appears immediately that the “theoretical” averages obtained starting from simulations Sim1 and Sim2 are included in this interval.

6. Conclusions

Via an unconditional sensitivity analysis, we wish to check that the variability of the model as a whole is not too important in the event of simultaneous modification of all the parameters. To do this, the Gaussian Quadrature Method is implemented as developed by Arndt (1996), De Vuyst and Preckel (1997) and Piet (2002). From the methodological point of view, an unconditional sensitivity analysis allows to give evidence of the robustness of the results.

This article wanted to be a contribution to the analysis of the impact, on the interior employment, of the insertion of Morocco in the economy. Its main result is summarized in a sentence: a larger opening of the Moroccan economy results in an increase in demand for female labor in the principal exporting sectors, in particular the agriculture, the agribusiness industry, the textile industry and leather.

More precisely, the increasing opening results in more female employment in the sectors which are competitive and intensives in the same time in this type of labor. Such a result confirms the relation between expansion of exporting industries and the increasing of the female employment, relation already observed by Ozler and Cagatay (1995), like by Ozler (2000, 2003). However: if the female labor in these sectors is an object of a supported demand, it is because the female labour force flexible as much as is very underpaid there. Commercial liberalization in Morocco creates thus gaining and of the losers among the women according to their mobility and of the assignment of their work.

To finish, we would like to insist on some of the limitations of this article and also, in connection, on some of its prolongations. The first limitation of the model presented is due to its static character, which does not make it possible dynamic effects of the commercial opening. Moreover, this fact is modelled only under the angle of the suppression of the customs duties. However, the existence of noncustoms barriers must be taken into account. Undoubtedly, the incorporation of a dynamic form and barriers noncustoms in the model increase its realism. In the same way, not considering the arbitration between female work, leisure and housework implies the inexistence of perverse effects on female labor.

Lastly, the perfect competition is postulated on the markets of the goods and services. The introduction of elements of imperfect competition and the increasing returns to scale could at the very least moderate the results obtained. Similarly, the taking into account of the imperfect intersector mobility of the workers would constitute an interesting prolongation of this work.

It remains however - it will be the ultimate conclusion - that our model such as it is founded on the selected hypothesis appears completely robust against the modifications of its essential parameters and consequently, its validity appears also assured.

Bibliography

- Arndt, C. (2001), An introduction to systematic sensitivity Analysis via Gaussian Quadrature, *GTAP Technical Papers*.
- Armington, P. (1969), A Theory of Demand for Products Distinguished by Place of Production, *IMF Staff Papers*, 16, 159-176.
- Bouzahzah, M., H. Esmaili and A. Ihadiyan, (2005), Ouverture commerciale et migration. Un modèle d'équilibre général calculable pour le Maroc, *Actualité économique*.
- Decaluwé, B., Savard, L. (2001), La politique économique du développement et les modèles d'équilibre général calculable, *Les Presses de l'Université de Montreal*.
- De Vuyst, E.A., Preckel, P.V. (1997), Sensitivity analysis revisited: A quadrature-based approach, *Journal of Policy Modeling*, 17(2), 175-185.
- Fontana, M., Wood, A. (2000), Modeling the Effects of Trade on Women, at Work and at Home, *World Development*, 28(7), 1173-90.
- Fontana, M. (2003), Modeling the Effects of Trade on Women, at Work and at Home: A Comparative Perspective, *International Food Policy Research Institute, Trade and Macroeconomics Division Discussion*.
- Marouani, M.A. (2004), Effets de l'accord d'association avec l'Union Européenne et du démantèlement de l'accord Multifibres sur l'emploi en Tunisie : Une analyse en équilibre général intertemporel, *Document de travail DIAL*, DT/2004/01.
- Karim, M. (2010), Viabilité des finances publiques marocaines, *Editions l'harmattan*.
- Karim, M. (2006), Management des finances publiques au Maroc. Contexte actuel et évaluation, *CNRST*.
- Karim, M. (2013), Taxation of agricultural sector. An Analysis using a Dynamic Computable General Equilibrium Model, MPRA paper 45622.
- Martin, M.C., Souissi, M., Decaluwe, B. (1993), Modèle 3 - modèle réel d'une économie ouverte avec gouvernement », in PARADI (Programme d'analyses et de recherches économiques appliqués au développement international).
- Piet, L. (2002), Spatialisation d'un modèle d'équilibre général calculable pour l'étude de la localisation des activités agricoles à une échelle infra-nationale, *Thèse de Doctorat de l'ENGREF en Sciences de l'Environnement*, p. 315.
- Ozler, S., Cagatay, N. (1995), Feminization of the Labor Force: the Effects of Long Term Development and Structural Adjustment, *World Development*, 23(11), 1883-1894.
- Ozler, S. (2000), Export Orientation and Female Share of Employment: Evidence from Turkey, *World Development*, 28, 1239-1248.
- Ozler, S. (2003), Is Trade Liberalization a Window of Opportunity for Women? , *Staff Working Paper, ERSD - 2003 - 03, WTO*.
- Schubert, K. (1993), Les modèles d'équilibre général calculable : une revue de la littérature, *Revue d'Economie Politique*, 103, 775-825.

- Shoven, J.B., Whalley, J. (1984), Applied General Equilibrium Models of Taxation and International Trade: An Introduction and a Survey, *Journal of Economic Literature*, 23, 1007-1051.
- Shoven, J.B. Whalley, J. (1992), Applying General Equilibrium, *Cambridge University Press*.
- Schultz, T.P. (1990), Women's Changing Participation in the Labor Force: a World Perspective, *Economic Development and Cultural Change*.
- Touhami A., Bocciafuso, D., Savard, L. (2006), Politiques économiques et pauvreté au Maroc : Analyses en équilibre général microsimulé. Cahier de recherche, *Working Paper. Groupe de Recherche en économie et Développement International*.
- Varian, H. (1997), Introduction a la Microéconomie, *De Boeck Université, Collection Ouvertures, Prémisses*.