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Gender policy and female employment: a CGE model for Italy

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ABSTRACT

The gender integration in all areas of policy choices and at all stages of the decision-making process is strongly recommended by the European Union and represents an achievement that the Member States should accomplish when implementing policy measures. In a country like Italy, where the level of female labour participation is among the lowest in Europe, policy maker decisions should encourage and stimulate the demand for female labour without neglecting the global employment rate and income growth. The multisectoral analysis offers the possibility to bridge gender disaggregation within income formation and distribution from the production phase to the demand formation. In this perspective, this paper develops a gender-aware CGE model based on the gender-aware SAM for the Italian economy to evaluate the impact of different fiscal policies aimed to reduce female labour cost and trigger woman hiring in those sectors with high gender disparity.

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1. Introduction

Greater women inclusion in the labour market is a necessary condition to improve economic growth and to cope with demographics challenges (Elborgh-Woytek et al., 2013). Recent empirical evidence from OECD shows that the average gain expected from the full convergence of participation rates would generate in the EU-21 an increase of 12.4% in GDP per capita by 2030 (OECD, 2014). According to this point of view, the gender integration at all stages of the decision-making process is strongly recommended by the European Union (EU) and represents an achievement that Member States should accomplish when implementing any policy measure (European Commission, 2014). Indeed, gender equality is considered an essential value to overcome the economic crisis in a wide range of areas and it represents one of the EU's founding principles, which contributes to job creation, growth, fairness and democratic change. In European guidelines, all Member States are recommended to increase female participation in the labour market and the employment of women to reduce the gender pay gap and the segmentation of the labour market.

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Although gender gap has narrowed in recent decades, inequalities and several criticisms remain in many aspects. In particular, gender gaps in employment and decision-making have narrowed but women still account for less than a quarter of company board members, despite representing 40% of the global labour force (World Bank, 2011). Female employment remains a strong objective target set by the EU for some European Countries, this phenomenon stems from multiple factors of discrimination against women. Indeed, women have more difficulties in accessing the labour market. These difficulties translate, in some contexts, in high inactivity and/or unemployment rates. Different studies highlight a positive relationship between the increase in labour market participation by women and potential macroeconomic gains (Dollar and Gatti, 1999; Loko and Diouf, 2009). Some of them estimate that GDP losses are attributable to gender gaps in the labour market suggesting that, for several countries, raising the female labour force participation rate to country-specific male levels would raise GDP (Aguirre et al., 2012; Cuberes and Teignier, 2012). In this perspective, when introducing policy measures aimed to stimulate employment, policy makers should concentrate on the female labour participation especially where it is more discouraged to trigger the gender integration and inclusion.

Testing the profitability of such policy measures requires a set of instruments of analysis capable of quantifying the interactions between gender and economic variables, from the production phase to the final formation of the demand moving through the generation and distribution of income. The multi-sectoral computable general equilibrium approach offers a comprehensive macro framework capable of assessing the economic and social impact of the policies both in direct and indirect terms (Ciaschini et al. 2010). In particular, the multi-sectoral analysis offers the possibility to identify the contribution of each industry to income generation and how it is allocated among primary factors by gender. Moreover, it allows detecting how gendered income is allocated to gendered institutional sectors and thus to final demand. Gendered CGE models, calibrated on gendered SAM, represent a powerful tool capable to properly assess the impact of a gender policy measure and provide policy-makers with the instruments to achieve gender integration.

Generally, in the literature on gender-aware CGE models, two broad approaches or schools can be identified: the 'gender-disaggregation' school, which disaggregate labour factors, production and household groups by sex; and the 'two-systems' approach which includes some representation of unpaid domestic and care work in addition to sex-disaggregation of labour factor and households (Fontana, 2014). The 'gender disaggregation' approach is widely adopted to study the impact of trade policies for Mozambique (Arndt and Tarp, 2000; Arndt et al., 2006; Arndt et al., 2011) and South Africa (Thurlow, 2006). It is criticised for its simplicity since the rules of behaviour of various agents in the model remain largely governed by neo-classical principles and do not make explicit reference to unpaid care work (Fontana, 2014). The 'two-systems' approach makes an attempt to overcome the above-mentioned limits through the integration into the CGE framework of nonmarket activities (Fontana and Wood, 2000; Fontana, 2001; Fontana, 2002; Cockburn et al., 2007; Siddiqui, 2009; Zacharias and Masterson, 2016). However, this class of models still follows neoclassical principles and fails to highlight the overall interactions between market and nonmarket activities.

The present study contributes to the debate on the effectiveness of gender policies in stimulating female labour participation in Italy, trying to overcome some of the above-mentioned limits of the approach. In particular, in comparison to the existing studies, we

identify gender categories into the value-added components for all the production sectors determining the different female and male participations in income generation by industry. Moreover, we split the mixed incomes generated in each production process by male and female. This represents an innovative feature in the gender-disaggregation approach because mixed income contains the remuneration for work done by the owner or other members of the households (male and female) that cannot be distinguished from the return to the owner as an entrepreneur. Therefore, separating the mixed income allows determining the contribution of unpaid female work by industry independently from the fact that they may be owners of the industry or a member of the household. Regarding the Institutional Sectors, we consider female and male households according to the gender of the main earner in the household. In this way, CGE models allow wide flexibility in assessing qualitatively and quantitatively relapses and effects of gender policies on all macroeconomic aggregates.

The aim of this paper is therefore to analyse the effects of a policy conceived to reduce female unemployment. In this way, the paper attempts to disclose any trade-offs between stimulating female employment and aggregate performances. More specifically, we consider a policy aimed to reduce the female labour cost for the industry, that is to say, the taxes paid by firms on female wages (social contribution). The reduction applies only to those industries affected by higher gender disparity. This analysis will permit to verify how the structural conditions of the labour market by industry affects the gender policy results and therefore the possibility to improve the reliability and effectiveness of the measures adopted.

In this perspective, the next section discusses the main actions suggested and carried out by the EU and the Italian Government to guarantee a higher level of gender integration. Then, we present the gender-CGE model calibrated on the gender-SAM built to carry out the impact analysis of the fiscal policy aimed to stimulate the female labour inclusion. Section 4 presents the results of the analysis and Section 5 provides some conclusions.

2. The gender inclusion in Europe and Italy

Since 1997, the EU Member States established a common set of objectives related to policies of employment with the purpose of creating more skilled and unskilled jobs throughout the European Union by using the European Employment Strategy (EES).¹ The commitment for the Member States complies with a number of common objectives resting on four pillars: employability, entrepreneurship, adaptability and equal opportunities. Under the pillar of equal opportunities, the priority was to combat inequalities and increase female employment rate with the implementation of policies on career breaks, parental leave, part-time jobs and childcare services quality.

In 2000, the EES, was inserted into the Lisbon Strategy with the European strategic goal of becoming “to become the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion” (European Council, 2000).² In 2010, in the middle of the economic

¹ After inclusion of the new title ‘Employment’ in the Treaty on EU, the Heads of State and Government launched an EES at the Luxembourg Jobs Summit with a view to coordinate national employment policies.

² The Lisbon strategy has not produced the desired results particularly after the international financial crisis in 2008 followed by the explosion of the economic crisis of 2009, still in progress, with its serious repercussions on the labour markets. The

crisis, the 'Europe 2020' strategy established the strategic objectives of a 'smart, sustainable and socially inclusive society' based on high employment rates and social and territorial cohesion. In this context, female labour participation holds a key role.

However, gender mainstreaming is included in Member States guidelines for employment policies and gender equality is interpreted as a precondition for sustainable, competitive and inclusive growth. Nevertheless, its inclusion in 'Europe 2020' is unusually scarce as if gender equality policies and their monitoring processes continued to be considered a short-term cost rather than long-term investments. The focus on macroeconomic and fiscal consolidation has led to the neglect of the goal of gender equality. Whilst the role of women in promoting labour participation and social cohesion is fully recognised, the importance of a gender-mainstreamed approach seems to have been undermined by the current circumstances (Villa et al., 2012).

Among European Countries, Italy has always been characterised by low levels of female employment and in recent years, the employment and the non-participation rates further worsened, in particular for the negative effects of the economic and financial crisis. Gender differences, instead, were reduced by the stronger impact of the crisis on the most typically male occupations, especially in industries such as construction and by the better resilience of female occupations in the services (ISTAT, 2015).

The presence of women in decision-making roles appears to be growing, however, the female labour market continues to be characterised by deep structural limitations that affect the employment rates. Many women are inactive because salaries (net of all settlement costs) are considered insufficient. Indeed, women end up earning less because they are concentrated in low-wage sectors, in the less skilled jobs, in occupations that are recognised inferior to the typically male occupations, while facing more obstacles to ascend to senior positions. This is a common phenomenon in several European countries where women are over-represented in the healthcare, education and public administration sectors, characterised by lower than average salaries. The growth in female employment, with particular attention to those sectors with high levels of gender inequality, could generate a wide virtuous cycle represented by an increase in disposable income and final demand, but also direct tax revenues, which could be used to finance employment support policies.

Therefore, promoting female labour participation can be considered important for several reasons: (i) it ensures the implementation of the equity principle between men and women; (ii) it improves the economic well-being of the households; (iii) it reduces the risk of poverty among women in old age, ensuring them an adequate pension level; (iv) it could contribute to the growth of the whole economic system. In Italy, significant efforts were concentrated in reforming the labour market alongside with the introduction of new types of contracts, including tax incentives to encourage the enrolment and the cut in the tax wedge, which have led to the implementation of the Jobs Act in 2015 and the structural review of the Italian labour market. Reducing taxes on labour - in line with almost all international institutions' recommendations - helps to improve the competitiveness of the country and is sustainable and consistent with the budgetary measures on cutting taxation.

Lisbon strategy had defined quantitative targets in terms of female employment rate (60% by 2010) and childhood care services for children under the age of three (with a coverage rate of 33% by 2010), which have not been achieved in several countries. The pace of growth is hard to gather, unemployment has returned and exceeds 10%, while many countries have implemented strong restrictive measures to rebalance their public finances (European Commission, 2010).

3. The approach: gender CGE and SAM

In order to measure the direct and indirect effects in the economic system of a policy aimed at encouraging the integration of women into the labour market, we developed a static CGE model, which includes the assumption of the labour market imperfection, based on the existence of involuntary unemployment rate. The model is calibrated on a gender SAM in which Value-Added components and Households are disaggregated by gender. The inclusion of gender characteristics into the SAM, and thus into the CGE model, allows to formalise the behaviour of the agents according to their gender and then track policy transmission mechanisms within the income circular flow

3.1. The gender SAM

In this study, we developed the gender SAM for Italy (year 2012) to quantify the economic influence of gender-related phenomena on income generation, primary and secondary income distribution and final demand formation. More specifically, the gender SAM includes 64 industries, as listed in Table 1, four components of value-added (compensation of employees, mixed income, gross operating surplus and indirect net taxes), three Institutional Sectors (Households, Firms and Government), the formation of capital and the Rest of the World accounts.

The contribution of each gender in production processes derives from the disaggregation of compensation of employees and mixed income by male and female per each industry using the statistics on social cohesion produced by ISTAT and the Ministry of Labour and social Policy.³ On the one hand, the share of male and female on total workers is used to decompose compensation of employees by gender. On the other hand, the portions of male and female self-employed on total self-employed workers is used to split the mixed income account. The disaggregation of mixed income by gender represents an innovative feature in the gender-disaggregation approach that usually considers only the disaggregation of labour (Fontana and Wood, 2000). According to the System of National Accounts (United Nations, 2008) mixed income is a balancing item for unincorporated enterprises owned by households in which the owner(s) or members of the same household may contribute unpaid labour inputs of a similar kind to those that could be provided by paid employees. In other words, mixed income contains the remuneration for work done by the owner or other members of the households (male and female) that cannot be distinguished from the return to the owner as entrepreneur. Therefore, by splitting the mixed income by gender, we attempt to determine the contribution of unpaid female work by industry independently from the fact that they are the owner of the activity or a member of the household.

As regard to Institutional Sectors, the flows in the SAM related to Households incomes and expenditures are disaggregated in two groups based on the gender of the main earner, using data from the ‘Survey of Household Income and Wealth 2012’ from Bank of Italy.⁴

³ SocialCohesion.Stat is a warehouse of statistics regarding social cohesion produced by the National Social Security Institute (Inps), the Italian National Institute of Statistics and the Ministry of Labor and Social Policy. It collects more than 700 indicators on crucial aspects of Italian society such as population dynamic, labour market, human capital, poverty, social security and income support, active labour market policies.

⁴ ‘Survey of Household Income and Wealth 2012’ that covers 8151 Households composed of 20,022 individuals, about which 48.3% are men and 51.6% are women.

Table 1. Classification of industries in SAM.

N.	Industry	N.	Industry
1	Crop and animal production, hunting etc.	33	Air transport
2	Forestry and logging	34	Warehousing and support activities for transportation
3	Fishing and aquaculture	35	Postal and courier activities
4	Mining and quarrying	36	Accommodation and food service activities
5	Manufacture of food beverages and tobacco products	37	Publishing activities
6	Manufacture of textiles, wearing apparel and leather products	38	Motion picture, video and television programme production, sound recording and music publishing activities
7	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	39	Telecommunications
8	Manufacture of paper and paper products	40	Computer programming, consultancy and related activities; information service activities
9	Printing and reproduction of recorded media	41	Financial service activities, except insurance and pension
10	Manufacture of coke and refined petroleum products	42	Insurance, reinsurance and pension funding, except social security
11	Manufacture of chemicals and chemical products	43	Activities auxiliary to financial services and insurance
12	Manufacture of basic pharmaceutical products and preparations	44	Real estate activities (excluding imputed rent)
13	Manufacture of rubber and plastic products	45	Imputed rents of owner-occupied dwellings
14	Manufacture of other non-metallic mineral products	46	Legal and accounting activities; head offices, management & consultancy
15	Manufacture of basic metals	47	Architectural and engineering activities; technical testing and analysis
16	Manufacture of fabricated metal products, except machinery	48	Scientific research and development
17	Manufacture of computer, electronic and optical products	49	Advertising and market research
18	Manufacture of electrical equipment	50	Other professional, scientific and technical activities; veterinary activities
19	Manufacture of machinery and equipment n.e.c.	51	Rental and leasing activities
20	Manufacture of motor vehicles, trailers and semi-trailers	52	Employment activities
21	Manufacture of other transport equipment	53	Travel agency, tour operator reservation service etc.
22	Manufacture of furniture; other manufacturing	54	Security and investigation activities; services to buildings and landscape activities; office administrative, office support and other business support
23	Repair and installation of machinery and equipment	55	Public administration and defence; compulsory social security
24	Electricity, gas, steam and air conditioning supply	56	Education
25	Water collection, treatment and supply	57	Human health activities
26	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation and waste management services	58	Social work activities
27	Construction	59	Creative, arts and entertainment activities; libraries, archives, museums and other cultural activities; gambling and betting activities
28	Wholesale, retail trade, repair of motor vehicles	60	Sports, amusement and recreation activities
29	Wholesale trade, except of motor vehicles	61	Activities of membership organisations
30	Retail trade, except of motor vehicles and motorcycles	62	Repair of computers and personal and household goods
31	Land transport and transport via pipelines	63	Other personal service activities
32	Water transport	64	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

Hence, we distinguish male-headed and female-headed households to highlight the origin and the use of income by gender. Each group might include components as diverse as a single pensioners, lone mothers, single men and couples with and without children and receives male and female compensation of employees and male and female mixed income as showed in Figures 1 and 2. The gender of the main earner therefore, does not exclude the possibility to receive primary factors' compensations' from the other gender.

The allocation of gender-headed Households disposable income between final consumption and savings is obtained considering the ISTAT Investigation into Family Consumption for 2012 that provide detailed information about many expenditure items classified according to the final consumer's gender.

3.2. The gender CGE model: review and main assumptions

CGE models represent an extension of classical equilibrium analytical models in the sense that they are mostly policy driven and aim to provide numerical solutions to large multi-sectoral models (Scricciu, 2007). Their main task is to simultaneously find equilibrium in prices, quantities and incomes in a system where all economic flows are accounted for. Furthermore, they are capable of illustrating the economic flows in much more detail and complexity than analytical models, which can only afford to work in small dimensions. CGE modelling hence represents a flexible analytical and simulation device capable of capturing the multiple effects that the implementation of a set of combined policy issues could produce on the economy (Pretaroli and Severini, 2009).⁵

The use of CGE approach to analyse the impact of gender policies has become quite common practice due to the growing interest in the gender and inequality dimension and the recognition of the special role that women play in economic development especially with the ascension of developing countries. It generally involves the introduction of gender components in the labour market (Arndt et al., 2006). Some studies have also introduced nonmarket activities in CGE models with the explicit choice between labour (in domestic activities) and free time (Fontana and Wood, 2000). Therefore, distinguishing the database by gender would enable the assessment of alternative development strategies for both men and women and the evaluation of policies aimed to improve the economic conditions of women (Duchin and Sinha, 1999; Stewart, 2005). Especially for developing countries, trade policies are likely to have gender differentiated effects because of women's and men's different access to and control over resources and because of their different roles in productive activities and households. Fontana and Wood (Fontana and Wood, 2000) were the first to develop a gendered CGE model for Bangladesh incorporating households' work and leisure in addition to the market economy with inputs and outputs. Two other papers by Fontana (2004) and Fofana et al. (2003) also developed a gender CGE framework to find that expansion of the females' paid employment is accompanied by a reduction in their leisure time.

⁵ In CGE modelling, several studies focused on analysing the labour market under different points of view. On one hand, from a direct point of view, by analysing the changes in the internal market rules (social security and labour taxation policies) (Dewatripont et al., 1991; Gelauff et al., 1991; Sorenson, 1997; Hutton and Ruocco, 1999; Bovenberg et al., 2000; Bohringer et al., 2005; Agenor et al., 2007), and on the other hand, by studying the indirect effects that economic measures (fiscal, trade liberalisation, energy and climate policies), albeit not directly related to the labour market, may have on it (De Melo and Tarr, 1992; Herault, 2007; Bourguignon and Savard, 2008; Bussolo et al., 2008; Ferreira et al., 2008; Robilliard et al., 2008; Ballard et al., 2009; Fraser and Waschik, 2010).

Figure 2. Aggregated gender SAM for Italy (2012) – millions of Euros.

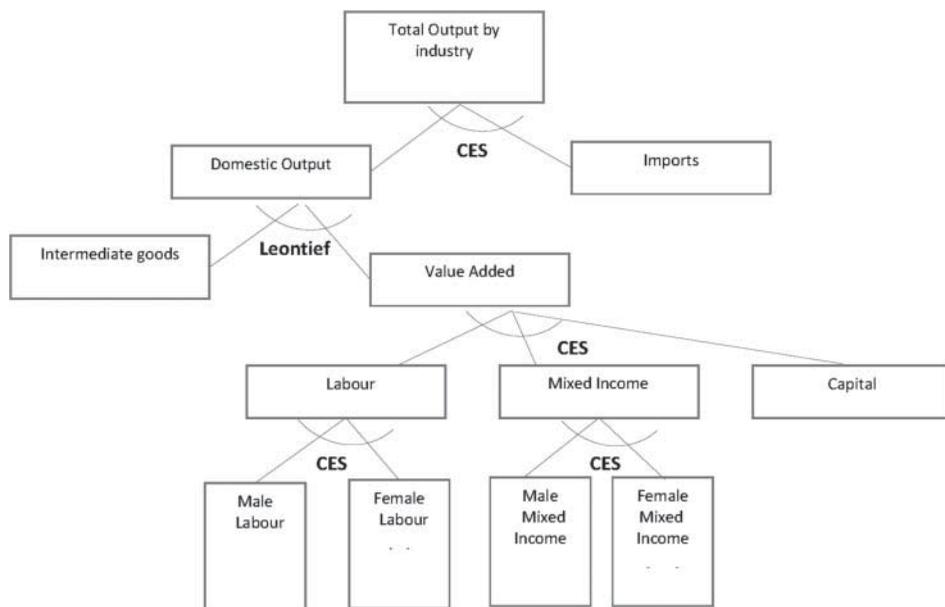
	Industries		Primary Factors					Trade and transport margins	Institutional Sectors				Capital account	Total		
			Compensation of employees		Mixed income		Gross operating surplus		Taxes on products less subsidies	Firms	Government	Households			Rest of the World	Capital formation
			male	female	male	female						male	female			
n.	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
Industries	1	1599217								334772	693089	265276	344085	295377	3531816	
Primary Factors	Compensation of Employees	male 2	382415										553		382968	
		female 3	288282										341		288623	
	Mixed income	male 4	163624													163624
		female 5	60716													60716
	Gross operating surplus	6	479350													479350
	Taxes on products less subsidies	7	36709											6206		42915
	Trade and transport margins	8	155815													155815
Institutional	Firms	9				328711			97622	27957	47460	12966	47646		562362	
	Government	10				29628	42915	152644	52994	716	329371	90844	4744		703856	
	Households	male 11	287772	58875	148962	19802	89921			182474	228531	80845	226321	22715		1346219
		female 12	95196	229748	14661	40915	31090			49777	98725	60334	22666	9813		652926
Rest of the World	13	365686					3172	40544	45063	8511	4232			467208		
Capital formation	14								138951	-31909	126609	30621	31104		295377	
Total		3531816	382968	288623	163624	60716	479350	42915	155815	562362	703856	1346219	652926	467208	295377	

In general, two broad approaches to gender CGE can be identified: the ‘gender-disaggregation’ school, which simply disaggregates labour factors, sectors of production and household types by sex and the ‘two- systems’ approach, which includes some representation of unpaid domestic and care work (including childcare, for instance) in addition to sex-disaggregation of factors and households (Fontana, 2014). The former approach is the simplest one but also the latter is useful particularly if gender categories are used simply to classify results, with exclusive attention to the market sphere and the rules of behaviour of various agents in the model remain largely governed by neoclassical principles. Moreover, unpaid care work is not made explicit in either case.

In this article, a static gender CGE is developed following the assumptions of ‘gender-disaggregation school’. The model is calibrated on the basis of the gender SAM for Italy that presents gender features in the production processed and income distribution. Since the behavioural parameters of the model are calibrated on the SAM that itself provides a clear picture of the gender structure in the economic system, the model is able to capture also the different behaviour and the policy transmission mechanisms of a gender policy. In this sense, we are able to overcome the limit of the ‘gender-disaggregation’ CGE approach related to the incapacity of the existing models to reflect some plausible explanation as to the underlying causes of gender-based inequalities.

More specifically, following the structure of the SAM, the model considers an open economy with: 64 Industries, 5 Primary Factors or Value-Added components (male and female Compensation of Employee, male and female Mixed Income, Gross Operating Surplus), taxes on Industries, net taxes on commodities and imports, 5 Institutional Sectors (Firms, male- and female-headed Households, Government and Rest of the World) and capital formation.

Constant Elasticity of Substitution (CES) functions and the related Constant Elasticity of Transformation functions have been used to model the producers’ and consumers’ decision-making process regarding the production technology and the final demand

Figure 3. Nesting structure of production function.

formation (Pauw, 2003).⁶ In particular, the production function of the model is defined following the nested scheme reported in Figure 3.

Starting from the nest on the top, total output by industry is obtained combining imports and domestic production following the Armington hypothesis of imperfect substitutability between domestic and imported goods (Armington, 1969). In the second nest, the domestic output results from the combination of Value Added and the intermediate goods aggregate assuming a Leontief production function. The intermediate goods aggregate derives from the combination of intermediate goods with fixed coefficients (calibrated on the SAM), thus no changes in technologies are considered.

In the third step of nested production function, the Value Added is obtained combining three primary factors: Labour, Mixed Income and Capital. In the ultimate step of the production function, Labour and Mixed Income aggregates are determined respectively as the combination of female and male components following the structure provided by the SAM database (see Section 3.2). The model is therefore able to take into account the different behaviour of the economic system as regard to the gender composition of its value-added components in all industries. In this sense, our approach differs from the existing literature that usually considers the disaggregation of labour by gender and solely for agricultural activities (Fontana, 2014).

Value-added components represents primary factors of production and their price is determined as the balance between their demand (expressed by production process) and their endowments (exogenously determined). In particular, in the model we consider a

⁶ In particular, the use of CES functions in CGE models is mainly due to the mathematic characteristics of regularity that ensure an easier analytic treatment. Furthermore this kind of function is flexible enough to characterise a series of different economic behaviours (Bohringer et al., 2003), and it allows us to calibrate the model directly on benchmark deviations (Rutherford, 2002; Klump and Saam, 2008; Sancho, 2009).

perfect competitive market for mixed income and gross operating surplus (Ciaschini et al., 2013).

As for the labour market we consider a no-competitive market and the presence of Trade Unions affecting the formation of nominal wages. This rigidity in forming the labour price contributes to the generation of involuntary unemployment since wages do not adjust to balance demand and endowments of labour factors as in typical neoclassical CGE models, but follow the Trade Unions' utility function. More specifically, wages derives from the negotiations between Trade Union and firms in a 'right to manage' Nash-bargaining approach (Bohringer et al., 2005): Trade Unions choose the nominal wage that maximise their utility function (depending on employment) but firms choose the level of employment to maximise their profits taking the negotiated wage as it is given.⁷

The markets of goods and services are perfectly competitive so that, in equilibrium, prices allows the balance between total supply by industry and total demand (market clearing condition). Total demand is made up of domestic demand for intermediate goods (depending on the production processes), Households consumption, Government consumption, investment and export.

In the model, Households are disaggregated in two groups 'Female-headed' and 'male-headed' households, according to the gender of the main earner, but their behaviour is modelled through the same equations. Therefore, the different coefficients, shares and propensities that are calibrated on the SAM are the elements determining the differences in their choices. Households⁸ and Government consumption derive from the maximisation of their respective utility function subject to their budget constraint, leading to the demand-side specification of the model. The budget constraint is represented by their disposable income that, for Households, derives from primary factors compensation and transfers from others institutional sectors, net of direct taxes and transfers to other institutional sectors. Full tax revenues plus primary factors compensation plus net transfers from other institutional sectors represents the Government disposable income. It can be destined to consumption or saving according to the respective propensity to consumption (obtained from the SAM).

The closure of the model is given by the conditions on: (i) Government balance, (ii) Rest of the World balance, (iii) Saving-Investment balance. The Government Balance follows the condition by which saving is endogenously determined as the difference between Government disposable incomes and total expenditure. The condition for the balance of Rest of World imposes that the real exchange rate can be flexible, while gross saving is fixed in nominal terms. The condition for Savings-Investment balance imposes that investments are saving driven, so that the gross fixed investment derives from the sum of Institutional Sector's savings.

4. Simulation and results

In Italy as in other EU countries, policies aim to reduce gender disparities and overcome the international economic crisis through the conquest of a balanced participation of men and women in the economic, social and political life (European Commission, 2011). For

⁷ Workers are supposed to be all represented by Unions that behave as monopolists in the labour market (Pissarides, 1998).

⁸ When we mention 'Households', we simultaneously refer to male- and female-headed Households.

this reason, supporting female employment requires two actions able to stimulate the conciliation of work with family responsibilities and female labour participation.

In this perspective, this study simulates the introduction of subsidies for those industries that hire women⁹ through the reduction of the fiscal burden associated with the cost of female labour. It represents a preliminary exercise to evaluate whether a fiscal policy like that can trigger the demand or the wage of female labour force, with consequences on female unemployment and incomes. In particular, we consider an incentive that ex-ante accounts for the 0.1% of GDP and reduce taxes associated with female labour cost only for those companies characterised by high gender disparity.

The Italian Ministry of Labour defines the economic sectors with a marked gender disparity¹⁰ based on Istat data and in line with the European Commission Regulation. It defines a disadvantaged worker as a person who works in a sector where the gender imbalance exceeds by 25% the average gender imbalance across all economic sectors and belongs to that under-represented gender group. The sectors identified by ISTAT as those with high gender imbalance were associated with the industries in the SAM that present a difference between male and female compensation of employee greater than 25% as showed in Table 2 (first and second column). The other columns of the table record the tax rate and the tax revenue associated with the compensation of female labour within the SAM together with the new tax rate and revenues after the reduction in taxation. The total amount of the policy is calculated as the difference between the tax revenues before and after its implementation.

The interpretation of the policy results can be quite complex since several partial equilibrium effects can work in opposite directions (Bohringer et al., 2003). Nevertheless, the outcomes can provide a road map for policy makers to indicate the directions of the policy measures.

Table 3 displays the macroeconomic effects of the simulation on GDP and its main components. The final impact on the variables reflects the direct and the indirect effects of the shock. In aggregate terms, tax reduction on female labour compensation has a positive effect on real GDP that is higher than the benchmark by 0.05%. This impact comes from the positive effect of the policy on all components of GDP and a general reduction of prices denoted by GDP deflator (−0.05%). This stimulates households' real consumption (+0.02%), investment (+0.02%), government expenditure (+0.1%) and exports (+0.07%).

It should be pointed out that the policy is implemented without any compensation, therefore it is operated through an increase of public deficit resulting from the reduction of tax revenues. This does not affect the aggregate value of GDP that remains higher in relation to the benchmark, meaning that the policy stimulates other income channels and allows a compensation of the initial reduction of government incomes.

In disaggregate terms, we can also identify how each industry contributes to the global performance on GDP as showed in Figure 4. The industries characterised by higher gender imbalance that receive the incentive are represented with the grey bars, while the black bars refer to industries not directly involved with the policy measure. It demonstrates how the contribution of each industry on GDP (Value Added) is quite composite. We observe a

⁹ Similar measures are included in the Labour Reform Law (Law n. 92/2012) and consider the reduction by 50% of the employers' social contributions in relation to the recruitment with employment contract workers that belong to the categories with a higher risk of exclusion from the labour market.

¹⁰ (EU) n. 651/2012.

Table 2. Policy implementation.

ISTAT industry	SAM industry	n.	Sectoral gender imbalance	Lf tax rate	Lf tax revenue (€ mln)	Lf tax rate <i>policy simulation</i>	Lf tax revenue <i>policy simulation</i> (€ mln)	Policy amount (€ mln)
Agriculture	Crop and animal production, hunting and related service activities	1	39%	-15.83%	-415.94	-17.33%	-455.35	39.40
	Forestry and logging	2	39%	-16.10%	-10.06	-17.60%	-11.00	0.94
	Fishing and aquaculture	3	39%	-16.28%	-22.70	-17.78%	-24.79	2.09
Mining and quarrying	Mining and quarrying	4	46%	3.22%	11.72	1.72%	6.26	5.45
Manufacturing	Manufacture of food products, beverages and tobacco products	5	46%	3.45%	149.88	1.95%	84.67	65.21
	Manufacture of textiles, wearing apparel and leather products	6	46%	3.46%	141.02	1.96%	79.87	61.15
	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	7	46%	3.35%	34.37	1.85%	19.00	15.37
	Manufacture of paper and paper products	8	46%	3.51%	27.52	2.01%	15.74	11.78
	Printing and reproduction of recorded media	9	46%	3.55%	27.14	2.05%	15.69	11.46
	Manufacture of coke and refined petroleum products	10	46%	3.91%	13.09	2.41%	8.07	5.02
	Manufacture of chemicals and chemical products	11	46%	3.44%	53.40	1.94%	30.11	23.29
	Manufacture of basic pharmaceutical products and pharmaceutical preparations	12	46%	3.49%	41.01	1.99%	23.40	17.61
	Manufacture of rubber and plastic products	13	46%	3.39%	51.29	1.89%	28.60	22.69
	Manufacture of other non-metallic mineral products	14	46%	3.44%	78.20	1.94%	44.07	34.14
	Manufacture of basic metals	15	46%	3.54%	40.87	2.04%	23.53	17.34
	Manufacture of fabricated metal products, except machinery and equipment	16	46%	3.45%	177.30	1.95%	100.22	77.09

(continued).

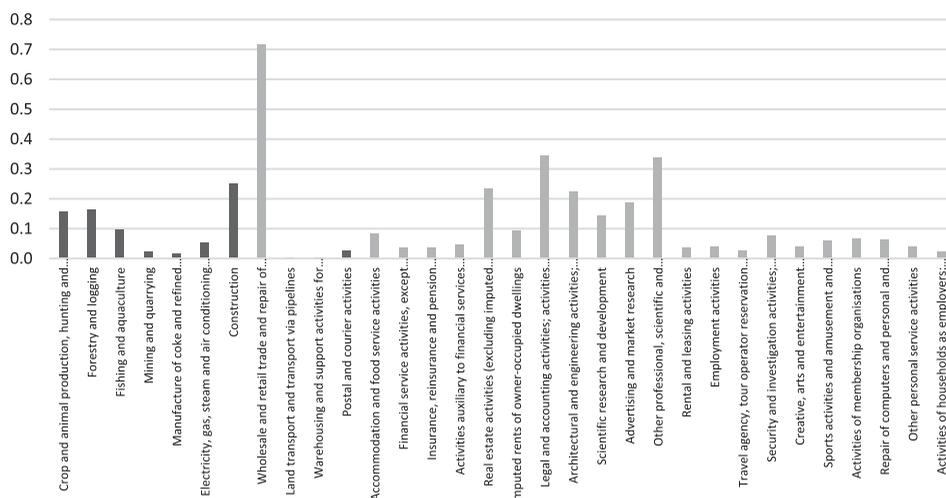
Table 2. Continued.

ISTAT industry	SAM industry	n.	Sectoral gender imbalance	Lf tax rate	Lf tax revenue (€ mln)	Lf tax rate <i>policy simulation</i>	Lf tax revenue <i>policy simulation</i> (€ mln)	Policy amount (€ mln)
	Manufacture of computer, electronic and optical products	17	46%	3.43%	55.36	1.93%	31.16	24.20
	Manufacture of electrical equipment	18	46%	3.40%	65.18	1.90%	36.45	28.74
	Manufacture of machinery and equipment n.e.c.	19	46%	3.46%	181.18	1.96%	102.58	78.60
	Manufacture of motor vehicles, trailers and semi-trailers	20	46%	3.39%	60.64	1.89%	33.83	26.81
	Manufacture of other transport equipment	21	46%	3.44%	36.28	1.94%	20.44	15.84
	Manufacture of furniture; other manufacturing	22	46%	3.48%	71.13	1.98%	40.50	30.63
	Repair and installation of machinery and equipment	23	46%	3.41%	35.61	1.91%	19.95	15.66
Energy	Electricity, gas, steam and air conditioning supply	24	46%	7.09%	114.14	5.59%	89.99	24.15
Water and waste management	Water collection, treatment and supply	25	46%	3.99%	16.82	2.49%	10.50	6.32
	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services	26	46%	4.22%	60.46	2.72%	38.99	21.47

Construction	Construction	27	86%	3.02%	84.18	1.52%	42.35	41.83
Transportation and storage	Land transport and transport via pipelines	31	58%	2.01%	109.92	0.51%	27.84	82.08
	Water transport	32	58%	2.10%	6.48	0.60%	1.85	4.63
	Air transport	33	58%	2.49%	4.14	0.99%	1.64	2.49
	Warehousing and support activities for transportation	34	58%	2.05%	39.60	0.55%	10.57	29.02
	Postal and courier activities	35	58%	2.00%	12.88	0.50%	3.23	9.65
Information and Communication	Publishing activities	37	31%	3.67%	18.19	2.17%	10.75	7.44
	Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities	38	31%	3.79%	57.16	2.29%	34.56	22.60
	Telecommunications	39	31%	3.79%	136.76	2.29%	82.60	54.16
	Computer programming, consultancy and related activities; information service activities	40	31%	3.71%	134.50	2.21%	80.08	54.41
PA General services	Public administration and defence; compulsory social security	55	33%	4.43%	1043.20	2.93%	689.87	353.34
	Total amount				2741.90		1397.82	1344.08

Table 3. Impacts of the gender policy on macro-aggregates.

	% change from benchmark
Real GDP	0.10
Households consumption	0.02
Investment	0.02
Exports	0.10
Imports	0.06
GDP deflator	-0.10

Figure 4. Impact of the gender policy on value added by industry (% change from benchmark).**Table 4.** Impacts of the gender policy on unemployment and labour prices.

	% changes from benchmark	
	Labour (male)	Labour (female)
Unemployment rate	0.34	-0.52
Labour prices	0.00	-0.34

positive change in value added for industries operating in agriculture (from n. 1 to n. 4), in transportation and storage (n. 31, 34, 35) and wholesale and retail trade (n. 28) even though the latter is not affected by the incentive on female labour hiring.

A positive effect of the policy can be observed for many industries in services and professional industries (from n. 41 to n. 54) in which female labour is more intensive compared to the others. The reduction of the cost of hiring a female worker probably stimulates the production of those industries in which this primary factor is more intensely used and whose shortage is principally associated with women's exits from the labour market. This is positive for the economy but also reduces gender disparity that is, in any case, high in these industries too. This is particularly evident if we observe the impact of the policy on the labour market variables reported in Table 4.

The pattern in employment change reflects that of the changes in output. With the reduction of taxes on female labour, the demand of this factor increases and nominal wages

Table 5. Impacts on disposable income, household's consumption and saving by firms and households.

	% changes from benchmark		
	Firms	Households (male)	Households (female)
Disposable income	0.06	0.03	0.02
Consumption		0.02	0.01
Savings	0.06	0.00	-0.01

reduce (-0.3%). The price of male labour is constant since it is assumed as the numeraire of this model.

The final effect on unemployment rate is to reduce it by 0.52% for female and increase it by 0.34% for male. This is encouraging if we consider the single result on women, but it is not so comforting as regard to male unemployment rate. Noticeably, some mechanisms of substitution between male and female labour arise.

The effectiveness of the policy can be analysed also by observing the disaggregated effects in terms of Disposable Income, Savings and Consumption for the different Institutional Sectors, in particular for Households that are disaggregated in male and female according to the gender of the main earner (see Table 5).

After the policy, disposable income increases for both Firms and Households confirming the changes in GDP components. Specifically, the Firms' disposable income increases by 0.06% and this change is totally translated into saving that increases by the same amount. Indeed Firms do not consume but use their disposable income only to save and, given the characteristics of the CGE model, to generate new investment.

In particular, we would like to observe the impact of the fiscal policy by gender. As regard to gender-headed Households disposable income, both groups register an increase by 0.03% and 0.02% for male and female respectively. This result is mostly due to the fact that the manoeuvre stimulates employment and, even though female wages decrease, the disposable income increases. This effect is accounted both for male and female headed Households because each of them receives male and female wages as primary incomes so that the positive change in employment affects both groups.

However, the increase of disposable income after the implementation of the policy generates a different impact on households' savings. They remain just unchanged for male households ($+0.01\%$) and decrease slightly in the case of female households (-0.01%). This effect is probably related to the increase in final consumption that absorbs almost the total amount of the increased disposable income.

4.1. Sensitivity analysis

The elasticities of substitution in the nested production function are exogenously determined according to the nature and the characteristics of the aggregates that are combined in each nest. In particular, we set the elasticity of substitution between Value Added and Intermediate Consumption equal to zero (Leontief), meaning that we do not consider the possibility of changes in technology. Then, we assume the possibility to substitute the components of Value Added when their prices change and set a positive value of sigma (0.582) according to the estimates of Van der Werf for the Italian Economy (Van der Werf, 2008).

As for the elasticity of substitution between male and female in labour aggregate, we assumed a value of 0.5 as a preliminary exercise, keeping in mind that the gender decomposition in general does not exclude the rigidity of gender roles. In particular, the study of Fontana and Wood (2000) introduced the gender decomposition to the literature and even though they did not base their specification on empirical estimations, they argued qualitatively for relatively low elasticities. On the other side, some empirical studies set the gender elasticity within the range of 0.7 and 1.4 (De Giorgi et al., 2013).

Given these different position, we considered a relatively low elasticity of substitution between male and female labour in our simulation and test the sensitivity of the results to this parameter through a set of exercises. Therefore, since the policy impacts may be quite sensitive to this elasticity, in this section we verify the consistency of the results when this value changes from 0.4 to 0.7, the lower value of the range identified by De Giorgi et al. (2013). Each test involves the re-calibration of the model and the main results are set out in Tables 6–8; which also reproduce the results in relation to the central specification elasticity value.

When the elasticity of substitution between genders in labour aggregate changes, it is possible to observe that the policy introduced in the simulation (reduction of taxes for female employees compensation) still generates a positive impact on GDP and disposable income. To be more specific, the results are all confirmed in the sign even though their value changes. In particular, when the elasticity of substitution between male and female labour is low, the factors are used in a more rigid proportion and the impact of the policy on the economic system is barely more favourable compared to the case of high substitution between the genders.

Table 6. *Sensitivity analysis: impact on macroeconomic variables with different elasticities.*

σ	% changes from benchmark			
	0.4	0.5	0.6	0.7
Real GDP	0.11	0.10	0.09	0.04
Consumption	0.03	0.02	0.01	0.01
Investment	0.02	0.02	0.02	0.02
Exports	0.07	0.07	0.08	0.08
Imports	0.07	0.06	0.06	0.06
GDP deflator	−0.06	−0.10	−0.14	−0.09

Table 7. *Sensitivity analysis: impact on employment with different elasticities.*

σ	% changes from benchmark	
	Male labour	Female labour
Unemployment rate		
0.4	0.39	−0.53
0.5	0.34	−0.52
0.6	0.29	−0.50
0.7	0.23	−0.48
Labour prices		
0.4	0.00	−0.32
0.5	0.00	−0.34
0.6	0.00	−0.37
0.7	0.00	−0.39

Table 8. *Sensitivity analysis: impact on disposable income, households' consumption and savings with different elasticities.*

σ	% changes from benchmark		
	Firms	Male-headed households	Female-headed household
Disposable income			
0.4	0.07	0.05	0.04
0.5	0.06	0.03	0.02
0.6	0.04	0.01	0.00
0.7	0.09	0.01	0.00
Consumption			
0.4		0.03	0.02
0.5		0.02	0.01
0.6		0.02	0.01
0.7		0.01	0.00
Savings			
0.4	0.07	0.01	0.00
0.5	0.06	0.00	-0.01
0.6	0.04	-0.01	-0.01
0.7	0.09	-0.01	-0.02

This outcome is quite interesting and in some cases does confirm the potential of the policy that is aimed to hire women into the sectors with the greatest disparities between male and female wages. These sectors can be notoriously those with higher rigidities and discrepancies between genders, but according to this sensitivity analysis we could say that this aspect can amplify the effects of the policy.

5. Conclusions

From a European viewpoint, the gender integration should be pursued in all areas of policy choices and at all stages of the decision-making process. This imposes to design proper measures able to simultaneously cope with the complexity of the economic system and gender objectives. In this phase, having a set of analysis instruments capable of evaluating the impact of policy design in the economic system in aggregate and disaggregate terms becomes crucial. Given the low level of female employment in Italy compared to most European Countries, there is a strong need for policy measures aiming to increase employment rates by reducing the multiple discrimination factors that obstacle the female participation to the labour market. Gender sensitivity should be therefore developed in planning any policies and when implementing the analytical approach that should integrate gender aspects among other economic variables.

The multi-sectoral analysis offers the possibility of identifying the income generation by gender and the income distribution among the Institutional Sectors by gender, allowing the impact analysis of gender policies within the economic system. In particular, this study develops a gendered CGE model based on a gendered SAM for Italian economy to analyse the impact of a fiscal policy aimed at encouraging the integration of women into the labour market. We consider a market of labour affected by rigidities in wage formation thus allowing the formation of involuntary unemployment.

The simulation exercise shows the relevance of interactions among different industries and the labour market. In particular, the gender disaggregated CGE model reveals that

female employment plays a strategic key role in the Italian economy. Indeed, a decrease in the female labour cost through the introduction of an incentive to those industries with high gender labour disparity created a positive impact on GDP and disposable income by gender-headed Household. More specifically, the policy positively affects employment, especially in terms of reduction of female unemployment rate; this effect is confirmed from the change in Household's disposable income and consequently in final consumption.

The gender specification of the model might be elaborated and further developed in many ways. In particular, a further development could be represented by the breakdown of female and male value-added components by skills, age cohorts or other individual characteristics. It is also important to combine different policies in terms of direct incentives to firms and services for households to increase the inclusion of women in the labour market. Furthermore, to better understand the overall impact of these policies, policy-makers should evaluate whether men and women are actually complements or substitutes in the production process and how this substitution might affect the results. Given the results of this study, it might become important to think of structural measures capable of increasing the substitutability between male and female labour rather than focusing only on direct instruments of gender policy.

Disclosure statement

No potential conflict of interest was reported by the authors.

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