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**Analysis of *gender-sensitive* policies through CGE models:  
the Italian case.**

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# Contents

<b>Introduction</b>	<b>1</b>
<b>1 Gender-sensitive Social Accounting Matrix for Italy</b>	<b>11</b>
1.1 The Social Accounting Matrix Framework . . . . .	14
1.2 The 2012 Gender-sensitive Social Accounting Matrix for Italy . . .	20
1.2.1 The gender aspect in SAM . . . . .	20
1.2.2 The SAM for Italy: Construction and Data . . . . .	22
1.3 Final considerations . . . . .	37
<b>2 Evaluating female labour force participation and employment: a CGE model for Italy</b>	<b>39</b>
2.1 The Gender Issue . . . . .	42
2.1.1 The European Framework . . . . .	42
2.1.2 The Italian Context . . . . .	46
2.2 Review and critics to CGE models . . . . .	49
2.2.1 Strengths and weaknesses . . . . .	55
2.3 The Methodology: <i>Gender-</i> CGE and SAM . . . . .	59
2.3.1 Review of Related Studies . . . . .	59
2.3.2 The CGE model . . . . .	61
2.4 Simulation and results . . . . .	75
2.4.1 Sensitivity Analysis . . . . .	82
2.5 Final Considerations . . . . .	85
<b>3 Gender-sensitive policies and support programs for early childhood: a dynamic CGE for Italy</b>	<b>89</b>

3.1	Childcare costs and policies in the Italian context . . . . .	93
3.2	The methodology used: SAM and DyCGE . . . . .	99
3.2.1	The gender aspect in SAM . . . . .	99
3.2.2	The gender behaviour in DyCGE model . . . . .	101
3.3	Policy results for the Italian Economy . . . . .	105
3.4	Final Considerations . . . . .	114
	<b>Conclusions</b>	<b>119</b>
	<b>Appendix</b>	<b>129</b>
	<b>Bibliography</b>	<b>131</b>

# List of Figures

1.1	Circular Income Flow (Ciaschini and Socci, 2007) . . . . .	17
1.2	Compensation of Employees (% on total Compensation) . . . . .	30
1.3	Mixed Income(% on total Mixed Income) . . . . .	31
1.4	Male and Female Households Final Consumption (% on total Final Consumption) . . . . .	35
2.1	Total EU Employment Rate . . . . .	44
2.2	Female Employment in European Counties . . . . .	46
2.3	Steps in computable general equilibrium analysis (Bohringer, 2004)	53
2.4	Nesting structure of production function . . . . .	65
3.1	Share of young children using formal child-care arrangements . . . . .	94
3.2	Children aged 0-2 years attending infancy day-care services . . . . .	95
3.3	GDP differences from Benchmark (% change) . . . . .	108
3.4	Disposable income: differences from Benchmark (% change) . . . . .	109
3.5	Consumption differences from benchmark (% change) . . . . .	110
3.6	GDP from 2015 to 2025: Differences from Benchmark (% change) .	112
3.7	Disposable income: differences from Benchmark (% change) . . . . .	113
3.8	Consumption differences from benchmark (% change) . . . . .	114



# List of Tables

1.1	<i>Macro</i> National Accounting Matrix (Fiorillo and Socci, 2005) . . . . .	18
1.2	The <i>Gender</i> framework of Social Accounting Matrix (SAM) . . . . .	25
1.3	<i>Value Added Matrix by gender (millions of Euros)</i> . . . . .	27
1.4	Primary distribution of income by gender (millions of Euros) . . . . .	32
1.5	Secondary distribution of income (millions of Euros) . . . . .	33
1.6	Allocation of Disposable Income among Institutional Sectors . . . . .	36
2.1	Male and female employment rates in Italy . . . . .	47
2.2	Employment by Regions in Italy . . . . .	76
2.3	Tax Reduction: Industries allocation . . . . .	79
2.4	Changes from Benchmark (%) . . . . .	80
2.5	Changes from Benchmark for Institutional Sector (%) . . . . .	80
2.6	Household's consumption differences from benchmark (%) . . . . .	81
2.7	Changes from Benchmark for Employment variables (%) . . . . .	82
2.8	Effects of tax reduction on macroeconomic indicators with different elasticity values (% differences from benchmark) . . . . .	83
2.9	Effects of tax reduction on Disposable Income, Households' Con- sumption and Savings with different elasticity values (% differences from benchmark) . . . . .	83
2.10	Effects of tax reduction on Labour market indicators with different elasticity values (% differences from benchmark) . . . . .	84
3.1	Basic framework of Social Accounting Matrix (SAM) . . . . .	100
3.2	Fundamental framework of Dynamic General Equilibrium model . . . . .	102
3.3	Cohesion Action Plan fund for 2007-2012 (million of EURO) . . . . .	106
3.4	Cohesion Action Plan Fund: Industries allocation . . . . .	107

3.5	Households final demand for childcare services . . . . .	111
A	Aggregated SAM with gender disaggregated accounts for Italy (2012) (millions of Euros) . . . . .	129
B	Classification of Commodities and Industries in the SAM . . . . .	130



# 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 Member States should accomplish in every policy measure. Equality between women and men is a fundamental value and a driver for economic growth.

The increase in female employment represents a key objective in order to promote equality and social inclusion values, founding principles of the European Union. A larger women inclusion in economic and social life might have a direct impact on household's disposable income, on consumption and, in a virtuous income circular flow, on total output especially in countries like Italy where economic, social and cultural disparities between men and women still persist.

Total employed women workforce, in Italy, is still far below the EU average and concentrated in only few professional fields. Moreover, female participation is structurally related with the difficulty in balancing different households' needs. Focusing on these aspects, the availability of actual and potential support becomes critical. There is a broad consensus, between politicians and academics, that intervention measures should be concentrated on the implementation of increasing employment rate policies. The female and male participation in the labour market should be scrutinized and the policy-maker decisions should secure the integration path whether any unbalance that discourage female participation emerges. This is possible by choosing the proper policy action that need to encourage and stimulate female participation in labour market without neglecting the employment rate and income growth. Therefore, the gender issue should be integrated with other

traditional economic variables observed from the production phase to the demand formation moving through the formation and distribution of incomes.

The aim of this thesis is to contribute to the analysis of the gender background in Italy by designing a set of policies related to the empowerment of female labour employment and testing the impact of these policies on the economic system. To this end, the multisectoral analysis offers the possibility to identify the labour demand by gender and detect how the income is allocated and distributed allowing to properly assess the overall impact of any gender policy on the entire economic system.

This analysis requires the construction of a useful and efficient tool that comprehensively includes the circular flow of income and that takes into account the labour demand, giving a picture of the workforce. For this purpose, has been built a Social Accounting Matrix (SAM) for Italy for 2012, which contains gender attributes. The SAM is a flexible framework that describes all the flows taking place in the whole economic system, with particular attention to the role of secondary distribution of income. The reading of the SAM makes it possible to trace the circular income flow from its generation to distribution, up to the final use. Besides providing a consistent picture of the structure of an economy, SAMs are used as database in calibration of Computable General Equilibrium (CGE) models, which evaluate the impacts of economic shocks.

The *gender-sensitive* SAM provides the suitable data for developing *gender-related* CGE models for the quantitative testing on the main macroeconomic variables of the alternative policies' effects. In this thesis have been evaluated different kind of policies designed to increase the level of women participation into the labour market with twofold nature: incentive and conciliation. The incentive policies are based on providing an additional income, directly to both women and their families, or subsidies to firms that hire women. Conciliation measures, instead, are generally based on the release of time for care, and the provision of care services (public or private), both for children and for other reliant relatives (elderly and disabled) allowing people with family constraint to work.

In the first chapter of this work, all the phases designed to build the *gender-sensitive* SAM for Italy for 2012 are presented and described.

In the second chapter, are evaluated the impacts of the gender policy according

to which the taxes on female compensation of employees are cut in order to subsidize the hiring of women from firms in those economic sectors with higher gender disparity. This analysis is developed through a static CGE model that presents rigidities into the labour market.

In the third chapter, in order to encourage female labour participation, two different policies have been designed. More specifically, the first policy is designed for counteract the lack of childcare facilities by increasing the level of investment in services for early childhood. The second policy is realized for expanding expenditure on services related to early childhood by providing direct transfers to households. The direct and indirect effects of these two alternative policies have been analyzed through a dynamic *gender related* CGE model.

The results obtained from the different simulations have allowed to exclude the recessive traits that some of these manoeuvres can generate given the absence of a trade-off between their social and economic features.



# Introduction

The notion of gender - originally a grammar class - began to be used in the US in the 60s, in the field of social sciences. The notion considers all those processes, behaviors and relationships by which every society transforms biological sexuality into a set of implicit and explicit rules governing the relations between men and women and according to which different tasks are attributed to one and the other. This notion enriches the social sciences, since it allows observing that social reality is sexual and that the concepts of male and female are always underlying in it. It represents the culmination of a long and complex process of cultural revolution that has multidisciplinary and remote roots. The theory of gender has not developed its own original thought but rather put together and reworked ideologies from the past dating back to Marxist and psychoanalyst's thought, and the sexual and cultural feminist revolution of the 50-70s years.

The intellectual origins of gender concept, therefore, lies in the Simone de Beauvoir's assertion (De Beauvoir, 1961) that "One is not born, but rather becomes, a woman". Moreover, before it belongs to the long history of women's reflections from the Enlightenment onwards, in which they found ethically, politically and intellectually difficult to accept that biological differences could be understood as differences in all dimensions of humanity, in turn, translated into social and political inequalities. Already the great American anthropologist Margaret Mead, even if still using the terms "sex" and "sexual rules", has shown that in all societies the attribution to the group of men rather than women, the definition of what is masculine and what is feminine, it is a principle of social organization and distribution of tasks and resources. There is no culture that does not classify by gender

a significant fraction of its members (Mead, 1949).

In the 70s the anthropologist Gail Rubin was the first to use the term "gender" talking about "gender system" as the sexual / biological instinct processing into a product of human activity (Rubin, 1975). In her essay, she tried to discover the historical and social mechanisms by which the role of gender is produced and how a secondary role in human relations is assigned to female subjects. Rubin stated that "sex as we know is a social product" and she invented the concept of "gender" that represents the cultural construction, which requires a representation, definition and promotion of behaviors assuming the biological requirements and giving life to the status of man or woman. It is different from sex, which is the genetic makeup, based on a set of biological, physical and anatomical characteristics that distinguish male from female. From the 80s onwards the concept of gender has been used across the board in various socio-humanistic disciplines that consider the differences but at the same time detect inequalities.

Gender is a category that applies for both sexes, but often the term is used only referred to women. Unfortunately, even today, when speaking of gender differences, the attention seems "naturally" focus on women's differences and not about the interdependencies between the masculine and the feminine as they are socially constructed. This can be justified by the fact that especially women have been to reflect on their existential condition in order to reject a state of subordination. After all, who suffers disadvantages has every interest in changing reality while who has privileges tends to keep them. The gender analysis is therefore a systematic examination of the roles, relationships and processes, focused on inequalities between women and men in couples, in power, in income, in work and in politics.

On a practical level, a decisive stage of the recognition of gender issues has been the "Fourth International Conference on Women", organized by United Nations in Beijing in 1995. From that point onward, the "gender perspective" has emerged, as a standard global politics rule and entered in the agendas of all the main political programs. The "paradigm of gender" has rapidly become an universal priority for action and an ethical imperative of global education, affecting a lot of area: from government policies to philanthropic and humanitarian organization, from schools to universities, companies in the world art, music, film and advertising. So gender mainstreaming was established as a major global strategy for the promotion

of gender equality. While mainstreaming is clearly essential for securing human rights and social justice for women as well as men, it also increasingly recognized that incorporating gender perspectives in different areas of development ensures the effective achievement of other social and economic goals. Mainstreaming can reveal a need for changes in goals, strategies and actions to ensure that both women and men can influence, participate in and benefit from development processes (Baden and Goet, 1997)

Gender has increasingly recognized as a key variable for economic and social analysis, it is seen as complementary to class variables, employment, income, family status. In this way become important to present and analyze statistical data related to education, work, leisure activities and political participation under a gender point of view. From the recent European normative and programming (from 1984 onwards) and from the World Conference on Women in Beijing (1995), the gender culture has become the starting point for all those political and social actions aimed at ensuring equity, to the benefit of men and women indistinctly. The Beijing Conference itself saw the production of several gender-disaggregated data, including a new edition of *The World's Women* produced by the UN Statistical Office (UN, 1995b) and the UNDP's Human Development Report (UNDP, 1995). This latter featured two new indices—the Gender Disparity Index (GDI) and the Gender Empowerment Measure (GEM)<sup>1</sup>. Another important result obtained from Beijing was the successful campaign for the Platform of Action to include a commitment to the valuation of women's unpaid labour in satellite national accounts, making able to exploit the increasing sophistication of gender-disaggregated statistics and of statistical method in general.

The recognition that inequality between women and men is a relational issue

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<sup>1</sup>The GDI adjusts the HDI for gender inequalities in the three dimensions covered by HDI, i.e. life expectancy, education, and income. It is important to note that the GDI is not specifically a measure of gender inequality. The GEM seeks to measure relative female representation in economic and political power. It considers gender gaps in political representation, in professional and management positions in the economy, as well as gender gaps in incomes (Klasen, 2006). They are useful in their capacity to identify gender gaps in developing countries, rather than an overall picture of growth or education. However, they are limited in many ways. One concern is that the indicators are too broad to reflect the multiple dimensions of gender equality. A way to offset this might be to use the GEM and GDI in combination with measures of additional dimensions of equality, such as personal security and dignity, women's leisure time and gender balances in decision-making (UNDP, 2007).

led to the awareness that inequalities is not going to be resolved through a focus only on women. More attention need to be brought to the relations between women and men, particularly with regard to the division of labour, access to and control over resources, and potential for decision-making. Thus the need is to move away from "women" as a target group, to gender equality as a development goal (United-Nations, 2002).

Gender differences and inequalities are manifested in different fields from education to social work passing through the family and political life. In the social sphere with the continuous research of autonomy and recognition of their role in society, women have achieved important civil and social rights. In education, women have realized great results as demonstrated by the data referring to the presence in the school and the school performance but the persistent educational segregation continues to restrict women's work access, despite the progressive school feminization. In the labour's sphere, numerous inequalities are still favored by qualitative and quantitative differentiation of employment, gender pay gap, differentials in career paths joined with the difficulties for women to access and to remain in the labour market due to the need of balancing family and working needs. In the family life, changes within the couple are remarkable, with particular reference to the division of care work and changes in roles, linked to the new one assumed by the working mother who has questioned the traditional of housewife, wife and mother. Finally, analyzing data in the political area it emerges that women are little present not only in Parliament but also in the party leadership. It is important the participation of women in the political decisions, with particular attention to the administrative life because their exclusion represents a real limit in democratic representation.

It is important to act with the aim of achieving equal opportunities by detecting, analyzing and taking action against inequalities and overcoming them through specific positive actions of interventions with different nature. The equal treatment of men and women has been a fundamental principle of the European Union since its inception and the value of gender equality is central to all its activities. Starting from the Treaty of Rome, in 1957, in which Member States were committed to the right of equal pay for equal work for men and women passing through the Treaty of Amsterdam (1997) that promoted equality between women and men as one of



the EU's fundamental tasks until the Strategic engagement for gender equality (2016-2019) that is a prolongation of the Commission Strategy for equality between women and men (2010-2015). The engagement focuses on the following five priority areas: 1) Increasing female labour market participation and equal economic independence; 2) Reducing the gender pay, earnings and pension gaps and thus fighting poverty among women; 3) Promoting equality between women and men in decision-making; 4) Combating gender-based violence and protecting and supporting victims; 5) Promoting gender equality and women's rights across the world.

Considering the demographic dynamics in the main developed economies, characterized by shrinking working-age population and changes in the features of the once typical family, the main purpose of this thesis is to analyze the gender issue focusing on the employment field with particular attention to female labour force participation and consequently on the female employment rate. A greater women inclusion in the labour market is a necessary condition in order to improve economic growth and to cope with demographics challenges (European-Commission, 2014). The Lisbon strategy for 2010 had defined quantitative targets in terms of female employment rate (60% by 2010) and childcare services for children under three years (with a coverage rate of 33% by 2010) that have not been achieved in several countries.

Female labour market participation is a phenomenon with a large degree of unpredictability and is a widely studied topic, especially since from the different women's propensity to work, descends deep changes in the structure and functioning of society. The unpredictability of this phenomenon is because women's participation not only depends on the individual and collective willingness of women towards work, but also from the society's inclination towards women's employment. Over the last few years, there has been a significant shift in the approach respect this topic; most policy actions in favor of a greater women inclusion into labour market no longer focus only on equity and equal opportunities for men and women principles, but also on the economic efficiency values.

Analyzing the Italian case, gender represents one of the most pronounced inequality aspect. If we consider a synthetic indicator of gender inequality as the Global Gender Gap Index, annually produced by the World Economic Forum, Italy

in 2016, ranks into the 41th place out of 144 countries. This indicator captures four dimensions: a) Economic Participation and Opportunity b) Educational Attainment c) Health and Survival d) Political Empowerment. In ten years Italy, has significantly enhanced positions thanks to the results obtained in the political field with the 2014 Government that has seen the presence of 50% of women ministers. In the others sub-indices is possible to notice a slight improvement in education (from 62th to 58th positions), where the young Italian are more educated than men although often they choose courses of study less profitable in the labour market, and in the Economic Participation and Opportunity (from 114th to 111th positions) while in Health and Survival there is a fall from 70th to 74th position. The positioning of Italy in the lowest place of the rank due to the lacking of female participation and opportunities in the labour market represents on the one hand a serious problem for Italian economy, but at the same time it highlights a potential growth that a more and better use of women's skills could allow.

Considering working hours and productivity as GDP's determinants of growth, for economic statistics, unpaid work is not employment and it is not relevant to the measurement of what an economy makes and produces. This myopic version, from a social and economic point of view, takes no account of that works of "social reproduction" always played by women that are not paid if carried out by a family member. A country can unleash its economic potential (and increase its long-term growth and prosperity) by employing more women and narrowing the employment gap between men and women. So taking into account that GDP's growth may come mainly from three sources: employing more people, using more capital per worker and increasing labour and capital productivity due to new technology, women remain perhaps the world's most underutilized resource. More women employed means more growth: if a woman enters into paid work, her salary will be one of the quantities counted in the statistics to calculate the volume of domestic product. This is the main link between women's employment and economic growth.

A paradigm shift that sees a rise in the value of women into the labour force, could generate real multipliers producing growth effects in several economic areas from consumption to services, investment and innovation, that could contribute to the development of the entire economic system. Services generate other services, which is why the two-income household in which the woman works, acts as a

real driver of economic activities and jobs. The growth in female employment generates more consumption and more revenue, in terms of taxation and social security contributions. If in Italy, the female employment rate would increase from the current 46.8% to 60% (Lisbon strategy target), according to Bank of Italy estimates, the GDP would increase by 7% (Bianco et al., 2013).

By monitoring individuals during their life cycle, starting from the education to the employment, family formation and fertility's choice, is possible to find that differences between men and women follow precise developments. They are almost non-existent in the education phase, arising with the entry into the labour market and are amplified with family formation and fertility choices. In Italy, the rate of women's participation in the labour market is always among the lowest in Europe, while the time spent on domestic and care works is always among the highest. One of the main reasons for the low participation is because a quarter of women employed leaves the labour force with the birth of their first child. Within the family, the allocation of time and family tasks between men and women is so unbalanced given the shortage of care services which creates enormous problems of conciliation between work and motherhood contributing to reduce the growth of female employment.

Policy makers therefore have to implement specific and targeted policies to reduce this gap that is configured not only as a discrimination matter but also as a huge waste of talent and a lack of economic growth. Policies designed to increase the level of women participation in the labour market can have twofold nature: incentive and conciliation. Conciliation measures generally based on the release of time for care and the provision of care services allow people with family constraint to work, while the incentive policies are mainly based on providing an additional income, either directly to women and their families, or to firms that hire women.

The aim of this thesis is to contribute to the analysis of the gender background in Italy, by designing a set of policies for stimulating female labour employment and testing the impact of these policies on the economic system thorough multisectoral models with gender attributes. The multisectoral analysis offers the possibility to identify the demand of labour by gender and detect how the income is allocated and distributed by gender allowing to properly assess the overall impact of any gender policy on the whole economic system. There is much to be gained in empirical

research in a multisectoral framework in distinguishing between male-intensive and female-intensive sectors of the economy. A greater empirical understanding of the comparative sectoral pattern of the employment of men and of women is extremely useful for any analysis of inter-sectoral resource transfers, such as are implied by structural adjustment (Elson et al., 1997). More specifically Computable General Equilibrium models (CGE) calibrated on Social Accounting Matrix (SAM) represents a powerful tool able to properly assess the overall impact of a gender policy measure and consequently provide the policy-maker with the instruments to achieve the gender integration. In particular, CGE models constitute an analytical representation of all the interconnected exchanges that take place between economic agents based on observed data. The advantage of this kind of analysis is that, by describing the agents' behavior functions in equations that link variables through behavioral parameters (e.g. elasticities), the CGE allows us to have a wide flexibility in assessing qualitatively and quantitatively relapses and effects of gender policies on all macroeconomic aggregates in both the short and long term. This thesis is therefore composed of three chapters with the global aim to create useful and efficient tools for the economic impact analysis of public policies designed to increase the female employment in the Italian economic system.

For this purpose in the First Chapter, a SAM with gender attributes for Italy for 2012 will be built. Within the SAM all the economic activities of the system and all the phases of circular flow of income from its generation in the production process to its allocation in the distributive process are represented (Ciaschini and Socci, 2007a). In addition, the SAM has a flexible nature: starting from the basic framework is possible to include measures of flexibility. The main effort in this first part of the work is to consistently include gender disaggregation and other gender connected economic variables within the data base to get a gender-sensitive SAM, i.e. a SAM able to perceive and evaluate quantitatively the specific economic influence of gender related phenomena. For the purpose of tracing the process of income generation, primary and secondary distribution across institutional sectors, the primary factors accounts (compensation of employees and mixed income) will be disaggregated between female and male and the institutional sector of Households according to the gender of the main earner. This kind of classification allows to highlight the links between primary distribution of income and the em-

ployment composition in relation to the production structure characteristics and represents a useful analytical framework for modelling, providing an integral part of the benchmark data set required to calibrate CGE models (Pyatt, 1998).

In the Second Chapter, will be developed a static CGE model, which presents rigidities in the labour market. The model will be calibrated on the *gender sensitive* SAM in order to analyse the effects of a policy aimed at encouraging the integration of women into the labour market. The policy measure is represented by a reduction in female labour costs, for those productive sectors with higher gender disparity. The use of a CGE model will allow for assessing the measure of direct and indirect effects overall the Italian economic system. This analysis will allow verifying how the structural conditions of labour market by sector affects the gender policy results and therefore the possibility to improve the measures reliability and effectiveness. The main contribution of this work is to consider the non perfect competition hypothesis in the labor market which presents "involuntary unemployment" rate. The non-full employment hypothesis followed by sectoral wage bargaining allows the model to provide quantitative insights into the potential implication of tax policy shifts for employment and unemployment for Italy.

In the Third Chapter of the thesis will be designed policies targeted to reconcile work, private and family life and the impact that these policies can generate on the main macroeconomic variables will be teste. The analysis will be drawn on the *gender-sensitive* SAM through the use of a Dynamic Computable General Equilibrium model (DyCGE). Simulations will allow to determine the direct and indirect impacts of policies that enhance the supply of social and educational services for early childhood, as a tool for stimulating a larger inclusion of women in working life. In order to encourage the implementation of women work-life balance policies will be compared two policies for Italy that act in two different ways. One from the supply side through the increasing into the level of investment in services for early childhood (children aged 0-3) and the other one, from the demand side providing direct transfers constrained to the childhood services consumption to households. The comparison between the two scenarios will permit to identify which of two gender policies mostly impacts the economic system, in a country like Italy still strongly characterized by the woman seen as a producer rather than final recipient of welfare.



# Chapter 1

## Gender-sensitive Social Accounting Matrix for Italy

Recent statistics and studies supplied by the Italian National Institute of Statistics (ISTAT) on female employment are very worrying and require particular attention. In Italy, the year growth rate is very low, and for some recent years it has been negative. It is among last in Europe, first only to Greece and Malta for female labour force participation. This means that in Italy strong obstacles to the development and emancipation of women's inclusion in the labour market still persist. An increased inclusion should not be seen as an advantage only for women, but, on the contrary, as a benefit for the whole society; greater gender equality produces not only fairer societies, but also greater economic well-being.

A paradigm shift that sees a rise in the value of women in the labour force, could generate real multipliers producing growth effects in several economic areas from consumption to services, investment and innovation, that could contribute to the development of the entire economic system. Services generate other services, which is why the two-income household in which the woman works, acts as a real driver of economic activities and jobs. The growth in female employment, generates more consumption and more revenue, in terms of taxation and social security contributions. If in Italy, the female employment rate would increase from the current 46.8% to 60% (Lisbon strategy target), according to Bank of

Italy estimates, the GDP would increase by 7% (Bianco et al., 2013).

Another important effect of women's employment growth regards the long run fertility rates that is essential for the growth and the sustainability of Italy, which is among the oldest countries in the world. Numerous international studies, as well as the statistics themselves, demonstrate a direct relation between the highest rate of female employment and the increase in birth rate. Furthermore, numerous are the social implications of a gradual increase in female employment: independent women economically and with a social role, are less at risk of poverty, they are realized and enjoy more widespread prosperity that transmit to their children. However, this is a difficult goal to reach for a country like Italy that presents a serious cultural lag in terms of equal opportunity rights and with an informal welfare system, which is a burden almost entirely on women. Italy is also the country of OECD area with the highest percentage of family members providing care for elderly or disabled people on an ongoing manner (16.2% of the population: the double, for example, than Sweden).

In Italy, the women's revolution seems to be blocked and this essentially for three reasons: the imbalance in the household labour division between men and women, the persistence of prejudice against women's work and the lack of sufficient "conciliation policies", both at national and at local level, allowing women for a better balance of professional and family life. Policy makers therefore have to implement specific and targeted policies to reduce this gap that is configured not only as a discrimination matter but also as a huge waste of talent and a lack of economic growth. Policies designed to increase the level of women participation in the labour market should have twofold nature: incentive and conciliation. Conciliation measures make it possible people with family constraint to work. They are generally based on the release of time for care, including the supply of flexible and / or reduced working hours, such as part-time, and the provision of care services (public or private), both for children and for other reliant relatives (elderly and disabled). The incentive policies, on the other hand, are mainly based on providing an additional income, either directly to women and their families, or to firms that hire women.

The aim of this work is to create a useful and efficient tool for the economic impact analysis of public policies designed to increase the female employment in



the Italian economic system. For this purpose, a Social Accounting Matrix (SAM) with gender attributes for Italy for 2012 will be built. A SAM is a particular representation of the macro and meso economic accounts of a socio-economic system, which capture the transactions and transfers between all economic agents in the system (G. and Round, 1985) (Reinert and Roland-Holst, 1997). It records transactions taking place during an accounting period, usually one year.

The advantages in using a SAM are numerous. First, the accounts are represented as a square matrix; where the incomings and outgoings for each account are shown as a corresponding row and column of the matrix, so that all the interconnections between agents are described in an explicit and comprehensive way. In the SAM, all the economic activities of the system (consumption, production, accumulation and distribution) are presented. It describes all the phases of circular flow of income from its generation in the production process (final demand, total output and value added generation) to its allocation in the distributive process (value added by factor, primary and secondary distribution of income)(Ciaschini and Socci, 2007). In addition, the SAM has a flexible nature: starting from the basic framework is possible to include measures of flexibility both in the degree of disaggregation and in the emphasis placed on different parts of the economic system by integrating data not collected in national accounts system according to the main features necessary for the research's purpose (Round, 2003).

The main effort in this work is to consistently include gender disaggregation and other gender connected economic variables within the data base to get a *gender-sensitive* SAM, i.e. a SAM able to perceive and evaluate quantitatively the specific economic influence of gender related phenomena. This is done in order to design simulation experiments for assessing the impact of a set of policies aimed at stimulating the female labour employment on the main macroeconomic variables in national accounts.

For the purpose of tracing the process of income generation, primary and secondary distribution across institutional sectors, the primary factors accounts (compensation of employees and mixed income) will be disaggregated between female and male and the institutional sector of Households will be divided according to the gender of the main earner. This kind of classification allows to highlight the links between primary distribution of income and the employment composition in

relation to the production structure characteristics. Including transactions among different Household groups and between factor and product markets, the SAM shows clearly the linkage between income distribution and economic structure, furthermore, represents a useful analytical framework for modelling, providing an integral part of the benchmark data set required to calibrate Computable General Equilibrium (CGE) models (Pyatt, 1998).

A CGE model enables the representation and simulation of the whole economic system functioning, once the functional relationships between variables and the system's foundations have been specified. For this purpose is necessary to provide a Social Accounting Matrix that permits the specification of the numerical connections between all the agents present in the economic system with particular attention to the relations between production structure and the income distribution among the socio-economic groups and the final demand composition. Thus, is firstly necessary to determinate the SAM values for one base year, that generally requires numerous processing data between different sources ensuring the initial equilibrium of the system. Secondly, the starting SAM's values as solution for the general equilibrium model have to be obtained. In this article the attention is paid on the presentation and the description of the main phases designed to build the *Gender-SAM* for Italy for 2012.

## 1.1 The Social Accounting Matrix Framework

A SAM can be defined as a double entry table that reflects the circular flow of income of an economy during a given period of time. Within it each row records the details of receipts by each particular account while the columns (which follow the same ordering as the rows) record the corresponding expenditures. starting from a general scheme, SAMs can take a wide variety of forms, depending on how the component accounts are defined (Pyatt and Round, 1977). A SAM can be viewed as a natural integration of input-output (I-O) tables into the national accounts framework. It adds matrices to the traditional sector interdependencies scheme that allow for the Leontief's model extension taking into account the relations between factorial distribution, personal income distribution and the consumers' expenditure composition, traditionally absent in the input-out model (Fiorillo and

Socci, 2005).

The SAM owns its origins into 1960 from a Cambridge University project initiated by Stone in association with Brown: "The Cambridge Growth Project" started as a work on social accounting, input-output and consumer behavior for the construction of a multisectoral model of the British economy. The project developed a large-scale model for the British economy, using analysis of production in the form of input-output tables with consumer expenditure in the form of a Social Accounting Matrix, which was initially realized by Stone. The most innovative aspect of the model was its levels of detail, the accounting consistency and the combination of time-series and cross section analyses (Cambridge, 1960 - 1987).

These ideas were further developed and used for the economic planning in developing countries as an alternative tool to the standard accounting system given the strong imbalances in the distribution of income typical in these countries. Starting from 1970 ahead (Pyatt and Thorbecke, 1976), a large number of national SAM have since followed, some of the earliest being for Sri Lanka (Pyatt and Round, 1979), Botswana (Hayden and Round, 1982), Korea (Defourny and Thorbecke, 1984), Indonesia (Thorbecke et al., 1992), and more recently, for Ghana (Powell and Round, 2000) and Vietnam (Tarp et al., 2002). In all of these studies, the SAM, thanks to the description of the available income formation process, allowed to study poverty and income distribution issues examining the nature of the multiplier effects on the distribution in general and on the incomes of socio-economic groups of Households in particular, due to an income injection in one part of the economic system (Round, 2003). Instead, in the developed countries, the use of SAM plays a purely scientific key role, representing an efficient base for the implementation of theoretic models (Socci, 2004). Stone (Stone, 1947, 1956) set up also the basis of the Standardized System of National Accounts published by the United Nations in 1953. In his report "Input-Output and National Accounts", (Stone, 1961) completed the subdivision of national accounts on an industry basis to integrate I-O tables into national accounting. All of these advances were incorporated into A System of National Accounts (United-Nations, 1968).

Now, the System of National Accounts (SNA)<sup>1</sup> is a coherent set of macro-

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<sup>1</sup>The System of National Accounts is the internationally agreed standard set of recommen-

economic accounts, balance sheets and tables, based on established conceptual standards, definitions, classifications and accounting rules. The basic classifications include: classification by transaction institutional sectors (Households and Nonprofit Institutions serving Households (NPISH), non-financial Corporations, General Government, financial Corporations, and the Rest of the World), as well as by transaction objects, first of all product accounts, CPA (*Classification of Products by Activity*) or activity accounts, NACE (*Nomenclature statistique des Activités économiques*). The basic principle is to record all the transitions between accounts along two different sides: the resources on a given account correspond to the uses (expenditures) for the other corresponding account. In this way, SNA supplies statistical information about the economic system that follows the conceptual and analytical scheme of income circulation flow including a processes' description from the generation, primary and secondary distribution up to the use of income for consumption and accumulation.

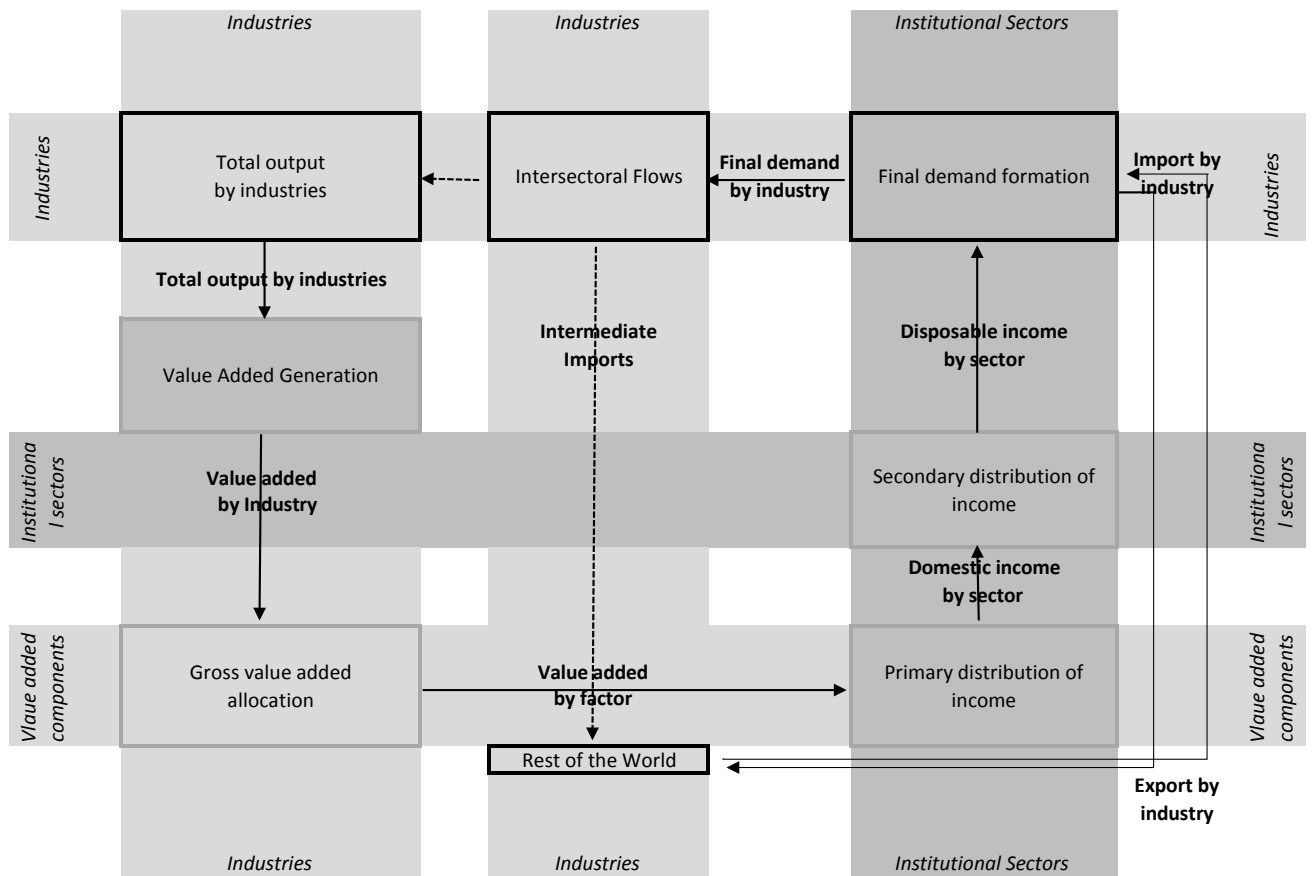
The sequence of income flows in an economy is the following (see Figure 1.1): the product accounts, which are followed by value added generation and primary distribution of income, secondary distribution of income, the use of disposable income, and capital institutional accounts, showing property growth in individual sectors, and finally the Rest of the World account.

The first stage of income circulation is the process of production, the effects of which are shown in the form of goods and services for intermediate consumption and final use. The primary distribution of income to Households is strictly related to the value added generation phase, in a specific structure of the economic system disaggregated in several production activities. Secondary distribution of income, instead, is logically determined subsequently, once the Government acts a redistributive policy by positive and negative, direct and indirect transfers to the other institutional sectors. The introduction of institutional sectors (Households, Firms, Government and Rest of the World) allows for the passage from the factorial to the personal distribution of income analysis. Disposable income of institutional sectors, particularly for different groups of Household specified according to spe-

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ditions on how to compile measures of economic activity in accordance with strict accounting conventions based on economic principles. The System of National Accounts, 2008 (United Nations, 2008) is an updated version of the System of National Accounts, 1993 (United-Nations, 1993). It is the fifth version of the SNA, the first of which was published over fifty years ago.

Figure 1.1: Circular Income Flow (Ciaschini and Socci, 2007)



cific socio-economic characteristics, represents the base to foster the different final demand components with particular attention to the Household's consumption expenditure. Incomes not spent are saved and go to increase the capital formation account.

The matrix representation of the circular flow of income pass through the National Accounting Matrix (NAM) that consist in the matrix representation of National Accounts. The basic scheme of NAM considers as rows and columns' holders: Commodities, Industries, Primary Factors of production, Institutional Sectors, Capital Formation and Rest of the World (see Table1.1). The NAM reflects the principle of double entry of every transaction in the system of national accounts, that guarantees the balance between rows and columns. In this way, given a period of time, each expenditure of one entity is a resource of another one and the expenditures of every institutional sector, recorded along columns, are equal to its resources, registered in rows (Socci and Pretaroli, 2008).

Table 1.1: *Macro* National Accounting Matrix (Fiorillo and Socci, 2005)

	<b>Commodities</b>	<b>Industries</b>	<b>Primary Factors</b>	<b>Institutional Sectors</b>	<b>Capital Formation</b>	<b>Rest of the World</b>	
	1	2	3	4	5	6	
<b>Commodities</b>	1	U		Cf	I	E	q
<b>Industries</b>	2	M					X
<b>Primary Factors</b>	3		Va			Tr	Y
<b>Institutional Sectors</b>	4	IT		R	DT+Tr	Tr	Yn
<b>Capital Formation</b>	5				S	(+/-)A	K
<b>Rest of the World</b>	6	N		Tva	Tr		b
	q	X	Y	Yn	K	b	

In the first column of the matrix are recorded the main and secondary productions of all the Industries (M), indirect net taxes on goods (IT), which represent an input flow for Government, and the imports (N). The first column represent the total amount of available resources in the economic system classified for Commodities (q). In the second column, there are all the intermediate requirements of

goods and services by Industries (U) and the Value Added (Va), that represents the amount of income generated from the factors costs in the production process. The total of the column represents the total amount of resources used in the system according to the industry's classification (X). The third column presents the total amount of net value added (Y) that consist in the allocation of primary incomes among institutional sectors, which receive income from their primary factors involvement in the domestic production process (R) and abroad (Tva). In the fourth column are detected all the flows of secondary distribution and use of disposable income that concur in forming the national income (Yn). The secondary distribution of income concerns all the redistribution processes of transfers between the institutional sectors (DT+Tr) and to the rest of the world (Tr). Gross saving (S) is determined as difference between the total of row and column for each institutional sector. The capital formation process considers fixed investment and change in inventories (I), while closing the circular income flows the last column considers all the transactions that record input flows between resident and not (b). Among which: exports (E), part of value added and without exchange transfers coming from the rest of the world (Tr). Finally, the balancing item is represented by the debt or credit position towards the rest of the world (A).

For a passage from NAM to SAM is necessary to characterize the several phases of circular income flow according to social criteria identified on the basis of the research's objectives. For this reason, the step from the production account to the institutional account, represents the most characteristic and innovative feature of the SAM compared both to national accounts and Input-Output tables. The institutional sectors disaggregation according to social aspects represents the main element of interest and the main improvement of the SAM respect to the standard national accounts (Round, 1985). The specification of institutional sectors, in which economic actors are grouped, has to respond to some homogeneity criteria related to the actors and the transactions nature. The degree of detail is set by the research objectives and it can be classified according to the study of specific phenomena. Usually is interesting to analyze the income distribution among institutional sectors and the economic policies effects on the social and productive stratification.

In the present work the disaggregation is mainly concentrated on the Household

institutional sector and on two components of value added in which gender features has been introduced. In this way, the matrix contains an informative framework suitable for the impact assessment of shocks produced by policy actions aimed at increase the female labour participation on the main macroeconomic variables that can be simulated through the implementation of theoretical models of general nature.

## **1.2 The 2012 Gender-sensitive Social Accounting Matrix for Italy**

### **1.2.1 The gender aspect in SAM**

Assessing the disaggregate effects of a gender policy within the economic system in a long-term perspective requires a set of instruments able to draw and quantify the relations among all the agents involved in the production process, the generation and distribution of income. By describing all transactions between sectors and institutions in the economy, it represents a very general accounting model and a useful tool for analysis of income distribution. Moreover, the SAM framework is characterized by great flexibility in describing the flows within the economy that allow for representing a wide range of socio-economic characteristics, useful in analyzing different economic, social and cultural settings important for policies' design. Therefore, building a SAM is often the first step towards the economic analysis given that the resulting model is theoretically consistent with respect to the needs of empirical analysis. The demand for integrated systems of social and economic statistics has received great attention, generating a big effort in extending the conventional structure of the SAM to incorporate a larger number of indicators.

In particular, the gender issue has played an increasingly important role in the world policy debate and the number of studies that analyze it using a SAM framework has noticeably increased over the recent years. Many of these SAM extensions can contribute significantly to understanding the gender effects of economic reforms, by providing better insights into the different roles of women and



men in the generation and distribution of income and the interactions between households and the market economy (Fontana, 2004).

This kind of evaluation needs different sources of data and often requires implementing difficult methodology, for this reason, only a few countries so far provide satellite accounts regularly. Between developed countries, Netherlands (Kazemier et al., 1998), Australia (Ironmonger, 2000), and Canada with the exception of India, that belongs to developing countries, present SAMs constructed incorporating environmental concerns (Nugent and Sarma, 2002), the informal sector and gender disaggregation in the labour market (Sinha, 2000). Given the increased attention into this issue, different SAMs with gender feature have been built. Some of them present labour disaggregation by gender or grouped Households on the basis of male and female head allowing to assess the gender implications of changes in both direct and indirect taxation, given that the two different types of Households appear to have markedly different sources of income and consumption patterns (Arndt and Tarp (2003) for Mozambique and Sinha and Sangita (2003) for India). The study for India also distinguishes economy by male from female intensive informal sectors of the economy. In a SAM for Uganda, Households are distinguished not only by the gender of the Household's head but also by location and income level (Nyanzi, 2000). In a further disaggregation of SAM for Bangladesh and Zambia, the authors not only distinguish factors, sectors and Households by gender but also add estimates of social reproduction (or household work) and leisure to the standard accounting framework (Fontana and A., 2000; Fontana, 2001, 2002).

In Italy, has started a project for the compilation of a labour oriented SAM in the context of an international working group<sup>2</sup> identifying gender and education level as the key variables which, in addition to the traditional ones of national accounts (such as industries and institutional sectors), are more suited to study

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<sup>2</sup>In particular, the project on SAM was addressed to answer the expressed ECOFIN Council Recommendation need to implement statistical tools for information and analysis on the labour market integrated with National Accounts. Unlike the traditional set of indicators on employment and unemployment, the compilation of a labour market SAM-oriented, thanks to its structure, is enable to analyze within a coherent framework, all the variables that contribute to determining the macro-economic situation of a country, proving to be one useful tool in defining economic policies. The working group formed in 1999 and named Leadership Group (LEG) on Social Accounting Matrix, have involved eight countries: Belgium, Finland, Greece, Italy, Norway, Netherlands, Portugal, United Kingdom.

the labour market. The analysis showed how the worker's characteristics are linked to the productive structure and influence the remuneration of labour.

Following the inspiration of this studies focused on the gender issue, the main effort of this work is to consistently include gender disaggregation and other gender connected economic variables within the data base to get a *gender-sensitive* SAM for Italy for 2012. The obtained SAM is able to perceive and evaluate quantitatively the specific economic influence of gender related phenomena on national accounts. This is done in order to provide an efficient tool for assessing the impact of a set of policies aimed at stimulating the female labour employment on the main macroeconomic variables that characterize the Italian economy.

Labour is a component both for the value added and for the generated income. Thus, the input of labour underlying the SAM, can be considered from two different perspectives. From the demand side, labour is a component of value added and can be specified according to the employing industry and the socio-economic characteristic of the worker. From the supply side, as source of income, it can be disaggregated according to the individual characteristics of the worker and the characteristics of his/her household. For the purpose of tracing the process of income generation, primary and secondary distribution across institutional sectors, the primary factors accounts (compensation of employees and mixed income) and the institutional sector of Households have been disaggregated under a gender prospective.

### 1.2.2 The SAM for Italy: Construction and Data

The need for disaggregate Households institutional sector into socio-economic groups, has asked for the integration of different sources, since there is no a single source that can detect information on Household's income and expenditure with the detailed level of analysis required by the SAM. To break down Households into groups according to the gender of the main earner have been used information derived from the "Surveys on Household Income and Wealth in 2012" conducted by the Bank of Italy<sup>3</sup>. The Household's final consumption instead, have been decom-

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<sup>3</sup>*Surveys on Household Income and Wealth of Bank of Italy*: the survey was born in the 60's with the aim of gathering information on income and savings of Italian households. Over the years, the object of the detection has gone extending also including wealth and other aspects

posed, both for goods and for kind of Household. The indicator that allows for a consumption's disaggregation among goods has been derived from the survey conducted by ISTAT on households expenditure<sup>4</sup>, but the survey does not provide any detailed information about income, essential for breaking down Households in different groups according to the main source of income. In order to use simultaneously the information from these two surveys is necessary to make a harmonization process of the two different databases. The National Accounts made a first trial of integration between microdata from the two surveys for 1991 (Cimino and Coli, 1998a,b,c). From 1999-2012, ISTAT has formalized a working group on this subject, (the results of which are reported in (Coli and Tartamella, 2000a,c)) finding that the statistical matching to individual record level is the most appropriate technique for the two sources of microdata integration because of the same population sample of both surveys. The survey of the Bank of Italy has been considered as an incomplete file whose records had to be supplemented with information regarding the purchase of goods and services derived from ISTAT survey. The decision of integrate the Bank of Italy archive with ISTAT information for the spending implies that data detected by Bank of Italy are considered more reliable for income and savings and, in turn, is attributed a greater reliability to ISTAT data for final consumption. The hypothesis is motivated by an obvious imbalance that the two surveys show, respectively, in favor of the income and the savings analysis the first

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of the economic and financial behavior of families, such as the use of the means of payments. In the 2012 survey the sample is composed of 8,151 households (20,022 individuals), from 371 municipalities. The survey is conducted every two years and the results are regularly published in the Supplements to the Statistical Bulletin of the Bank. The survey in detail detects different kinds of incomes for every source of recipient, are also present information concerning the employment status of each component, means of payment and savings, the primary residence and other real estate, real and consumption goods and of course socio-demographic information on all household's members.

<sup>4</sup>*ISTAT on households expenditure*: the survey on household consumption detects household expenditure, paying particular attention to the social and economic aspects of Italian household living conditions. The survey has the purpose of detecting the structure and the level of consumption by the main social, economic and territorial resident households. Thanks to the design that characterizes it, the survey provides insight and follows the evolution of both the qualitative and quantitative standards of living and behavior consumption of the main types of households, in reference to the different spatial and social spheres. Expenses by resident households to purchase goods and services represent the subject of the survey. The consumption's items are extremely detailed, involving both goods and food consumption, durable consumer goods and all the current expenses.

and on consumption analysis the second.

The construction of the SAM is based on the so called *top-down* method: the top is given by national accounts aggregates organised in a matrix format (NAM), which offers a synthetic view on the macro-economic variables of a system, and on their interrelations; and the down is obtained by the SAM's accounts disaggregation through some proper indicators. The basic framework of the *gender-sensitive* SAM refers to 2012 and is presented in Table 1.2. The SAM is composed by 64 Industries; 4 primary factors: Compensation of Employees, Mixed Income, Gross Operating Surplus and Taxes on production and imports less subsidies, where compensation of employees and mixed income are disaggregated according to the gender of the workers; Trade and Transport Margin; 4 Institutional sectors: Firms, Government, Households disaggregated according to the gender of the main earner and the Rest of the World and finally the Capital account. Its structure is identified by five blocks that describe the main phases of the income circular flow: *i. The total output by industry, ii. The generation of income or value added, iii. The allocation of primary income, iv. The secondary distribution of income, v. The use of income and the capital formation.*

Table 1.2: The Gender framework of Social Accounting Matrix (SAM)

	Primary Factors							Institutional Sectors				Capital account			
	Industries		Compensation of employees		Mixed income		Gross operating surplus	Taxes	Trade and Transport margin	Firms	Gov	Households	Rest of the World	Capital formation	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	male	female	male	female	male	female	male	female	male	female	male	female	male	female	
Industries	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Compensation of Employees	X														
Mixed income	VA														
Gross operating surplus															
Taxes on products less subsidies															
Taxes															
Trade and Transport margin	t+tm														
Firms						Y									
Gov															
Households											Yn				
Rest of the World															
Capital formation											S			b	
	X														
	VA														
	N														
	Y														
	Yn														
	Cf														
	K														
	S														
	b														

X Domestic Production: total output and intermediate consumption by industry (1,1), taxes on output and trade and transport margin (8-9,1)  
 VA Generation of income: Value Added (2-7,1), Indirect net taxes (7,1)  
 N Imports  
 Y Primary distribution of income: allocation of primary income among Institutional Sectors  
 Yn Secondary distribution of income: Current taxes on income, wealth etc; social contributions: social benefits, other current transfers  
 Cf Final consumption: Government's consumption expenditure (1,11), Households' final consumption expenditure (1,12-13), Exports (1,14)  
 K Capital formation: gross fixed capital formation, changes in inventories, acquisition less disposals of valuables  
 S Savings  
 b Balancing item: Net borrowing/net lending

### 1.2.2.1 The production account

The production account is composed by domestic available resources and intermediate goods. All the production process can be disaggregated in Industries (production activities) that are collected according to the principal product homogeneity (Commodity). This implies the construction of intersectoral flows tables which structure is contained in the standard aggregation of Statistical Classification of Economic Activities in the European Community (NACE-Rev2, 2008) which imposes the use of the classification uniformly within all the Member States. The aggregation in homogeneous production activities is based on the hypothesis of the uniqueness of the product. In National Accounts the intersectoral tables construction implies the use of two separate matrices. One for the resources, which rows are headed to industries and columns to commodities, that records the commodities made by all the activities in the economy (*The total output by industry: Make table*), and the other one showing the purchases or absorption of commodities by all activities in which row are assigned to commodities and columns to industries (*The intermediate consumptions by commodity: Use table*). From these two matrices is possible to obtain a symmetric input output table. In the SAM presented in this work, Make and Use matrix have been used in order to obtain a symmetric Industry by Industry (table A). The SAM presents 64 different production activities<sup>5</sup>. The closing of the productive account is achieved by the inclusion of value added for industries.

### 1.2.2.2 The generation of income or value added

The value added block is the interception of the production account and the generation of income account (see Table 3.1 (row 2-7, column 1)). This means that a monetary flow moves from production units to kinds of primary inputs (labour, capital) and it describes the industries in which the primary incomes originate. In this sub-matrix is shown the way in which the value added produced by each industry is attributed as income to the primary factors for their involvement in the production process. It represents, at the same time, the primary factors'

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<sup>5</sup>The disaggregation of activities corresponds to the disaggregation of commodities. The list of commodities and activities is showed in the appendix (table 3.1)

cost of production entering the products account (see Table1.3). According to

Table 1.3: *Value Added Matrix by gender (millions of Euros)*

		<b>Industries</b>
<b>Compensation of Employees</b>	<u>male</u>	382,415
	<u>female</u>	288,282
<b>Mixed income</b>	<u>male</u>	163,624
	<u>female</u>	60,716

(United Nations, 2008) Value added is formed by four components:

- Compensation of employees is defined as the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period. It has two main components:
  - Wages and salaries payable in cash or in kind;
  - Social insurance contributions payable by employers, which include contributions to social security schemes; actual social contributions to other employment-related social insurance schemes and imputed social contributions to other employment-related social insurance schemes.
- Mixed income, is the surplus or deficit accruing from production by unincorporated enterprises owned by households; it implicitly contains an element of remuneration for work done by the owner, or other members of the household, that cannot be separately identified from the return to the owner as entrepreneur but it excludes the operating surplus coming from owner-occupied dwellings.
- Gross operating surplus is the surplus generated by operating activities after the labour factor input has been recompensed. It can be calculated from the value added at factor cost less the personnel costs. It is the balance available to the unit which allows it to recompense the providers of own funds and debt, to pay taxes and eventually to finance all or a part of its investment.

- Taxes less subsidies on production consist of taxes payable or subsidies receivable on goods or services produced as outputs and other taxes or subsidies on production, such as those payable on the labour, machinery, buildings or other assets used in production.

In this work, the gender issue has firstly been introduced in the sphere of production and specifically in the value added components of compensation of employee. In particular, this component has been disaggregated not only for production activity but also according to the gender of the worker. In analogy with the input labour analysis carried out by the Italian national accounts, it was decided to extend the breakdown by gender also to the remuneration of self-employment, the amount of which is contained in the mixed income component. The share of residual mixed income, with which capital and business risk are paid, has been subsequently added to the gross operating result in order to obtain a value for the specific category of capital factor. In this way, it is possible to analyze the remuneration of labour as a whole, regardless of the employment status of the occupied. In order to ensure the consistency of the SAM with the national accounts, the labour input and their incomes estimates have been bounded on the published national accounts. For this reason compensation of employee and mixed income resulting from the production process have been break down into male and female components using data from ISTAT<sup>6</sup> on the number of employees and self-employed persons by sex and industry. On the one hand, the share of working men and working women on the total of working population has been utilized for the gender decomposition of the compensation of employees. On the other hand, the portions of self-employed men and women on the overall of self-employed workers have been adopted to split the mixed income account.

The method followed for the estimation of the value added is therefore in line with the methodology underlying the compilation of the Italian national accounts, in which the labour input is a central characteristic. In fact, Italy is among countries that usually estimates on labour-input in accordance with the European

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<sup>6</sup>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 Labour 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.



System of Accounts guidelines (ESA2010). The information potential of an accounting tool such detailed is evident. Data on labour input provides an insight into the gender distribution of work units used in the production process. It allows for measuring the share of value added generated by the labour factor, highlighting how gender aspects might influence this allocation. Thus it emerges a prevalence of male employment in almost all economic sectors except for healthcare, education, public administration sectors and other services that present high concentration of employed and self-employed women. An higher propensity in self-employment for men is registered in nearly all production industries (See Figure1.2, and Figure1.3).

### **1.2.2.3 The allocation of primary income**

The determination of this block of the SAM represents one of the most important and delicate phases in the construction of the SAM because of the need to connect cells of distribution of value added from primary factors to institutional sectors, which own the same factors (see Table3.1(row 10-14, column 2-9)). It is important to recreate different stages of the income generation going to determinate the factors source and the institutional sectors to which they belong since this phase focuses on Institutional Sectors capacity as recipients of primary incomes.

In this SAM, have been identified 4 Institutional Sectors: Firms, Households, Government, and Rest of the World. For the gender disaggregation of the Households, have been used micro-data from the Bank of Italy. Households have been divided into two main groups classified according to gender characteristics of the principal earner in order to split the Households sector into two main categories: male and female Households. The sample results then composed by 5,444 (67%) male-Households (HHM) and 2,707 (33%) female-Households (HHF). The Bank of Italy survey on Household Income and Wealth, in addition to providing information on individual characteristics of the worker, contains further information on the individual and familiar source of income like payroll employees, professionals and individual entrepreneurs, self-employed workers, employee's family business and employees family business working shareholder or partner's income. Thanks to the high level of details provided by the database, is possible to record the alloca-

Figure 1.2: Compensation of Employees (% on total Compensation)

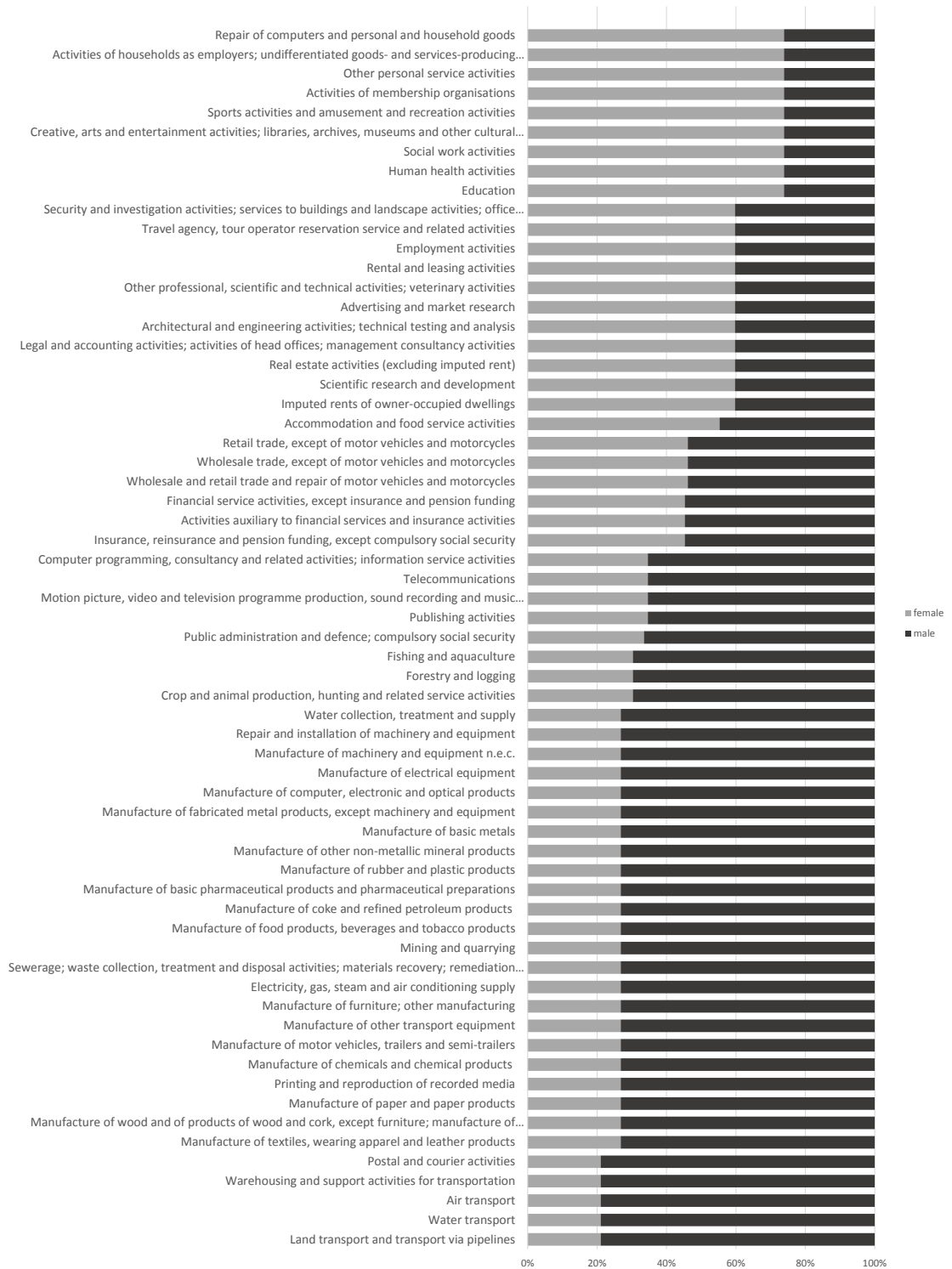
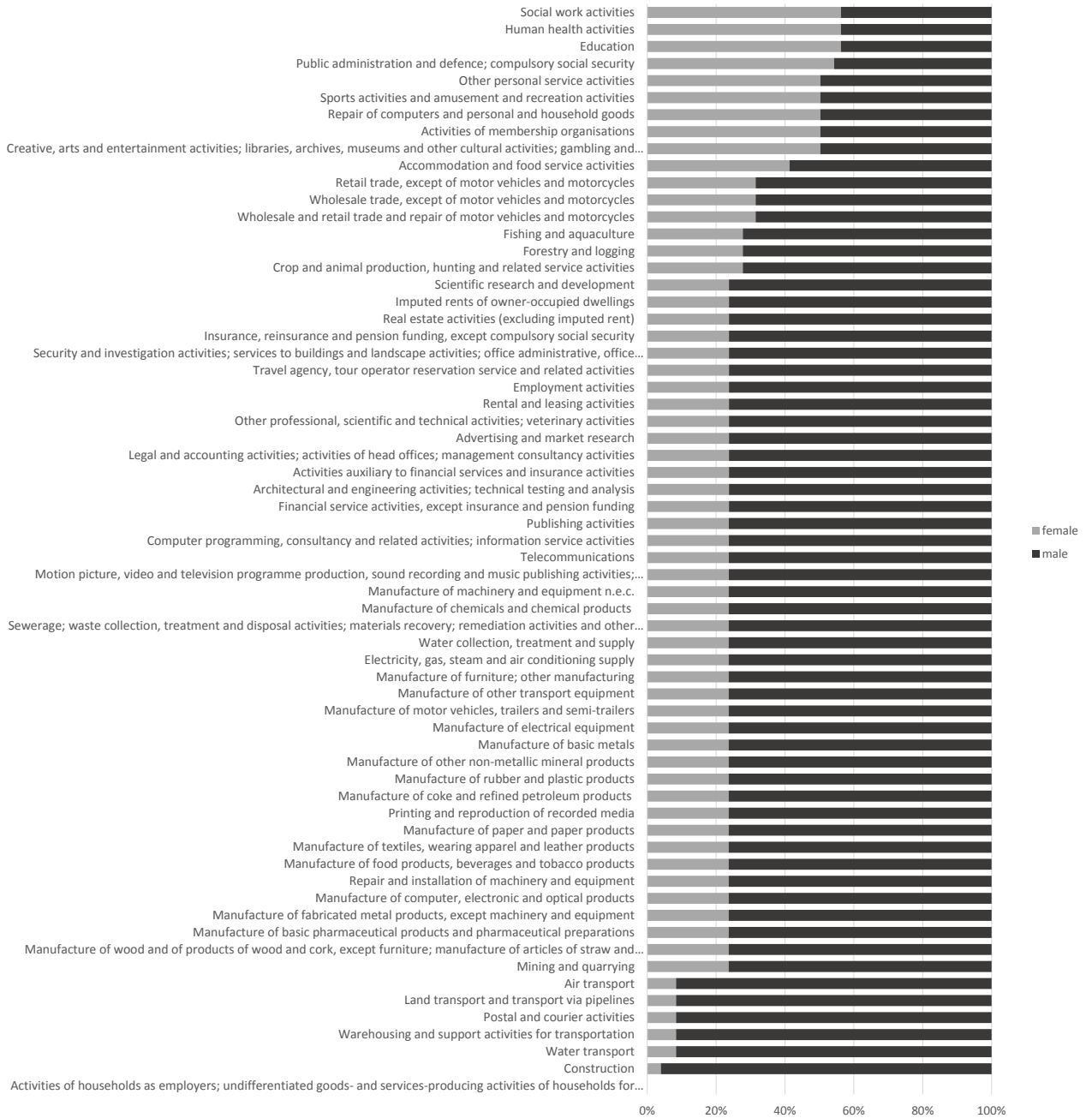


Figure 1.3: Mixed Income(% on total Mixed Income)



tion of primary income both to male and female Households for their involvement in the activity of primary production factors.

In this way, male Households receive income generated from male and female compensation of employees and mixed income, as it occurs with the female Households (see Table 1.4). Primary income allocated to male Households results the 60% of total primary income and the amount assigned to female Households is the 40% on the total. Primary income flows are not present for all the institutional sectors because some of that are exclusive items. Compensation of employee and mixed income are included in the primary income only for Households, taxes less subsidies on production are exclusive revenues of Government, while gross operating surplus is the only item that enters in the primary income formation for all the institutional sectors. Firms receive the portion related to earnings, while

Table 1.4: Primary distribution of income by gender (millions of Euros)

		<b>Compensation of employees</b>		<b>Mixed income</b>	
		<b>male</b>	<b>female</b>	<b>male</b>	<b>female</b>
<b>Households</b>	<b>male</b>	287,772	58,875	148,962	19,802
	<b>female</b>	95,196	229,748	14,661	40,915

Households detect the amount of self-employment and capital income. For the distribution of compensation of employees is important to remember that it includes gross wages and social contributions, these latter, for accounting agreement, are entirely assigned to Households and in a successive step they are rectified through the transfer of the amount to Government that records the flow as an own revenue.

#### 1.2.2.4 The secondary distribution of income

In this phase of the SAM's construction, primary incomes received by Institutional Sectors are increased/decreased by current transfers in the secondary distribution of income process. The SAM records the current transfers between resident, the current transfers from the rest of the world and the current transfers to the rest of the world. The result of the secondary distribution of income process is disposable

income (see Table3.1(row 10-14, column 10-14)). The process of national disposable income identification describes how the income is redistributed among Institutional Sectors through the payments or receipts of current transfers represented by current taxes on income, wealth etc; social contributions; social benefits and other current transfers (among which: net premia (non-life insurance),(non-life) insurance claims, current transfers within general government, current international cooperation, miscellaneous current transfers). For this reason it passes through the construction of unilateral transfers sub-matrices based on the secondary distribution of income (see Table1.5. The first sub-matrix in this process is represented by

Table 1.5: Secondary distribution of income (millions of Euros)

	<b>Firms</b>	<b>Government</b>	<b>Households</b>	
			<b>male</b>	<b>female</b>
<b>Firms</b>	97,622	27,957	47,460	12,966
<b>Government</b>	52,994	716	329,371	90,844
<b>Households</b>	<b>male</b>	182,474	228,531	80,845
	<b>female</b>	49,777	98,725	60,334

the transfers' flow of direct taxes on Income and Wealth which amount is recorded in secondary distribution among expenditures, while only the Government registers this item as a revenue. In the second sub-matrix social contributions (actual and imputed) are identified. In this phase is necessary to remember the national accounting agreement adopted in the primary distribution of income, according to which social contribution related to labour income are entirely attributed to Households in terms of compensation of employee but the real amount is really collected by others institutional sectors. In particular, Government collects most of them and a marginal part is attributable to Firms that act as managers of security funds. Other current transfers of different nature compose the last sub-matrix. In this case is appropriate to consider each singular flow: net premiums paid from all the institutional Sectors to Firms, insurance payments for damage from insurance undertakings to all the other institutional sectors, net transfers to the government and current transfers among institutional sectors (Socci, 2004). In order to build all the flows between institutional sectors considering the gender disaggregation

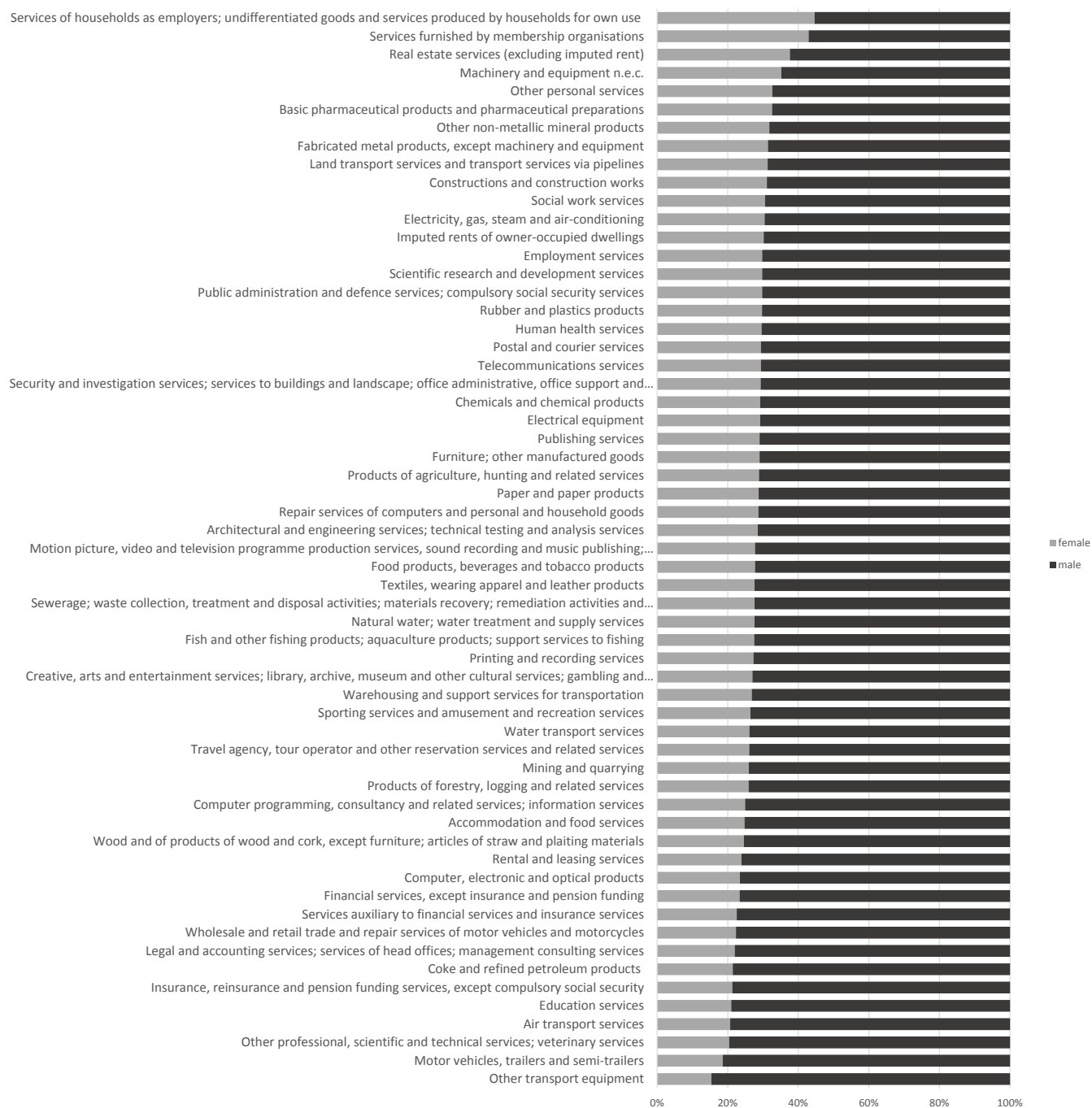
of Households and given the partial unavailability of official statistics, data from Bank of Italy survey on Household Income and Wealth and from official statistics have been integrated. In Bank of Italy survey are included incomes from work, from capital and also income from transfers with an high level of detail. Thereby it satisfies the secondary distribution of income process including not only after taxes and social contributions incomes but also both public and private transfers. Incomes from transfers are characterized from pensions, allowances received in relation to social assistance, unemployment benefits, transfers from private sector such as working liquidation value, scholarship, recurring cash contributions (rental expenses, monthly contributions, etc.) by relatives or friends and occasional cash contributions (wedding, graduation, special occasions) by relatives or friends not living together.

#### **1.2.2.5 The use of income and the capital formation aggregates**

The income circular flow closes with the allocation of disposable income by Institutional Sectors between final consumption (see Table3.1(row 1, column 11-14) and savings (row 15, column 10-13)). The use of income phase is described by the consumption matrix and the savings matrix. In a SAM, Household's final expenditure is usually analyzed according to the acquiring Households group and according to the type of acquired goods. In our SAM the consumption matrix points out the final consumption of each Households group by industries (see Figure1.4).

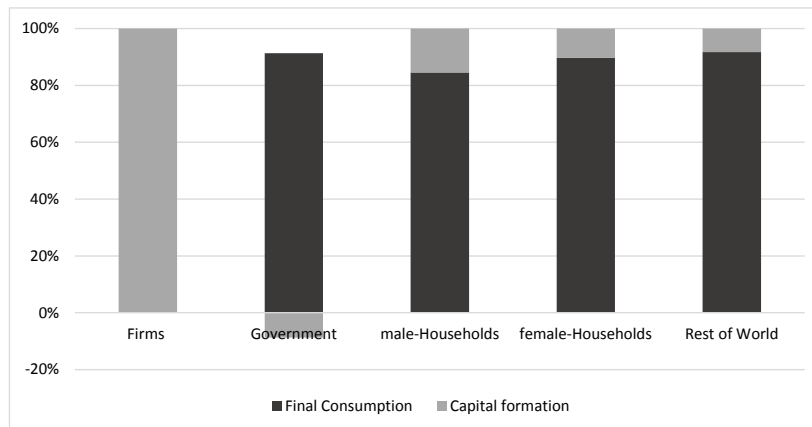
The estimate of the Households' consumption matrix is based on the micro data derived from the ISTAT survey on households consumption. It focuses on Households' expenditure and at the same time it collects enough detailed information also on the social demographic and economic characteristics of the household (and/or of its components) as well as on the characteristics of the house where the family lives. Importantly is to remember that ISTAT in order to determine the Household's expenditure, excludes spending related to mortgage loans for home and restitution of loans with banks, finance companies, etc., which are outside the economic concept of consumption as represent forms of investment. Final consumption is divided among individual and collective interesting only the Households and Government institutional sectors, while according to their economic

Figure 1.4: Male and Female Households Final Consumption (% on total Final Consumption)



functions, Firms don't make final consumption. Disposable income is adjusted for the change in net equity of Households on pension funds. Once subtracted consumption to disposable income it is obtained the amount of resources that each Institutional sector holds in the form of savings. In Table 1.6 is shown how disposable income is allocated between final consumption and savings among all the institutional sectors.

Table 1.6: Allocation of Disposable Income among Institutional Sectors



The Institutional Sectors saving is increased/decreased through capital transfers from and to resident and non-resident institutional units. The final amount of resources is finalized to investments are recorded in the gross capital formation cell. On the basis of available data it is not possible to subdivide the Institutional Sector investment according to the industries producing the investment goods. For this reason it is necessary to introduce an undivided Gross fixed capital formation account which shows the Institutional Sectors outlays finalized to investments (including changes in inventories) that derives from the production's allocation within the final demand (see Table 3.1 (row 1-column 15)).

A high level of disaggregation and increased detail in the SAM involved the need to identify origins and destinations of a much greater set of transactions in the system. The compilation process has required detailed information from different sources: ISTAT national accounts, Bank of Italy micro-data on Survey of Household Income and Wealth alongside the ISTAT Investigation into Family



Consumption, all of them involving different harmonizing processes in order to overcome gaps. A numeric version of the aggregate SAM is shown in the appendix (see Table A).

### 1.3 Final considerations

The importance of gender issue in Italy increasingly asks for specific tools enable to analyze the main relations in the economic system with particular attention to the female components of labour input and Household's groups. In order to describe all the circular income flow, in this chapter has been built a SAM which records gender disaggregation both in the production process, in particular for two components of value added, and in primary and secondary distribution of income, with the disaggregation of Households institutional sectors. Thus, compensation of employees and mixed income have been disaggregated according to the gender of the worker, while Households have been divided in female and male according to the gender of the person with the higher income in the family.

The high level of detail produced in the SAM for Italy for 2012 has allowed for a deep study of all the relations in each phase of the economic process in terms of gender differences. The introduction of gender disaggregation for compensation of employees and mixed income in the value added matrix has highlighted in which extent the different kinds of labour contribute to the value added generation for each Industry. In the phase of allocation of primary income has been possible to detect how different groups of Households receive incomes from different male and female labour thanks to the description of all this relationships in the SAM scheme. Furthermore in the consumption matrix, have been detected the final demand for consumption made by the two different kind of Households for each industry.

In order to differentiate income from labour, Households and final consumption between female and male has been necessary the integration of two different source of data. Only by integrating the dataset of surveys on income on the one hand and consumption on the other has been possible possible to have sufficient detail to estimate the flows relating to all stages of the economic process.

The present work highlighted the SAM contribution both in term of information content and in terms of potential analysis. For the first aspect is important

remember that all the data contained in the SAM are coherent and well integrated with the nation account macro variables, in fact is possible to calculate the incidence of a particular kind of labour respect to GDP or the weight of a determinate type of Household on the total of final consumption. For the potential of analysis, the *gender* SAM provides the fundamental data on the flows occurring in the economic system to calibrate CGE models for the study of direct and indirect effects of policies designed for allowing a greater inclusion of women in the labour market.

## Chapter 2

# Evaluating female labour force participation and employment: a CGE model for Italy

A greater women inclusion in the labour market is a necessary condition in order to improve economic growth and to cope with demographics challenges (European-Commission, 2014). According to this point of view, 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 Member States should accomplish when implementing any policy measure. 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 jobs, growth, fairness and democratic change. In European guidelines, all the Member States are recommend to increase participation in the labour market and the employment of women, to reduce the gender pay gap and the segmentation of the labour market.

Although gender gaps in recent decades has decreased, inequalities within and between Member States have grown overall and challenges remain in critical areas. In particular, gender gaps in employment and decision-making have narrowed in recent years, 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 rates registered for some European Countries are heavily under the objective targets set by the European Union and this phenomenon stems from multiple factors of discrimination against women. Women have more difficulties in access to labour market and these difficulties translate, in some contexts, in high inactivity rates and / or high unemployment rates. Lacking work-life balance policies impedes women's employment and therefore slows down the potential for economic growth. Occupational segregation is still common; often women work in productive sectors where the value and the compensation is lower than sectors dominated by men. In fact, women tend to be concentrated in less well-paid sectors. Women are more likely to have a higher education degree but are significantly under-represented in studies and careers, in research and in senior positions at all levels of education, including higher education.

Different studies highlight positive relationship between the increase in labour market participation by women and significant macroeconomic gains. (Loko and D., 2009; Dollar and Gatti, 1999). Some of them estimate GDP per capita losses attributable to gender gaps in the labour market suggesting that, for different countries, raising the female labour force participation rate to country-specific male levels would raise GDP (Cuberes and Teignier, 2012; Aguirre et al., 2012). Furthermore, an increase in female labour force participation could generate a series of positive macroeconomic implication given that women contribute substantially to economic welfare through large amounts of unpaid work, such as child-rearing and household tasks, which often remains unseen and unaccounted for in GDP (Elborgh-Woytek et al., 2013).

In this perspective, the female and male participation in the labour market should be scrutinized by policy-makers who have the duty to ensure the integration path whether any female participation is discouraged. This is possible by choosing the proper policy measure that can encourage and stimulate the female labour demand without neglecting the employment rate and income growth. The gender issue should therefore be integrated with the other economic variables that usually are observed from the production phase to the demand formation moving through the formation and distribution of incomes. Focusing on these aspects, in a country like Italy, where the level of female participation in the labour market is still

among the lowest within the European Countries, there is a broad consensus, between politicians and academics, that intervention measures should be primarily concentrated in the implementation of policies aimed at increasing employment rates. However, at the same time, it is crucial to determine whether the structural features of the labour market make such policies effective or not.

To understand the impact of major policy changes on women, it is essential to have a comprehensive macro framework. The multisectoral analysis offers the possibility to identify the demand of labour by gender and detect how the income is allocated and distributed by gender allowing to properly assess the overall impact of any gender policy on the whole economy. More specifically CGE models calibrated on SAM represent a powerful tool able to properly assess the overall impact of a gender policy measure and providing the policy-maker with the instruments to achieve the gender integration. In particular, CGE models constitute an analytical representation of all the interconnected exchanges that take place between economic agents based on observed data. This kind of analysis thanks to the use of equations that link variables through behavioral parameters (e.g. elasticities) permits to describe the agents' behavior. In this way, CGE models allow for a wide flexibility in assessing qualitatively and quantitatively relapses and effects of gender policies on all macroeconomic aggregates in both the short and long term.

The aim of this paper is therefore to study, for the national Italian system, the effects of a policy aimed at encouraging the integration of women into the labour market in the whole economic system in a specified time period. In this way, the paper discloses different trade-offs that involve the objectives of cutting unemployment in general and female unemployment in particular, stimulating labour supply in general and the labour-force participation of women in particular. This modeling approach represents therefore, a useful tool for the evaluation and the analysis of macroeconomic policies taking into account the role of the behavioral parameters that regulate the responsiveness of economic agents and, consequently, the effects of the modelled policy scenarios.

The policy measure analyzed in this paper is represented by a reduction in female labour costs, more exactly by a reduction on taxes less subsidies on production's rate for the primary factor of female compensation of employee by 1.5% and only for those productive sectors with higher gender disparity. In order to

properly assess the overall impact of these policies in increasing female labour supply, an important issue that policy-makers should ask themselves is whether men and women are actually complements or substitutes in the production process, and how the substitution between the two types of "labour-input" impacts on such policies results. Therefore, the policy makers cannot focus only on the direct instrument of gender policy but must necessarily think of structural measures capable in increasing the substitutability between male and female labour. To this end, firstly will be evaluated the impacts of the gender policy according to which taxes on female labour factor paid by firms are cut in order to subsidize the hiring of unemployed women on the main macroeconomic aggregates. These impacts will be investigated through the use of a CGE model that allows to assess the measure's direct and indirect effects on the whole Italian economic system. This analysis will allow to verify how the structural conditions of labour market by sector affects the gender policy results and therefore the possibility to improve the measures reliability and effectiveness. The Social Accounting Matrix -SAM- for Italy for the 2012, described in the first chapter, will be used as database for the calibration of the model.

## 2.1 The Gender Issue

### 2.1.1 The European Framework

Since 1997, the EU Member States decided to establish a common set of objectives related to the employment policies pursuing the main purpose of creating more jobs and more skilled jobs throughout the European Union within the The European Employment Strategy (EES).<sup>1</sup> Such coordination was mainly designed to commit the Member States in a number of common objectives focusing on four pillars: employability, entrepreneurship, adaptability and equal opportunities. Under equal opportunities, the priority was to combat inequalities and increase female

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<sup>1</sup>After inclusion of the new title "Employment" in the Treaty on European Union (EU), the Heads of State and Government launched a European Employment Strategy (EES) at the Luxembourg Jobs Summit with a view to coordinating national employment policies. The EES aims to improve employability, entrepreneurship, adaptability and equal opportunities at the level of the European labour market.

employment rate with the implementation of policies on career breaks, parental leave, part-time jobs and childcare services quality. In addition, the EES proposed to Member States to facilitate the return to work after the maternity leave. The European employment strategy, was inserted into the Lisbon Strategy in 2000 with the strategic goal of becoming "the most competitive knowledge-based economy and dynamic in the world, capable of sustainable economic growth with more and better jobs and a greater social cohesion" (Lisbon European Council, 2000<sup>2</sup>). The Lisbon strategy has not produced the desired results. Unfortunately, things turned out differently than expected, even for the triggering of the international financial crisis in 2008 and the explosion of the economic crisis of 2009, still in progress, with its serious repercussions on the labour markets. The Lisbon strategy for 2010 had defined quantitative targets in terms of female employment rate (60% by 2010) and childcare services for children under three years (with a coverage rate of 33% by 2010) that have not been achieved in several countries. The growth is hard to gather, unemployment has returned to exceed 10%, and many countries have recently implemented strong restrictive measures to rebalance their public finances (European-Commission, 2010).

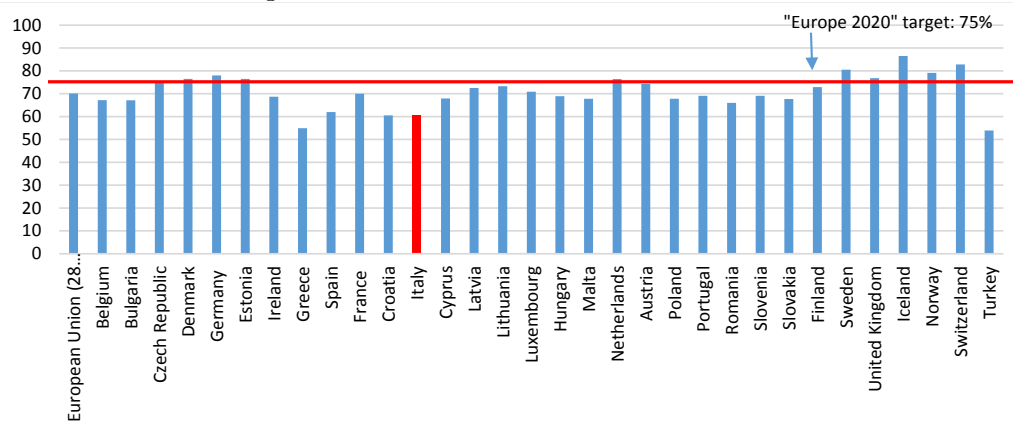
In 2010, in the middle of economic crisis, was approved the "Europe 2020" strategy, which establishes the strategic objective of "smart, sustainable and socially inclusive society" based on high employment rates and sustained by social and territorial cohesion. These priorities are declined according to quantitative targets to be reached by 2020 among which the relevant target to bring the employment rate of the population aged between 20 and 64 to 75%. In addition, further specific objectives are to reduce by 20 million the number of people living at risk of poverty and social exclusion, decrease the school dropout rate from 15% to 10% and increase the young graduate's proportion from 31% to 40%.

Given the attention towards gender issues in the previous agreements, we

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<sup>2</sup>The European Council held a special meeting on 23-24 March 2000 in Lisbon to agree a new strategic goal for the Union in order to strengthen employment, economic reform and social cohesion as part of a knowledge-based economy. At the start of proceedings, an exchange of views was conducted with the President of the European Parliament, Mrs Nicole Fontaine, on the main topics for discussion. The aim of the Lisbon Special European Council of 23-24 March 2000 was to invigorate the Community's policies, against the backdrop of the most promising economic climate for a generation in the Member States. It was therefore fitting to take long-term measures on the basis of this outlook.

Figure 2.1: Total EU Employment Rate



Source: Eurostat database "Employment and activity by sex and age" (2015)

should expect a key role of women employment in this reformulation. Before 2005, there was a guideline specifically dedicated to "equal opportunities"<sup>3</sup>; this guideline was lost in the reformulation of 2005, however, some important priorities, which could have led the Member States action towards a decrease in the labour market gender inequalities, were kept. Between those, the paid work in a life cycle perspective approach, the reduction in labour market segmentation and the increase in job's quality. On the contrary, the gender dimension is severely lacking in the Europe 2020 strategy. In fact it misses an explicit reference to the gender mainstreaming perspective and unlike the precedent Lisbon Agenda, it also lacks an occupational goal disaggregated by sex and, therefore, the women employment quantitative target to be achieved by 2020. This gender mainstreaming deficiency, however, would seem to be present in the guidelines for the employment of policies for the Member States that contain the recommendation to integrate gender equality and more specific references to measures for women in every policy measure. A greater women inclusion in the labour market is a necessary condition in order to improve economic growth and to cope with demographics challenges. According to this point of view, it is crucial to integrate a visible equal opportunity perspective in all policy areas. Explicit mention is made to Member States,

<sup>3</sup>Opinion of the advisory committee on equal opportunities for women and men on the social agenda. European Commission: Employment, Social Affairs and Equal Opportunities



in Guideline 7 (European-Council, 2010), where they are encouraged to actively engage for the increasing participation in the labour market by women and men. This goal should be realized by the reduction in structural unemployment and the promotion of work's quality which is possible by integrating into labour market policies the "flexicurity"<sup>4</sup> principles recognized by the European Council and by an appropriate use of European Social Fund and other EU funds.

As a result, a vital means to reinforce the gender dimension of the "Europe 2020" may be the adoption of gender-specific targets which help ensure a gender-equality perspective in regard not only to the employment, education and social inclusion issues but also to the strategy as a whole. In this way, it will be possible to better understand the multiple causes of inequality and how to combat them bringing the targets' achievement closer. However, the Strategy has not been sufficiently gender-sensitive. Gender equality is interpreted as a precondition for sustainable, competitive and inclusive growth, and gender policies as part of the response for the challenges. Nevertheless, its inclusion in "Europe 2020" is unusually scarce as if gender equality policies and its 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 neglect of the goal of gender equality. The lack of gender-specific targets concerning issues where gender inequalities exist (pensions, employment, education, skills, poverty, among others) shows that the strategy for equality has been partially diluted in these difficult circumstances. Whilst the role of women in promoting labour participation and social cohesion is fully recognized, the importance of a gender mainstreamed approach seems to have been undermined by the current circumstances (Villa and Sansonetti., 2012).

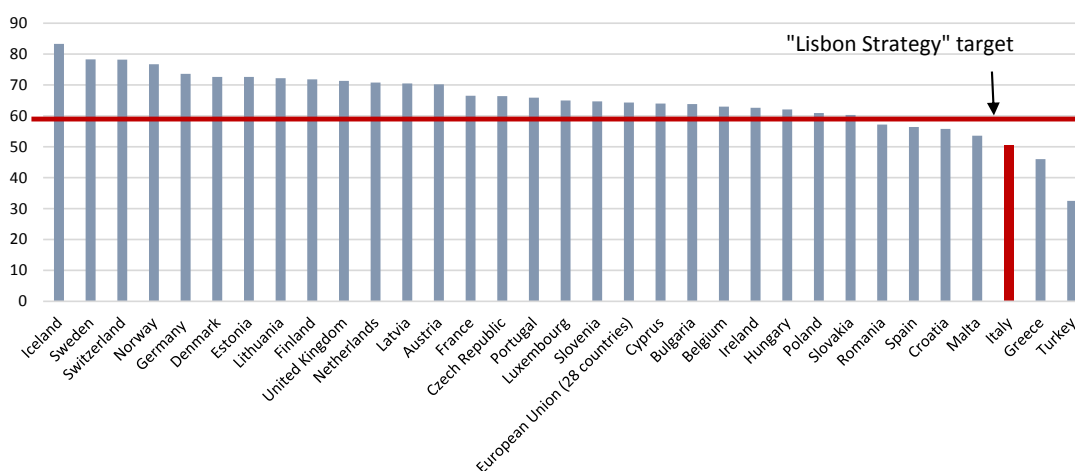
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<sup>4</sup>Member States should take into account the flexibility and security principles. They should reduce and prevent segmentation within labour markets and fight undeclared work. Employment protection rules, labour law and institutions should all provide a suitable environment for recruitment, while offering adequate levels of protection to all those in employment and those seeking employment. Quality employment should be ensured in terms of socioeconomic security, work organisation, education and training opportunities, working conditions (including health and safety) and work-life balance (European-Council, 2015).

## 2.1.2 The Italian Context

Female employment rates registered for some European countries are heavily under the objective targets set by the European Union and this phenomenon stems from multiple factors of discrimination against women. Women have more difficulties in access to labour market and these difficulties translate, in some contexts, in high inactivity rates and / or high unemployment rates. Women inclusion in the workforce results highly concentrated in job positions and occupations characterized by lower levels of wages than professions where the presence of men is greater. These disadvantages faced in accessing good quality work will also result in a concentration of women in non-standard employment with contracts less secure and less protected. Working positions occupied by women are furthermore characterized by less prospects of career advancement than typically male job positions. Between European Countries, Italy has always characterized by low levels of female employment and by high numbers of person looking for a job, even if in an inactive way (see Table 2.2.)

Figure 2.2: Female Employment in European Counties

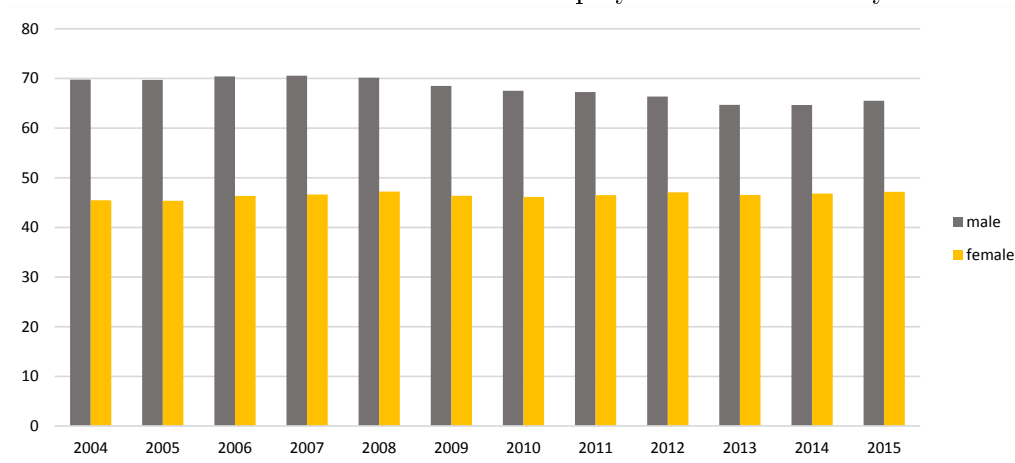


Source: Eurostat database "Employment and activity by sex and age", (2015)

Recent years are particularly signed by the economic crisis that has contributed to divide the period in two different phases. One in which employment rate has continued to growth and another one more critic. The employment and the non-

participation rates have further worsened in the years from 2004 and 2015, in particular for the negative effect of economic and financial crisis in the second part of the period. Gender differences have been reduced for stronger impact of the crisis on the most typically male occupations, in industry and construction, and for a better resilience of female ones present in the services (see Table2.1).

Table 2.1: Male and female employment rates in Italy



Source: ISTAT "Labour and Wages: Employment"

Female labour market continues to be characterized by deep structural limitations that affect employment rates. Education plays a protective role in participation in the labour market and represents a critical tool for access to work especially in the South of the Country although it is common to find the over education phenomenon. The presence of women in decision-making roles appears to be growing both in politic that in economic place, in this sense; the female dynamism emerges sharply in recent years, although not in all areas. Between 2004 and 2014 part-time work is the only form of rising job, even during the crisis years, and full-time jobs have fallen substantially. However, rather than representing a choice of conciliation carried out by workers, the growth of part-time has been actually one of the strategies of firms to cope with the crisis. Especially since 2008, the increase in part-time work is mainly involuntary, chosen in the absence of a full-time job opportunity (ISTAT, 2015).

In Italy many women are inactive because the economic gain (net of all set-

tlement costs) of work for the market is considered insufficient. Women end up earning less because they are concentrated in low-wage sectors, in the less skilled jobs, in occupations that not recognize the same value of typically male occupations. In addition, women face more obstacles in accessing senior positions. Labour market segregation is a phenomenon still present nowadays: women and men tend to do different jobs. Often women work in productive sectors where the value and the compensation is lower than sectors dominated by men. In fact, in a large number of cases, sectors with high concentration of women present wage levels on average lower than sectors with high male concentration. This is present in almost the European countries where women are over represented in the health-care, education and public administration sectors, and those are characterized by salary levels lower than the average. In all countries there is a certain level of discrimination against women, even though the way and the intensity with which discrimination in the labour market is manifested may be different from country to country. For example, in North European Countries there are high female employment rates (with few differences between men and women in their employment rates), but accompanied by a strong occupational segregation, with women employed in lower-paid job positions. In the UK the high female employment is combined with large wage differences to the detriment of the female component; in Italy both occupational segregation and wage differentials are relatively small, but access to paid work for many women remains barred. The growth in the number of women employed, with particular attention to those sectors with high level of gender inequality, would generate a wide virtuous cycle for the economic system with the result of a greater amount of social contributions paid (by reducing the current pension expenditure constraint) and higher tax revenues, which could be directed to the financing of women's employment support policies.

Therefore, promoting gender equality in the workplace is important for several reasons: first of all it ensures the implementation of the equity principle between men and women; secondly it improves the economic well-being of families, especially families with minor children and reduces the risk of poverty among women in old age, ensuring them an adequate pension level, finally it contributes to the growth of the whole economic system. The attention to the problem of gender inequality is high, especially at the level of major international institutions (Eu-

ropean Commission and European Parliament). It is generally recognized the importance of the role of women in economic and social life, but is observed the persistence of prejudice and discrimination against women at single state level (Villa, 2010)).

Governments should takes positive actions oriented to improve the opportunities for a growing number of women to enter into the typical labour sectors with high male concentration. In Italy, significant efforts have been concentrated in the labour market reform alongside the introduction of new types of contracts, including tax incentives to encourage the adoption 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 improving the competitiveness of the country and is sustainable and consistent with the budgetary measures of cut taxation.

The main objective of this study is to analyze the effect of policies aimed at reduce female unemployment, in the light of the strong advantages for the whole economic system given by the increase in female employment and taking into account that Italy is bringing up the rear in terms of female labour participation among European Countries. In particular, the aim of this paper is to analyze the effect of gender policies on the economic system by reducing taxes on female compensation of employees for the economic sectors with higher gender disparity. More specifically to those sectors or professions where the gender imbalance is at least 25% higher than the average gender imbalance across all economic sectors<sup>5</sup>.

## 2.2 Review and critics to CGE models

General equilibrium theory, where supply and demand are balanced across all of the interconnected markets in the economy, goes back to Walras (Walras, 1874) that is considered the father and was developed by Arrow and Debreu (Arrow

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<sup>5</sup>COMMISSION REGULATION (EU) No 651/2014 defines 'disadvantaged worker' as any person who: works in a sector or profession in a Member State where the gender imbalance is at least 25% higher than the average gender imbalance across all economic sectors in that Member State, and belongs to that underrepresented gender group.

and Debreu, 1954). The general equilibrium approach is a conventional analytical framework for evaluating the economic implications of policy intervention. Its main virtue is the micro-consistent representation of the direct as well as indirect effects induced by exogenous policy changes on resource allocation and agents' incomes. It contains the explanation of the origin and the spending of the agents' income making possible to give attention both to economy-wide efficiency as well as equity impacts of policy. Theoretical general equilibrium analysis provides important qualitative insights into the driving forces of adjustment reactions by economic agents to exogenous policy constraints but at the same time the theoretical models present limits due to the highly stylized form that is not able to seize the analytical flexibility of the real-world complexities. The needs for analytical and numerical solutions methods made it possible the development of CGE models as standard tools for applied policy analysis (Bohringer, 2004). CGE models are simulations that combine the abstract general equilibrium structure with realistic economic data to solve numerically for the levels of supply, demand and price that support equilibrium across all the specified markets.

The first CGE model was that of Johansen: the model was general with 20 cost-minimizing industries and a utility-maximizing household sector, it considered market equilibrium assumptions in the determination of prices and it was computable <sup>6</sup> (Johansen, 1960). Arnold Harberger, was the first to investigate quantitatively the effects of the corporation income tax in a two-sector general-equilibrium framework for U.S. (Harberger, 1962) and Herbert Scarf produced a work on computationally solving general equilibrium with an original computer algorithm. He emphasized both the computability of competitive equilibrium and the potential applications of constructive proofs of the existence of these equilibrium to public policy's issues (Scarf, 1967a,b). Among the earliest policy-oriented CGE studies the most important are Miller and Spencer, which studied the effects of tariff levels and redistribution of tariff revenues harmonization in an illustrative four-country neoclassical trade model with particular reference to the entrance of the U.K. to the European Economic Community (Miller and Spencer, 1977).

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<sup>6</sup>it produced a numerical, multi-sectoral description of growth in Norway using Norwegian input-output data and estimates of household price and income elasticities derived using Frisch's (1959) additive utility method (Dixon and Parmenter, 1996).

Shoven has examined the incidence and efficiency cost of the discriminatory taxation of capital income in the United States comparing the results with the previous 1966 Harberger's model (Shoven, 1976). Shoven and Whalley, produced a paper in which they analyzed both the incidence effects and the efficiency costs associated with the differential taxation of income from capital in the U.S. economy (Shoven and Whalley, 1972). Whalley, applied computational techniques directed of determining the existence of competitive equilibrium to a particular set of policy measures grouped under the name of "the 1973 UK tax reform" (Whalley, 1975). Conrad (Conrad, 2001) focused his study on the importance of general equilibrium interactions in assessing efficiency costs of environmental policies in a wide range of government policies to control air pollution, deforestation or water quality; Kehoe and Kehoe (Kehoe and Kehoe, 1994), constructed and used a simple model in a series of examples and extended it to include increasing return to scale, imperfect competition and differentiated products. Gunning and Keyzer (Gunning, 1995) provided a classification of existing and potential applications which is explicitly related to the theoretical literature allowing for inequality constraints and for non-distortionary government interventions justified by external effects or non-convexities, intertemporal aspects, both under finite and infinite horizons with particular attention to the modelling of money and financial assets. Later, Piggott and Whalley (Piggott and Whalley, 2008), brought together developments in the field of applied general equilibrium modelling starting from their first publishing of the volume in 1985. Volume contains papers discussing approaches to welfare measurement in applied models, applications unexplored areas, such as economic history, extensions to analyze micro data files, regional analyses and fixed price equilibrium.

Subsequently, the number of CGE models of national economies exploded. Several review on CGE studies have been produced by many authors: Shoven and Whalley reviewed the early national CGE literature on taxation and trade (Shoven and Whalley, 1984). Borges (Borges, 1986), focused his work on a description of the strengths and weaknesses of the general equilibrium approach. Pereira and Shoven surveyed in detail studies related to dynamic CGE modeling of national tax issues (Pereira and Shoven, 1988). Jaime de Melo collected the contribution of CGE models to quantification of trade policy scenarios in developing countries

(De Melo, 1988), while Bandara surveys CGE studies of development policy in LDCs (Bandara, 1991) and Bhattacharyya reviewed national and international CGE studies of energy and environmental issues (Bhattacharyya, 1996). In recent times, further studies have reviewed regional CGE modeling implemented to examine regional economies and regional policy issues review (Partridge and Rickman, 1998). Other recent reviews on CGE literature are by Shoven and Whalley (Shoven and Whalley, 1992), who have been actively working in the field for decades, (Dixon and Parmenter, 1996) with an updated description of CGE modelling together with its history, and Ginsburg and Keyzer (Ginsburgh and Keyzer, 1997) which their contributions seems to cover very well the common recognition of the main sources of CGE.

CGE models have become a standard tool for applied analysis of measures in various policy fields among which public finance and taxes, international trade policies and tariffs, regional development, energy, and environmental policy. These models incorporate lots of details that on the one hand allow for the quantitative study of direct and indirect effects of different policy actions and on the other hand provide an open framework for the incorporation of new economic research topics such as the new growth and trade theory or important relationships to other disciplines adopting an integrated assessment approach. These models are widely employed by various national and international organizations (EU Commission, IMF, World Bank, OECD, etc.) for economic policy analysis both at the sector-level and at the wide economic system level<sup>7</sup>

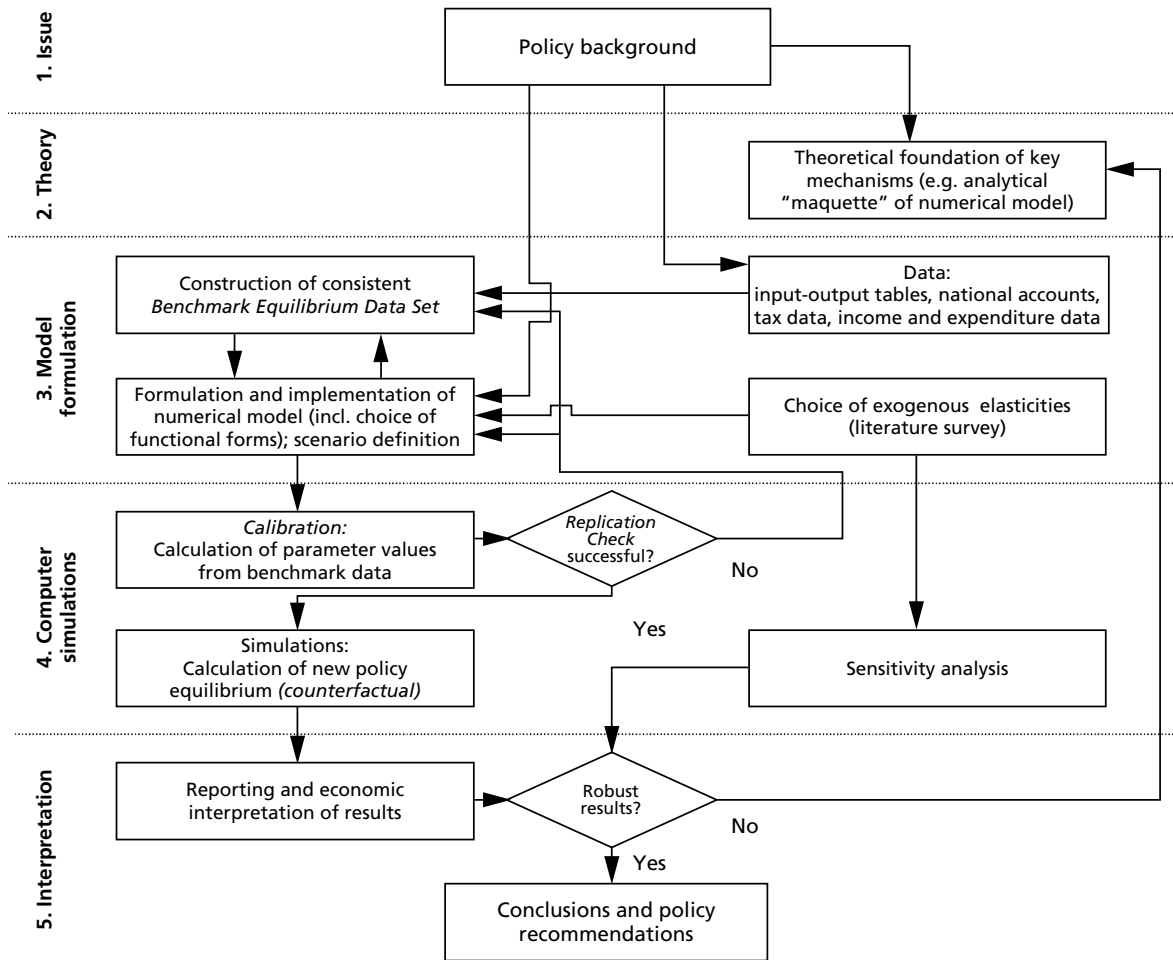
The essence of CGE economics is the combination of general equilibrium theory with a consistent data set (most commonly from National Accounts) in order to derive policy insights. Thus, the construction and the use of CGE models requires the implementation of several phases (see Figure 2.3). First, it is fundamental to carefully study the policy question in order to choose the most appropriate model design and the coherent database. After having studied the policy issue, in a second moment is necessary to draft key economic mechanisms that drive the results in the numerical model by using the economic theory fundamentals. Subsequently a

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<sup>7</sup>Since 1991, the *Journal of Economic Literature* has listed a separate classification number for this type of analysis (D 58: *Computable and other Applied General Equilibrium Models*) as evidence of the importance of CGE modeling in academic research



Figure 2.3: Steps in computable general equilibrium analysis (Bohringer, 2004)



very important phase concerns the model formulation and the implementation of alternative policy instruments and strategies.

The model's formulation includes the choice and parameterizations of functional forms that are crucial in determining results of policy simulation. Calibration procedure is the most commonly used to select parameter values (Mansur and Whalley, 1984). It should be remembered that CGE are usually very large, including a substantial number of parameters and often embodying complex structures, so for the free parameters calibration of functional forms is necessary to choose a consistent one year's data together with exogenous elasticities that are usually taken from literature surveys. The calibrated model must be able to replicate the one year equilibrium (benchmark) as a model solution without the policy implementation. During the policy simulations, single parameters or exogenous variables change in order to reach a new (counterfactual) equilibrium. The comparison between the counterfactual and the benchmark equilibrium provides information on the economic policy effects in the main economic variables such as employment, production, consumption, relative prices, etc. Taking into account this process the detailed choice of functional forms, the method of parameterizations, the data base from which the model is calibrated, the parameter estimates used and the choice of aggregation level, are crucial. As a matter of fact, in CGE models everything depends on everything else, and no parts of the model are independent of the rest (Borges, 1986).

Before concrete policy recommendations are derived, sensitivity analysis on elasticities should be performed in order to determine the robustness of the results and to identify the key parameter values that dominate the final outcome. Finally, the model results must be interpreted on the base of the economic theory.

In the construction and simulation process of CGE, a fundamental problem is represented by the choice of proper macroclosure. The debate started with the Sen's (Sen, 1963) analysis of a simple version of a closed CGE model where stated that "in a closed economy with neoclassical production, it is impossible to achieve predetermined levels of real investment and public consumption, to pay production factors the value of their marginal product and to maintain factor full-employment at the same time". The system results overdetermined: the CGE model has more equations than unknowns and is necessary to find some way of closing the system

making it mathematically determined. It is possible to distinguish between four macroclosures, in the case of a closed economy: the Keynesian, the Johansen, the Classical and the Kaldorian. To choose one macroclosure among the four means to drop one specific assumption of the original model. In the case of the Keynesian macroclosure, labour full employment is no longer compulsory; employment becomes endogenous. In the Johansen closure, public consumption becomes endogenous, by itself, given the level of government revenue, it is up to public savings to fill the gap between the exogenous investment volume and the other sources of savings. With the Classical closure, the volume of investment, which is endogenous, adjusts itself to the total available savings. Finally, with the Kaldorian closure, production factors are not necessarily paid according to their marginal-value productivity, but real savings adjust to the total investment target through a change in income distribution (Rickman, 1992). When the economy is open to trade, there are two different cases depending on the foreign exchange regime. In the case of floating or fixed level in real terms of the exchange rate, there is the necessity of choosing among macroclosure because the supply of foreign savings is not perfectly elastic and does not necessarily fill the gap between the real investment target and available national savings. Indeed, in the case of the fixed exchange rate, the supply of foreign savings is perfectly elastic and automatically fills the savings-gap making the choice for macroclosure useless (Dewatripont and M., 1987). Therefore, the choice of a particular macroclosure depends significantly on how the CGE modeler views the functioning of the economy and this choice brings to an important qualitative dimension to the CGE model construction and simulation process.

### **2.2.1 Strengths and weaknesses**

One of the most important strengths of the general equilibrium methodology is its solid microeconomic foundation. The behaviors of all the economic rational optimizing agents are specified and are operative representing the most used basis for empirical work (Borges, 1986). However, CGE models represent an extension to classical equilibrium analytical models in the sense that they are mostly policy driven and aim to provide numerical solutions to large multi-sectoral models.

Their main task is to simultaneously find equilibrium prices, quantities, and incomes in a system where all economic flows are accounted for. Furthermore, they are capable of illustrating the respective economic flows in much more detail and complexity than analytical models, which can only afford to work in small dimensions (Scricciu, 2007). CGE modelling hence represents a flexible analytical and simulation device able to capture the multiple effects that the implementation of a set of combined policy issues could produce on the economy. This is can be achieved thanks to the integrated manner in which the economy workings are described and considering the complex inter-linkages, feedback and spill-over effects between all the sectors and economic agents operating in the modelled economy.

CGE models allow for an efficient description of all the relationships among variables making the model's structure transparent. Those interdependencies make it difficult to determine in advance, what the results of a particular simulation will look like, but the theoretical foundation makes it possible to trace back the simulation results and to determine which factors are crucial in explaining them. This general approach make it is possible to integrate into a single structure a complete series of effects taking into account all the components of a problem: all feedbacks are considered and no markets or agents are neglected. Thus, complex interrelationships that both explain the role and the impact of different factors and improve the analysis with new results, can be analyzed.

One of the main virtue of CGE models is the flexibility that makes possible the development of highly disaggregated models. Frequently, the overall impact of many policies actions on the economy is much smaller than their effect on the structure of the economy. Therefore, in order to analyze structural issues is fundamental to work with models that present detailed level of disaggregation. Furthermore, by specifying the economy in some detail, it is possible to include many structural aspects of distortions or market failures into the models. The most representative example of this is the tax system. Many inefficiencies introduced by taxes, can only be captured in a disaggregated model with significant sectoral detail (Borges, 1986). The impact of taxes is sometimes crucial to other policy analyses even those not related to taxes given their interaction with each other. Whereby, removing one source of inefficiency, does not necessarily bring to an general improvement of the resources allocation in the system if other distortions

persist (Ballard et al., 1985).

Another advantage of CGE models is the possibility of deriving better measures of the welfare gain or loss associated with a new policy. Especially when distributional issues are important, measures such as income or GDP are imperfect estimates of welfare while explicit welfare measures embodied in these models can help for a better explanation of how the situation has changed with the policy simulation, what factors contributed to it, and what is the relative weight of each one (Borges, 1986).

At the same time, the general equilibrium approach presents some weaknesses which reduce its interest and which limit its applicability to carefully chosen areas or issues. General equilibrium theory, that represents the basis for the CGE models, has been criticized (Ackerman, 2002) (Ackerman and Nadal, 2004) for the not necessarily either unique or stable equilibrium point. Stable solutions exist only under very special assumptions about aggregation and the individualistic model of consumer behavior. The assumption of the representative agent adopted in CGE models does not capture the behavior of social groups that present different preferences and technologies affected by inter-agent comparisons leading to conclusions that can be distorted (Kirman, 1992). Moving from the theoretical to the computable model, the "general" representation of the economy become absent because the number of economic agents is determined by the available statistical information about a given economy making this a not appropriate base for applying the tools offered by the microeconomic theory (Grassini, 2009). In order to reduce this weakness of the model is important to operate disaggregation with the highest level of details available, thereby making the behavior of social groups as closely as possible to the "general" representation of the economy.

One of the critic of CGE models poses the attention on the quality of data because on this, partly depend the quality of the model for an arbitrarily chosen benchmark year. In particular, in CGE models are generally ignored the rich sources of time series data available for the world economy and are used just one year's data for long term projections. Benchmark equilibria are constructed from national accounts and other government data sources that require some adjustments to ensure that equilibrium condition hold. These adjustments allow to suit the observed economy to the neoclassical paradigms: this is the case, for example,

of the zero profit assumption in the perfect competition that entails the removal of profits from the national product and income accounts. In this way, CGE models do not refer to the observed economy given that the available representation of the world has to be modified in order to assure the theoretical foundations of the model (Grassini, 2009).

Another critic that finds an extensive debate in the literature takes the name of "econometric critique" of CGE modeling. It calls into serious question the functional and numerical structures of calibrated CGE models. The optimization principle is applied to a short number of well defined analytical forms of utility, production and cost functions. The choice of these forms is up to the model builder. In the calibration method, some parameters are determined on the basis of empirical literature survey, some are chosen arbitrarily, and the remainder are set at values which force the model to replicate the data of a chosen benchmark year (Shoven and Whalley, 1992). This approach has been criticized by several authors (Jorgenson, 1984; Lau, 1984; Jorgensen et al., 1992). The main problem is that drawing parameter estimates for CGE models from literature makes the choice of functional form fundamental, in fact, with the same data and the same set of parameters, different functional forms produce different outcomes for policy analysis. The calibration approach tends to limit the researcher to the use of "first order" functional forms where preferred alternative would be to use flexible functional forms, which have enough free parameters to provide a second order approximation to any underlying preference or technology aggregation function (McKittrick, 1998). Another important criticism of CGE model is referred to the treatment of intertemporal issues, saving and investment decisions, and of expectations. The simulation done by using CGE models are basically used for comparative static analysis. The CGE models may be declared static or dynamic, but they are both focused on steady state equilibrium and what happens outside the equilibrium is not explained. It is not only assumed that all markets find their equilibrium but also that nothing happens until equilibrium is reached. In other words, no transactions take place in disequilibrium, as if all economic agents were to wait until equilibrium is found before they made any decisions. Moreover, given that these models are designed to look at long term issues it is somewhat contradictory that it does not account for factors such as capital accumulation, population growth and

technological change the implications of which can be far reaching in the long run. On the other hand, it is difficult to predict technological progress or to assume that it will continue to proceed in the future at the same rate and with the same characteristics as until now (Borges, 1986). Usually, changes in technologies are just the result of price substitution among different given production techniques. Existing technologies are gradually replaced in CGE models as relative prices of alternative technologies change (Bohringer and Loschel, 2006). Only more recently, CGE models took into account technological change responding to socioeconomic (policy) variables like prices, investment in R&D, or cumulative production as an important endogenous element. Induced technological change alters the character of production and involves invention, innovation, development, and diffusion of new technologies (Loschel, 2002).

## **2.3 The Methodology: *Gender*- CGE and SAM**

In order to measure 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 CGE which includes "unemployment equilibrium" calibrated on a SAM for Italy for the 2012 disaggregated by gender attributes within the components of value added and in the households institutional sector. The incorporation of *gender* components into the SAM and the model facilitates the analysis of several gender policies impacts, making the effects more detectable for policy-makers.

### **2.3.1 Review of Related Studies**

Among CGE modelling, several studies had the central aim of studying the labour market under different points of view. On the one hand, from a direct point of view, by analyzing the changes in the internal market rules and on the other hands by studying the indirect effects that economic policies measures, not directly related to the labour market, may have on it. The first attempts to address the labour issue in a CGE context were related to studies on social security and labour taxation (Gelauff et al., 1991; Dewatripont et al., 1991). Other studies were focused on options for stimulating unskilled employment through tax cuts

for the lower income and tax relief on the highly used services' consumption by unskilled persons (Sorenson, 1997). Further works had the objective of analyzing the effects of labour taxation changes with the aggregate labour market module (Hutton and Ruocco, 1999; Bohringer et al., 2005); others have focused primarily on tax reforms, but in models with a greater heterogeneity of the labour market (Bovenberg et al., 2000), while some studies have simulated various labour market policies as the reduction of taxes on wages, cuts on wages and employment in the public sector and reducing the bargaining power of labour unions in a dual labour market model with collective wage bargaining (Agenor et al., 2007).

Moreover, numerous studies have analyzed the economic policy shocks not directly linked to the labour market, but with consequences on its determinants. Some examples include studies of fiscal policies (Ballard et al., 1985), analysis of trade liberalization policies (De Melo and Tarr, 1992; Herault, 2007; Bourguignon and Savard, 2008; Bussolo et al., 2008), studies on energy economics and climate policy analysis with particular focus on the interaction of energy and labour markets (Fraser and Waschik, 2010), analysis of the impacts of macroeconomic shocks such as the financial crisis (Ferreira et al., 2008; Robilliard et al., 2008).

In this article the basic feature of the labour market concerns the dimension of heterogeneity, in particular, the labour demand breakdown with respect to gender. The decomposition of the labour market in CGE models, has become an increasingly common practice due to the growing interest in gender and inequality dimension and the recognition of the special role that women play in economic development. The importance of gender aware macro-economic analysis has increased with many more developing countries embarking upon Structural Adjustment Programs (SAP), since women and men are differentially affected by such programs. One reason for this is the nature of participation in work. Distinguishing the database by gender would enable an assessment of the impact of alternative development strategies on both men and women and an evaluation of policies that might improve the economic situation of women in particular (Duchin and Sinha, 1999). Major macroeconomic changes also impact upon income distribution and the social sector (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 both the market economy and the household. Most of these quantitative analyses of trade reforms use global CGE models which illustrate the linkages between sectors within an economy and the linkages between countries.

Considering the impact of gender policies on the female employment, there are numerous studies that have introduced the gender components in the labour market (Arndt et al., 2006). Some of them have also introduced non-market activities in the context of CGE models demonstrating that with the explicit modeling of domestic activities and free time, the impact of trade liberalization such as reducing tariffs policies, produce interesting changes in results on women's employment and wages (Hendy and Zaki, 2010). Fontana and Wood (Fontana and A., 2000) were the first to develop a gendered CGE model for Bangladesh incorporating households' work and leisure in addition to market economy with inputs and outputs. Two other papers by (Fontana, 2004) and (Fofana et al., 2003) also have analysed gender issue in CGE framework. They found that expansion of the females' paid employment has been accompanied by a reduction in their leisure time.

### **2.3.2 The CGE model**

In this work has been developed a disaggregated static computable general equilibrium model for a competitive system. The main aim of the model is to analyze the effects of specific gender policies on the main macroeconomic aggregates in an integrated system of production and consumption, which takes account of the circular flow of income. The model has been calibrated on a SAM for Italy that presents gender features both in the production process where the income generates and up to the income allocation in the distributive process. The present model is able to formalize the behavior of all economic agents going to solve a constrained optimization problem with income, technology and capital formation conditions.

More specifically, the model considers an open economy disaggregated into 64 production sectors (Industries), three value added components (Compensation of Employee, Mixed Income, Gross Operating Surplus), taxes on production and imports less subsidies and 4 institutional sectors (Firms, Households, Government and Rest of the World). In order to study how gender policies designed to increase

women's employment impact on the economic variables of the whole system, the Households institutional sector has been disaggregated according to the gender of head, i.e. the person that receives the highest income. At the same time, in order to track the process of generation, primary and secondary distribution of income among the different agents, we disaggregated by gender also two components of value added (Compensation of Employee and Mixed income).

Following the same pattern of SAM, also the model retrace the circular flow of income described by a system of equation and budget constraints responding to a maximization problem of price taker agents. The solution of the model is of Walrasian kind, represented by a vector of prices and quantities that maximize producers' profit and the consumers' utility given their budget constraints. So that all the markets are in equilibrium and all the agents satisfy their budget constraints, the following conditions have to be fulfilled. In particular, the zero profit and the market clearing conditions given the budget constraints should be applied at the same time.

The *zero profit* conditions requires that the value of inputs must be equal to the value of output. This condition according to which each producers can't realize a positive profit is guaranteed by the fact that the market price of good must be equal to the margin cost of production.

The *market clearing* condition for goods and factors instead is satisfied when for each combination of prices and produced quantities, supply and demand are balanced. On the commodities side, this condition is verified when the total output is equal to the total demand which is made up of domestic demand for intermediate inputs to current production; demand for households consumption; demand for government purchases; demand for inputs to capital formation and exports. In the same way, for primary factors, the market clearing conditions are verified when the factors endowments correspond to the primary factors demands expressed by the production system (Ciaschini et al., 2013).

Finally, the *income budget* constraint is imposed so that for every institutional sector, the value of income equals the value of factors endowments. In particular, primary factor compensation plus the net transfers from others institutional sectors are the total net endowments for Firms and Households, while total tax revenue plus the net transfers from institutional sectors represent the total endowments

for Government. According to this assumption, for each institutional sectors, the total endowment must be equal to the consumption expenditure and savings.

A peculiarity of the proposed model is to highlight the imperfections of the labour market considering the possibility for underemployment equilibrium (Keynesian macroeconomic models) in contrast with the Walrasian general equilibrium models where full price flexibility ensures full employment at market clearing wage level. The main effort of this work is to investigate labour market effects of tax policy intervention in the Italian economy by introducing non perfect competition features in the computable general equilibrium framework. Thus, the model presents an involuntary unemployment rate  $u$  and the wage determination is based on collective bargaining between firms and trade unions. The approach proposed is of "right to manage" type in which the parties negotiate over wages, and firms decide according to their own labour demand to the wage bargained (Bohringer et al., 2005). In this way, each industry's wages are determined by negotiation between the representative firm and the Labour Union resulting from a Nash function maximization which includes the objective function of both parties and their respective alternatives.

In order to empirically find the solution of the model is fundamental to use concrete functional forms able to describe the different production possibilities and preferences. In applied modeling, combinations of Leontief functions, CobbDouglas or constant-elasticity-of-substitution (CES) are among the most common. In open-economy CGE models, CES functions and the related Constant Elasticity of Transformation (CET) functions have been used to model consumers' and producers' decision-making process regarding consumption of production of traded goods (imports or exports) and domestic goods (Pauw, 2003). Specifically, they are employed as aggregation and transformation functions in models that incorporate international trade flows. Including a foreign sector local consumers can choice between imported and domestically produced goods, while local producers can choose whether they wish to export their production or supply it to the local markets. It is therefore necessary to make certain assumptions regarding the substitutability between imports/domestic goods (consumers) and exports/domestic goods (producers). The so-called "Armington assumption" provided the solution to this problem accordin to which imports/domestic demand and exports/domestic

supply are imperfect substitutes.

In particular the use of CES functions has seen a sharp increase in different economic applications and especially in the context of CGE models. This is mainly because contrary to less restrictive functions, the CES's mathematic characteristics of regularity ensure an easier analytic treatment<sup>8</sup>. Furthermore this kind of function is enough flexible to characterize a series of different economic behavior (Bohringer et al., 2003) and the use of a CES function allows us to calibrate the model directly on *benchmark* deviations (Rutherford, 2002; Klump and Saam, 2008; Sancho, 2009).

The CES production function, drawn for the first time from Salow (Solow, 1956) can be viewed as a generalization of two older concepts of the Harrod-Domar-Leontief production function, based on the assumption that there is not substitutability between factors and the Cobb-Douglas function that assumes unitary elasticity of substitution between factors. The limit of this function, however, is that an equal elasticity of substitution among all the production factors is considered. In order to overcome such rigidity the CES functional form can be extended. It is suggested the use of nested CES functions which present a flexible functional form built on more rigid functional forms (Sato, 1967). The general idea behind this approach is to build a separate CES function for each input group that share the same elasticity of substitution and combine them in the various levels of the overall production function. This allows for an easy implementation also for complex production facilities representing one of the main advantages of this functional form.

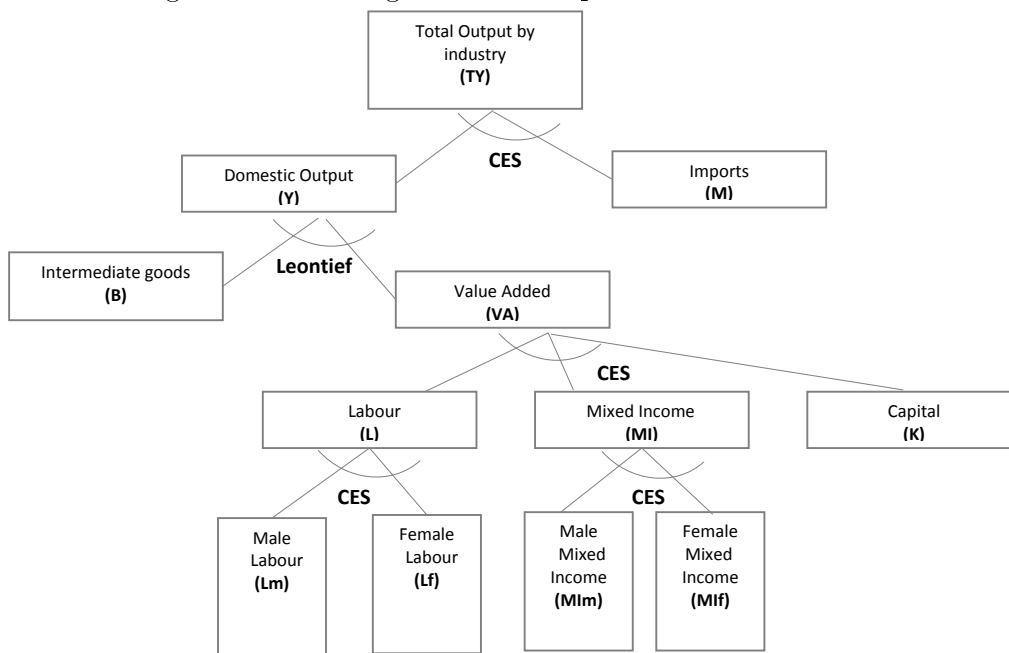
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<sup>8</sup>CES function is given by the form  $y = A[\sum y = 1^n \beta_i x_i^\rho]^\frac{k}{\rho}$ , where  $A$  is a multiplicative constant,  $\rho$  is the elasticity of substitution parameter,  $k$  is the scale elasticity and  $\beta_i$  the technical coefficients; it has the following properties:

- homogenous of degree  $k$ ,
- non-decreasing function in  $x_j$  variables,
- concave with respect to the  $j$ -th variable,
- constant elasticity of substitution equals to  $\sigma = \frac{1}{1-\rho}$  for each couple of  $(x_i, x_j)$ ,
- self-dual function: for a firm that seeks the optimal combination of inputs so as to minimize the total cost under the constraint of a CES production function, also its cost function is a CES.

Thus, for the production structure of the model has been used a production function of the nested constant-elasticity-of-substitution with a nesting structure as given in Figure 2.4. In each production sector, the representative firm produces

Figure 2.4: Nesting structure of production function



homogenous goods. In the system there are many firms as the number of consumer goods,  $N$ , and each firm produces only one good. Considering for example,  $x_{kj}$  the amount of capital factor (K), utilized by the firm  $j$ , and  $y_j$  is its output. The firm's available technology, represents the production function  $F_j$  which allows for the factor substitutability and can be written in this form:

$$y_j = F_j(x_{1j}, x_{2j}, \dots, x_{kj})$$

$F_j$  is described by either constant returns-to-scale activities or non increasing-returns-to-scale production functions (Varian, 1992). The zero homogeneity of demand functions and the linear homogeneity of profits in prices (i.e., doubling all prices doubles money profits) imply that only relative prices are of any significance in such a model. The absolute price level has no impact on the equilibrium outcome

(Shoven and Whalley, 1992). Moreover, each unit of product requires the use of raw materials as input. These inputs are goods that have to be produced and belong to the same classification of consumer goods.

In order to calibrate the model we need to solve it considering parameter as unknown and variables' value in benchmark as given. So is necessary to find the explicit forms that link variables to parameters. The calibration is correct if once found the parameter, the variable that solve the system are equal to their value in benchmark. The calibration of CES function allows to calibrate the model directly to the gap with the benchmark. This is possible starting from a CES cost function in the following form:

$$C(p, Y) = \frac{1}{\gamma} \left[ \sum_i \alpha_i^\sigma p_i^{1-\sigma} \right]^{\frac{1}{1-\sigma}} Y$$

from which is possible to obtain the calibrated form of the production function:

$$\frac{Y}{\bar{Y}} = \left[ \sum_i \theta_i \left( \frac{X_i}{\bar{X}_i} \right)^{\frac{1-\sigma}{\sigma}} \right]^{\frac{\sigma}{1-\sigma}} ;$$

Associated to this production function is a cost function both for goods and primary factors of production,

$$c(p) = \bar{c}(p) \left[ \sum_i \theta_i \left( \frac{p_{x,i}}{\bar{p}_{x,i}} \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}} \quad \theta_i = \frac{\bar{p}_i \bar{X}_i}{\bar{c}(p) \bar{Y}}$$

The over lined symbols derive from benchmark data (prices in the benchmark are all equal to one), the other symbols are calibrated by the model.  $\theta_i$  represent the distributive share that is received by the good or factor  $i$  in the *benchmark*.

The overall production function of the model is defined following the nested scheme reported in Figure 2.4. Starting from the nest on the top, in order to obtain the total output (TY) for different productive sectors, imports (M) must be added to domestic production (Y). The overall amount of resources is calculated following the Armington hypothesis of imperfect substitutability between domestic

and imported goods (Armington, 1969). A CES function characterizes the choice between imported and domestically produced varieties of the same good with an associate price equation:

$$p_{TY_n} = \bar{p}_{TY_n} \left[ \frac{\bar{p}_{Y_n} \bar{Y}_n}{\bar{p}_{TY_n} \bar{TY}_n} \left( \frac{p_{Y_n}}{\bar{p}_{Y_n}} \right)^{1-\sigma_n^M} + \frac{\bar{p}_{M_n} \bar{M}_n}{\bar{p}_{TY_n} \bar{TY}_n} \left( \frac{p_{M_n}}{\bar{p}_{M_n}} \right)^{1-\sigma_n^M} \right]^{\frac{1}{1-\sigma_n^M}},$$

Where

$TY_n$  = total output,

$\frac{\bar{p}_{Y_n} \bar{Y}_n}{\bar{p}_{Y_n} \bar{Y}_n}$  = value share of domestic production on total output,

$\frac{\bar{p}_{M_n} \bar{M}_n}{\bar{p}_{Y_n} \bar{Y}_n}$  = value share of imports on total output,

$M_n$  = imports,

$\sigma_n^M$  = elasticity of substitution,

$p_{TY_n}$  = commodity final price

$p_{Y_n}$  = price of domestic output

$p_{M,n}$  = price of imported goods (fixed in foreign currency).

In the second step of the production function nesting, the domestic output (Y) is composed by Value added (VA) and intermediate goods (B). B is a composite of intermediate inputs with fixed production coefficient (Leontief production structure). The production function for Y is a Leontief:

$$Y = \min \left[ \frac{1}{q} \cdot VA, \frac{1}{1-q} \cdot B \right]$$

To which corresponds to the following cost function:

$$pY = [qp_{VA} + (1-q)p_B]$$

where  $q$  represents the value added input per product unit that is constant in Leontief function, while  $p_{VA}$  and  $p_B$  are respectively the price index of value added and intermediate goods that are not substitutable each other. Prices of intermediate

goods are an arithmetic weighted average of single goods prices:

$$C_B = \sum_n p_n q_n$$

with

$$\sum_n q_n = 1, n = \text{goods},$$

$q_n$  is the “aggregate” input of intermediate goods.

The firm’s economic problem is to select the output level that maximizes profits given the raw materials prices  $p_B$ , factors prices  $p_{VA}$  and the available technology.

The price of domestic output, can be formalized as:

$$p_{Y_n} = \frac{\overline{p_{VA_n}} \overline{VA_n}}{\overline{p_{Y_n}} \overline{Y_n}} \left( \frac{p_{VA_n}}{\overline{p_{VA_n}}} \right) + \frac{\overline{p_{B_n}} \overline{B_n}}{\overline{p_{Y_n}} \overline{Y_n}} \left( \frac{p_{B_n}}{\overline{p_{B_n}}} \right)$$

where  $\sigma=0$

In the third step of nested production function, primary inputs are combined together in  $F_j$  in order to obtain the value added. Within Value added are present three components: Labour, Mixed Income and Capital. The price of value added composite is affected by the primary factor’s compensations and can be written as:

$$p_{VA} = p_L + p_{MI} + p_K$$

The two components of Labour and Mixed Income are disaggregated by male and female. Profit maximization yields the following cost functions for the primary factors at the sectoral level:

$$C_i(p) = \overline{C_i(p)} \left[ \sum_{i_g} \theta_i \left( \frac{w_{i_g}}{\overline{w}_{i_g} (1 + t_{i_g})} \right)^{1-\sigma^i} \right]^{\frac{1}{1-\sigma^i}} ; \quad \text{with } i = L, MI, K \quad e \quad g = m, f$$

cost functions for each primary factor are presented are the following:



$$p_L = \bar{p}_L \left[ \frac{\bar{w}_{Lf}(1+t_{l,Lf})\bar{L}f}{\bar{p}_L\bar{L}} \left( \frac{w_{Lf}}{\bar{w}_{Lf}(1+t_{l,Lf})} \right)^{1-\sigma^L} + \frac{\bar{w}_{Lm}(1+t_{l,Lm})\bar{L}m}{\bar{p}_L\bar{L}} \cdot \left( \frac{w_{Lm}}{\bar{w}_{Lm}(1+t_{l,Lm})} \right)^{1-\sigma^L} \right]^{\frac{1}{1-\sigma^L}} ;$$

$$p_{MI} = \bar{p}_{MI} \left[ \frac{\bar{p}_{MIf}(1+t_{mi,MIf})\bar{M}I f}{\bar{p}_{MI} \bar{M}I} \left( \frac{p_{MIf}}{\bar{p}_{MIf}(1+t_{m,MIf})} \right)^{1-\sigma^{MI}} + \frac{\bar{p}_{MI m}(1+t_{m,MI m})\bar{M}I m}{\bar{p}_{MI} \bar{M}I} \cdot \left( \frac{p_{MI m}}{\bar{p}_{MI m}(1+t_{m,MI m})} \right)^{1-\sigma^{MI}} \right]^{\frac{1}{1-\sigma^{MI}}} ;$$

$$p_K = \bar{p}_K \left[ \frac{\bar{p}_K(1+t_K)\bar{K}}{\bar{p}_K\bar{K}} \left( \frac{p_K}{\bar{p}_K(1+t_K)} \right) \right]^{1-\sigma^K} ;$$

$$p_{VA} = \bar{p}_{VA} \left[ \frac{\bar{p}_L(1+t_{l,L})\bar{L}}{\bar{p}_{VA}\bar{V}A} \left( \frac{p_L}{\bar{p}_L(1+t_{l,L})} \right)^{1-\sigma^{VA}} + \frac{\bar{p}_{MI}(1+t_{MI})\bar{M}I}{\bar{p}_{VA}\bar{V}A} \left( \frac{p_{MI}}{\bar{p}_{MI}(1+t_{m,MI})} \right)^{1-\sigma^{VA}} + \frac{\bar{p}_K(1+t_K)\bar{K}}{\bar{p}_{VA}\bar{V}A} \left( \frac{p_K}{\bar{p}_K(1+t_K)} \right)^{1-\sigma^{VA}} \right]^{\frac{1}{1-\sigma^{VA}}} ;$$

$w_{L,g}$  = wages (before tax),

$p_{M,g}$  = compensation of self-employee,

$p_K$  = capital income,

$\sigma_i$  = elasticity of substitution in L,VA, MI nest,

$t_{L,g}$  = payroll taxes rate,

$t_{MI,g}$  = mixed income tax rate,

$t_K$  = capital income tax rate,

The present model is formalized in a perfect competition contest, meaning that firms cannot exploit the market power in their respective market segments. From this condition it follows that the production price of producer are equal to the marginal costs.

Consumers maximize utility subject to their budget constraint, leading to the demand-side specification of the model. The number of consumers in the model is specified. Each consumer has an initial endowment of the  $W_n$  commodities and

a set of preferences, resulting in demand functions for each commodity. Market demands are the sum of each consumer's demands. Commodity market demands depend on all prices, and are continuous, nonnegative, homogeneous of degree zero. This assumption is called "no money illusion" and implies that if all prices are multiplied by a fixed number, the equilibrium quantities do not change at all.

Since the demand functions are assumed to be homogeneous of degree zero in prices, is possible to arbitrary normalize prices considering that the sum of non negative price is equal to one.

$$\sum_{i=1}^n p_i = 1.$$

Moreover, demand functions satisfy Walras's law according to which for any set of prices, the total value of consumer demand equals consumer endowments.

$$\sum_{i=1}^n p_i X_i(p) = \sum_{i=1}^n p_i W_i$$

or the value of market excess demands equals zero at all prices

$$\sum_{i=1}^n p_i (X_i(p) - W_i) = 0.$$

Walras's law is an important basic check on any equilibrium system; if it does not hold, the model violates the budget constraints condition. A general equilibrium in this system is a set of prices  $p_i^*$  such that  $X_i(p^*) - W_i \leq 0$ . This equivalence is verified for  $p_i^* > 0$ , so the equilibrium prices clean the market (Shoven and Whalley, 1992).

The demand function is calibrated as a ratio respect to the *benchmark*. The deviations from the *emph benchmark* depend on initial values and the elasticity of substitution:

$$\frac{X_i}{\bar{X}_i} = \frac{Y}{\bar{Y}} \left( \frac{c_y \bar{p}_{x,i}}{\bar{c}_y p_{x,i}} \right)^\sigma \quad i = m, f$$

with respectively:

$Y$  =output

$X_i$ =input factor

$c_y$ = output cost

$p_{x,i}$  = input factor price  $X_i$   
 $\sigma$  = elasticity of substitution.

The demand functions are represented as the sum of the individual demand functions of institutional sectors. In this model, each representative group of consumer has its own demand functions derived from the utility maximization subject to the budget constraint according to which the total income of institutional sector is equal to its utility. So, the utility function for each institutional sector is considered such as a production function of "utility" good; the inputs of this function are represented by final consumption and savings.

The economic agent maximizes its utility considering the trade-off between current consumption and savings (future consumption). In a similar manner to the production, the process from which originate the individual consumer choices is decomposed in a series of multi-stage decisions, for which the disposable income is allocated in a less and less broad categories of expenditure. In their utility function, the decision for each institutional sector is between current consumption ( $C_h$ ) and savings ( $S_h$ ) restricted to the disposable income condition that is represented by net endowments. This condition can be summarized as follows:

$$R_h = p_{U_h} U_h$$

where  $R_h$  represents net disposable income for the Institutional Sector,  $U_h$  is the agent's utility and  $p_{U_h}$  is the utility price.

The representation of the savings decision follows the (Ballard et al., 1985) approach, in which a savings function whit both real interest rate and capital goods price sensitive-saving is derived. The savings correspond to the the purchase of an investment good at the price  $P_I$  per unit. The utility comes from the flow of future consumption, which corresponds to the return on investment. In formal terms, the trade-off between current and future consumption:

$$\max U_h(C_h, S_h) \text{ s.v. } P_{C,h} C_h + P_S S_h = R_h \quad h = \textit{institutional} - \textit{sectors}$$

where:

$U_h$  = utility

$C_h$  = final consumption

$S_h$  = savings

$R_h$  = income.

In the calibrated share form:

$$U_h = \left[ \sum \theta_h^C \left( \frac{C_h}{\bar{C}_h} \right)^{\frac{1-\sigma_{U_h}}{\sigma_{U_h}}} + (1 - \theta_h^C) \left( \frac{S_h}{\bar{S}_h} \right)^{\frac{1-\sigma_{U_h}}{\sigma_{U_h}}} \right]^{\frac{\sigma_{U_h}}{1-\sigma_{U_h}}},$$

where  $\theta_n^C$  represents the value share of current consumption on income. The spending function associated with the utility function is given by:

$$p_{U,h} = \bar{p}_{U_h} \left[ \sum_{n=1}^{63} \frac{\overline{pTY_n C_{n,h}}}{\bar{p}_{U_h} \bar{U}_h} \left( \frac{pTY_n}{\bar{pTY_n}} \right)^{1-\sigma_{U_h}} + \frac{\overline{pS_h S_h}}{\bar{p}_{U_h} \bar{U}_h} \left( \frac{pS_h}{\bar{pS_h}} \right)^{1-\sigma_{U_h}} \right]^{\frac{1}{1-\sigma_{U_h}}}$$

from which getting the demand function for saving:

$$S_h = \bar{S}_h \left( \frac{P_{U,h} \bar{P}_S}{\bar{P}_{U,h} P_S} \right)^{\sigma_{S_h}}$$

The total consumption of institutional sectors is distributed between different consumer goods  $C_n$  according to the CES function:

$$\frac{C_n}{\bar{C}_n} = \frac{C}{\bar{C}} \left( \frac{p_C \bar{p}_{C_n}}{\bar{p}_C p_{C_n}} \right)^{\sigma_C},$$

where

$p_C$  = consumer price index,

$\theta_n^C$  = benchmark value share of consumption goods,

$p_{C_n}$  = producer price of consumption good,

$t_{C_n}$  = consumption tax,

$\sigma_C$  = elasticity of substitution in consumption ,

$C_n$  = consumption of good  $n$ ,

C= aggregate consumption.

Regarding transactions relative to "gross fixed capital formation and changes in inventories", in the model specification, they are recognized to an industry that produces "investment" good, according to fixed proportions of only consumer goods, with a value equal to investments net of changes in inventories. The goods produced by this sector is demanded both from other sectors for amortization, both by Households for saving and is also used to model the public sector deficit and the trade balance with the rest of the world. In particular transactions with foreign countries are represented in the model through the activities of a particular consumer which demand exports of goods produced by the different sectors and provides imports. Also for this consumer the budget constraint that results in a formal break even on the trade balance, should be respected. To this end, the deficit or surplus of the trade balance is modeled as a capital goods' demand or supply through part of private savings. Finally the Government institutional sector is considered as a final consumer, whose economic function is to consume collective consumption. In addition to the consumption function, the government invests and redistribute resources through transfers made and collected from the other institutional sectors.

### **2.3.2.1 The Labour Market**

In this paper has been developed a CGE model of Walrasian inspiration, however, within have been introduced some rigidities in the labour market with the main aim of exploring the effects of policies aimed at reduce the female unemployment and improve the labour supply. The main effort of the present work is represented by the formalization of the labour market that covers, in this way, a central part of the model since it is focused on the wages formation, the demand and supply labour functions.

Including the non perfect competition hypothesis in the labour market, this model does not satisfy the Walrasian hypothesis where full price flexibility ensures full employment at market clearing wage level, in particular, workers are unable to sell as much of their labour as they desire at the given wage. The key assumption in

competitive model is that both firms and workers are price takers in labour market and wages are set at the level where aggregate demand for labour is equal to the aggregate supply. In this way, unemployment is treated as time off during which workers enjoy some return which is less than the wage rate (Pissarides, 1998).

The presented model, indeed, provides the inclusion of an "involuntary" unemployment rate. Thus, it integrates specific labour market institutions in an standard general equilibrium framework where wages are negotiated for two types of workers (male and female) between Firms and Labour Union. Workers are supposed to be organized in Union and wages are determined after a bargain between Firms and Union. From the demand side, the model presents the same characteristics of models with competitive labour market, while from the supply side Union utility function and negotiated outcome for wages are considered. The wage negotiation approach is modelled as a "right to manage" Nash-bargaining approach in which Union and Firm bargain over wages but the Firm chooses the level of employment to maximize profits by taking the negotiated wage as given (Pissarides, 1998). The equilibrium is described according to three equations: :

1. production function
2. labour demand function
3. wage equation (which is equivalent to the labour supply in the competitive case)

As in (Pissarides, 1998) is assumed that in the absence of Unions the full employment equilibrium is independent of policy and defined by  $n = 1$ . For the Union equilibrium to be feasible, the wage curve derived from the bargain has to lie everywhere to the left of the competitive labour supply curve, otherwise labour supply will constrain Union's choices. This is always satisfied for as long as the Union equilibrium is constrained by  $n \leq 1$ . Labour Union utility function is described by:

$$U_{LU} = n_i \frac{w_{Li}^{1-\gamma}}{1-\gamma} + u_i \frac{b^{1-\gamma}}{1-\gamma}; \quad i = m, f$$

where  $n_i$  is the employment rate,  $u_i$  is the unemployment rate,  $w_i$  is the wage

rate negotiated,  $b$  is the unemployment compensation and  $\gamma$  is the parameter that represents the Labour Union risk aversion.

Assuming that Labour Union has monopoly power and neutrality risk aversion  $\gamma = 0$ . The Union utility function does not distinguish between one member and another: all carry the same weight in Union decisions and all are exposed to the same unemployment risk. Therefore, we face with a bilateral monopoly, where the Union chooses the wage and the Firm chooses employment.

As a result of the maximization of the "right to manage" Nash function, the wages equation is derived (Ciaschini et al., 2013):

$$w_{Li} = \frac{\epsilon_{n,w_L} \cdot u \cdot b}{1 + \epsilon_{n,w_L} \cdot u}$$

with  $\epsilon_{n,w_L}$  = elasticity of the number of employed respect to the cost of labour. The elasticity  $\epsilon_{n,w_L}$  is obtained applying the Shepard' lemma<sup>9</sup> for which

$$\epsilon_{n,w_L} = \sum_{k=1}^n -\sigma_k \Gamma_k \prod_{j=1}^{k-1} (1 - \Gamma_j)$$

with  $\sigma_k$  = elasticity of substitution between the primary input in the production function,  $n$  is the number of stages in the production function and  $\Gamma_k$  is the total share of costs recognized to the aggregate not containing the labour component considered in the same production function stage.

## 2.4 Simulation and results

As discussed in the first paragraph, the female employment trend over the past decade has been affected by the crisis that stopped the previous years' positive trend of growth. Overall, the increase in female employment has more than halved compared to the previous decade, and the female employment rate increases only

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<sup>9</sup>Shephard's Lemma states that the conditional demand of the  $i^{th}$  production factor is given by the optimum amount of the same, i.e. that amount which minimizes the cost for the Firm. In practice, a change in production factor's price, leads to a change into the total cost (minimum) of the Firm equal to the use of the same factor

for women with at least 50 years, while it remains substantially unchanged for 35-49 and it decreases for the younger. On the other hand, the economic downturn has mainly affected the manufacturing industry and construction, sectors where man workers are most involved. Although female's employment has held more than male and there are advances also for women positions in political and economic decision-making, remain strong entry barriers into the labour market. Discontinuity of career paths, difficulty in overcoming obstacles to career and a higher overeducating phenomenon persist, as well as regional disparities are widening: 25 are the percentage point difference in employment rates between the Centre-North and the South regions of Italy (see Table2.2).

Table 2.2: Employment by Regions in Italy

	Male	Female	Total
North	72.6	57.0	64.8
Center	69.1	54.0	61.4
South	54.4	30.9	42.5

Both in Italy and European Union, policies to contrast gender disparities and at the same time the international economic crisis, pass through the conquest of a balanced participation of men and women in the economic, social and political life. In this context, promote women's employment means developing policies and measures geared towards not only an increase from a numerical point of view (more employed women), but also in accordance with a maintenance (more stable occupations and less fragmented and discontinuous careers) and quality principles of employment (more gainful, flexible in the hours etc.). For this reason, in order to support female employment is necessary to develop policies along two lines of action. On the one hand along the conciliation side, through system policies designed to make possible for women to work taking forward family responsibilities and constraints. On the other hand along the side of labour economics incentives oriented to women (in the form of additional income for the purchase of services) and to firms that hiring women (social security contribution and fiscal incentives).

In Italy, economic incentive policies for firms, oriented to the female employment's growth are included in the Stability Law which defines fiscal policy that is



closely associated to the implementation process of structural reforms. It proposes to permanently bring the Italian economy on a path of sustained growth and to boost employment basing measures on a gradual and incisive reduction of the tax burden oriented to encourage the labour demand and investment in physical and human capital and to support household consumption. In a particular phase characterized by economic and employment crisis, the Government should intervene with the aim of promoting the creation of new jobs and providing incentives to help employers into more stable and contractual relationships, with particular attention to the person more exposed to the risks of jobs uncertainty and instability, more specifically young people under 30 and women of all ages.

The policy simulation that will be implemented in this paper, provides special incentives for employers that hire women<sup>10</sup>. The incentives is represented by a reduction in female labour costs, more exactly by a reduction on taxes less subsidies on production for the primary factor of female compensation of employee. It was decided to carry out a maneuver by an amount equal to the 0,1% of GDP. In order to achieve this results the tax rate have been reduced by 1.5% and only for those productive sectors with high with higher gender disparity. In Italy, the Ministry of Employment and Welfare, with the Ministerial Order of 22 December 2014, has defined the economic sectors with a marked gender disparities based on Istat data and according to Commission Regulation<sup>11</sup> that defines "disadvantaged worker" any person who: works in a sector or profession in a Member State where the gender imbalance is at least 25% higher than the average gender imbalance across all economic sectors in that Member State, and belongs to that under-represented gender group. These sectors have been linked to the SAM's productive sector with a difference between male and female compensation of employee greater than 25% as reported the first and second column in Table 2.3. In the others columns of the table are recorded both the tax rate and the tax revenue for the component of value added of female labour calculated within the SAM and the new tax rate and revenues obtained after the reduction in taxation imple-

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<sup>10</sup>similar measures are present 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 an higher risk of exclusion from the labour market

<sup>11</sup>(EU) n. 651/2012

mented with the policy action. The total amount of the maneuver is calculated as difference between the tax revenues before and after the policy.

Policy scenario obtained with the reduction of taxes on input for the female compensation of employee in those sectors with high gender imbalance does not allow for an easy and univocal interpretation because of the economic interactions' complexity and the impact assessment of structural policy changes present in the model. This advantage can easily turn into a disadvantage when simulation results come as black box and are not explained on the basis of rigorous economic theory. Often, the interpretation of general equilibrium effects as the total of several partial equilibrium effects is difficult, particularly if the latter can work in opposite directions (Bohringer et al., 2003). The simulation's results, therefore, should provide indications, it should be as a "road map" for policy makers able to indicate directions of policy actions' effects they are going to implement.

Table 2.4 displays the macroeconomic effects of the simulation on GDP and its main components. The final effects on the variables reflect the direct and the indirect effects of the shock. In aggregate terms it is possible to observe that the real GDP after the policy is higher with respect to the benchmark. In particular female labour's input tax reduction has a positive effect on the Italian real GDP of about 0.10%. It is possible to observe the direct effect of the policy on the main components of GDP that almost all register a positive shock. The reduction in marginal costs of production generated with the policy has created an increase in total output by industries (0.1%). This is mainly due to the increase in final consumption from Government and Rest of the World. For what regards the others GDP's components, is possible to observe an increase respect to the benchmark also for Investments (0.17%), mainly in those sectors interested by the policy, and for Imports (0.06%), while there is a reduction into Household's final consumption after the policy implementation (-0.37%). It should be pointed out that such policy is implemented without compensating the debt position arising within the Government balance. In other words, the policy is operated through an increase of public deficit given by the reduction of input tax flow deriving from Firms. This does not affect the aggregate value of GDP that remains higher with respect to the benchmark, meaning that the policies implemented do not perturb the economic system rather stimulate growth.

Table 2.3: Tax Reduction: Industries allocation

ISTAT Industry	SAM Industry	n.	Sectoral gender imbalance	Lf tax rate	Lf tax revenue (€ mln)	Lf tax rate policy simulation	Lf tax revenue policy simulation (€ 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
	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%	1,043.20	2.93%	689.87	353.34
<b>Total amount</b>					<b>2,741.90</b>		<b>1,397.82</b>	<b>1,344.08</b>

Table 2.4: Changes from Benchmark (%)

Real GDP	0.10
Households Consumption	-0.37
Public Expenditure	0.49
Investment	0.17
Exports	0.78
Imports	0.06
Total Output	0.11
GDP deflator	0.99

The meaning of the impact of the policy can be deeply analyzed by observing the disaggregated effects of the policies in terms of Disposable Income, Savings and Consumption for the different kind of Households (see Table 2.5)

Table 2.5: Changes from Benchmark for Institutional Sector (%)

	Firms	GOV	Households (male)	Households (female)	Rest of the World
<b>Disposable Income</b>	0.159	0.555	-0.336	-0.342	0.799
<b>Households Consumption</b>			-0.375	-0.366	
<b>Savings</b>	0.370	-0.177	-0.111	-0.120	1.019

Disposable income after the policy shock is increased for Firms by 0.16%, for Government by 0.55% and for the Rest of the World by 0.799%. For Households, indeed some unexpected results on the disposable income are observed. More specifically both kinds of Households register a negative effect of the policy on their disposable income: -0.336% for male Households and -0.342% for female Households. This result is mainly due to the fact that a reduction in taxation on the female labour's input has implied a reduction in wages (see Table 2.7) and consequently a reduction in disposable income for Households.

Analyzing in deep the composition of Households consumption, even if the variation respect the benchmark is decreased for both Household's groups, is possible to observe a positive increase in consumptions for some Industries (see Table

2.6). The Industries highlighted in light gray are those in which the policy acts, but is interesting to note how the increase in consumption are positive in particular for that sectors representing services oriented to health and socio-educational training, whose shortage is principally associated with the women's exit from the labour market. The growth in consumption for this kind of services is greater for male-Households than for female-Households, probably because the formers are characterized by two-income welfare and the increase in female employment translates into additional demand for services.

Table 2.6: Household's consumption differences from benchmark (%)

Industries	9	16	25	26	31	35	38	39	40	41	52	55	56	57	58	64
Printing and reproduction of recorded media	0.104	0.073	0.183	0.061	0.067	0.277	0.058	0.063	0.049	0.280	0.181	0.950	0.892	0.137	0.175	1.371
Manufacture of fabricated metal products, except machinery and equipment	0.451	0.329	0.770	0.279	0.304	1.146	0.270	0.288	0.233	1.155	0.762	3.838	3.606	0.586	0.737	5.521
Water collection, treatment and supply																
Sewerage, waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services																
Land transport and transport via pipelines																
Postal and courier activities																
Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities																
Telecommunications																
Computer programming, consultancy and related activities; information service activities																
Financial service activities, except insurance and pension funding																
Employment activities																
Public administration and defence; compulsory social security																
Education																
Human health activities																
Social work activities																
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use																
Female-Househol	0.104	0.073	0.183	0.061	0.067	0.277	0.058	0.063	0.049	0.280	0.181	0.950	0.892	0.137	0.175	1.371
Male-Household	0.451	0.329	0.770	0.279	0.304	1.146	0.270	0.288	0.233	1.155	0.762	3.838	3.606	0.586	0.737	5.521

The increased value of disposable income after the policy manoeuvre is reflected in a greater propensity to save for Firms and Rest of the World which have seen an increase in savings, while they register a reduction for Households and Government. The reduction in Government savings is probably due on the lack of coverage for the implementation of the policy which is implemented without compensating the debt position for Government. For Households, instead, the policy has produced direct effects on income that are maybe less strong than indirect effects on investments.

If on the one side there is a loss in terms of income for Households, on the other side, concentrating on the labour market, is possible to observe a positive trends of growth (see Table 2.7). The pattern of employment's change reflects that of the changes in output. With the reduction of tax rate on value added

for female labour, the cost of labour is decreased both for male and female with an increase in labour demand for both kinds of workers. Female labour demand registers an increase of 0.36%, and 0.31% for male. The unemployment rate has seen a significant reduction of 2.81% for men and of 2.65% for women.

Table 2.7: Changes from Benchmark for Employment variables (%)

	<b>Labour (male)</b>	<b>Labour (female)</b>
<b>Unemployment Rate</b>	-2.80	-2.65
<b>Labour Demand</b>	0.30	0.35
<b>Labour Prices</b>	-3.04	-2.70

### 2.4.1 Sensitivity Analysis

There is uncertainty and disagreement about the responsiveness of gender aspects of the division of labour to changes in economic incentives for example, how much the mixture of female and male labour in market sectors might be altered by changes in the relative wages of men and women. In our central model specification, has been chosen the intermediate value of 0.5 for the elasticity of substitution between male and female labour component of value added in each sector, high enough to permit some responsiveness to price changes. In this section, is tested the sensitivity of results to alternative assumptions about gender-related elasticities. Each test involves re-calibrating the model with different elasticity values for, and then re-running of the experiments discussed perviously. The results are set out in Tables 2.8, 2.9, 2.10; which also reproduces the results' comparison respect to the central specification elasticity value (in light blue).

Analyzing the effect of reducing taxes on female compensation of employee for different values of elasticity of substitution on the whole Italian economic system, it emerges that the impact on GDP, total output and disposable income remain positive. In particular, all the results discussed, are consistent when the elasticity of substitution between capital and labour changes from the estimated value for the Italian case to a lower or higher value.

Table 2.8: Effects of tax reduction on macroeconomic indicators with different elasticity values (% differences from benchmark)

	sigma		
	0.4	0.5	0.6
<b>Real GDP</b>	0.107	0.101	0.095
<b>Households Consumption</b>	-0.370	-0.372	-0.372
<b>Public Expenditure</b>	0.497	0.487	0.474
<b>Investment</b>	0.176	0.174	0.171
<b>Exports</b>	0.783	0.780	0.774
<b>Imports</b>	0.065	0.061	0.057
<b>Disposable Income</b>	0.062	0.059	0.055
<b>Total Output</b>	0.107	0.110	0.100
<b>GDP deflator</b>	0.986	0.986	0.986

Table 2.9: Effects of tax reduction on Disposable Income, Households' Consumption and Savings with different elasticity values (% differences from benchmark)

	Firms	GOV	Households (male)	Households (female)	Rest of the World
<b>Disposable Income</b>					
0.4	0.163	0.565	-0.333	-0.340	0.801
0.5	0.159	0.555	-0.336	-0.342	0.799
0.6	0.154	0.541	-0.336	-0.342	0.793
<b>Households Consumption</b>					
0.4			-0.373	-0.364	
0.5			-0.375	-0.366	
0.6			-0.375	-0.365	
<b>Savings</b>					
0.4	0.163	0.565	-0.333	-0.340	0.801
0.5	0.370	-0.177	-0.111	-0.120	1.019
0.6	0.154	0.541	-0.336	-0.342	0.793

Table 2.10: Effects of tax reduction on Labour market indicators with different elasticity values (% differences from benchmark)

	Labour (male)	Labour (female)
<b>Unemployment rate</b>		
0.4	-2.853	-2.688
0.5	-2.805	-2.647
0.6	-2.742	-2.591
<b>Labour Demand</b>		
0.4	0.310	0.360
0.5	0.305	0.354
0.6	0.298	0.347
<b>Labour Prices</b>		
0.4	-3.074	-2.705
0.5	-3.043	-2.703
0.6	-2.993	-2.687



## 2.5 Final Considerations

In a European viewpoint of gender mainstreaming, according to which the gender perspective integration must be sought in all areas of policy choices and at all stages of the decision-making process related to intervention measure, it is necessary to evaluate the impact of such measurement and, where necessary, the introduction of adjustments in order to eliminate any negative effects. In a country like Italy, where the level of female participation in the labour market is still among the lowest within the European Countries, there is a broad consensus, between politicians and academics, that intervention measures should be primarily concentrated in the implementation of policies aimed at increasing employment rates. The gender issue should therefore be integrated with the other economic variables that usually are observed from the production phase to the demand formation moving through the formation and distribution of incomes. In this way, the multisectoral analysis offers the possibility to identify the labour demand by gender and to detect how the income is allocated and distributed by gender. Thus, allowing to properly assess the overall impact of any gender policy on the whole economy.

The aim of this paper was therefore to study, for the national Italian system, the effects of a policy aimed at encouraging the integration of women into the labour market, by extending the accounting framework of a standard CGE model with rigidities in the labour market disaggregated into female and male labour. The main contribution of this work has been to incorporate the non-full employment hypothesis with sectoral wage bargaining into the model and provide quantitative insights into the potential implication of tax policy shifts for employment and unemployment for Italy. Firms and Labour Union have been engaged in wage negotiation which are modelled as a "right to manage" Nash bargaining, and workers have been classified according to the gender. As also been tested the sensitivity of the results to alterations of the elasticity of substitution between female and male labour in the specification of the model.

The simulation operated in this work, makes clear that, to understand or predict the effects of changes in policies or other economic circumstances on women, it is important to take into account the interactions both among different sectors of the market economy and in the market economy as a whole. The manoeuvre shows

its effects along the whole multisectoral income circular flow and can be measured by means of a multisectoral CGE model. Through this general equilibrium scheme, the impact of a reduction in female labour taxation has been quantified taking into account each single macroeconomic aggregate present in the multisectoral model.

The multisectoral CGE model has identified the interdependencies between economic sectors and highlighted the policy scenario matching the best the results in terms of GDP and employment. These results reveal that female employment plays a strategic key role in the Italian economy. Thus, for instance, a decrease in the female labour cost has created a positive impact on GDP. This positive impact is mainly derived from a growth respect to the benchmark in Public Expenditure, Investment and Exports which has generated a rise in total output.

With the policy action, better effects in terms of employment and income generation are obtained. A reduction in female labour costs has raised the labour demand with a reduction in unemployment rate. Moreover some unexpected results on the Households disposable income and consequently on final consumption and savings are also observed. In fact a reduction in female labour taxation has generated a reduction in wages accompanied by a decline in Household's disposable income accordingly with a slow down in Households' final consumption and savings.

The results of simulation are the outcome of complicated calculations based on a particular set of data and on many assumptions, about both behavior and parameter values. There is thus room for disagreement about their accuracy, and also for improvement of the work described in this chapter. There are many ways in which the specification of the model might be elaborated in order to provide a fuller description of gender issue. In particular, a further development could consider of subdividing female and male labour, and households, by level of education and to demographic composition (with and without children, for instance). Is also important to consider, that for a greater inclusion of women in the labour market, is necessary the combination of different policies both in terms of direct incentives to firms that in terms of services for households. Furthermore, in order to be able to properly assess the overall impact of these policies in increasing female labour supply, an important issue that policy-makers should ask themselves is whether men and women are actually complements or substitutes in the production

process, and how the substitution between the two types of "labour-input" impacts on such policies results. Therefore, is important not to focus only on the direct instrument of gender policy but must necessarily think of structural measures capable in increasing the substitutability between male and female labour.



## Chapter 3

# Gender-sensitive policies and support programs for early childhood: a dynamic CGE for Italy

Demographic dynamics in the main developed economies, characterized by shrinking working-age population and substantial changes in the features of the once typical family, shifts the focus on the female labour force participation and consequently on the female employment rate. These indicators are central in monitoring the achievement of the "Europe 2020" strategic objectives, oriented towards the growth or, at least, to the labour force contraction containment. The 75% of the population aged between 20 and 64 should be employed by 2020. Recent empirical evidences from OECD show that on average the 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). From a gender perspective the measurement of the main indicators as to the labour market in Europe, and particularly in Italy, confirms the deep-rooted critical issues on the female labour segment. According to the Annual Report of the National Statistical Office (ISTAT, 2013) the share of women on the total employed workforce in Italy is still far below the EU average. In particular, after missing the goals set by the "Lisbon Strategy" Italy does not seem to be in line also with the objectives set by "Europe

2020". Furthermore, working women are concentrated in only a few professional fields and often associated with increasing levels of "overqualification", which is more accentuated than for men. Even the increase in the female labour supply, in recent years, is the result of new family strategies brought about to temporarily cope with economic difficulties, due to the economic crisis and not linked to the undertaking of models of true participation (ISTAT, 2013).

In this context, where the level of female employment appears to be lagging behind, compared with the other European countries, policies targeted to increase women labour participation takes up significant degrees of relevance. It is therefore fundamental to support greater women inclusion in economic and social life, considering that an investment in this area has a direct impact on family budgets, consumption and new jobs creation. Promote women employment by facilitating work-life balance, results in the spread of dual participation households and reduces the risk of poverty in families with children. Encouraging mothers to participate in the labour market is a key mechanism to reduce the gender gap labour force participation. Especially if we consider mothers of young children, they have among the lowest labour participation rates and often leave the labour market after the birth of their first child. The exit from the labour market for maternity reasons can erode human capital and reduce the accumulation of labour market experience, and thus result in a decrease of future potential wages and in a reduction of the incentives to join the labour market later in life.

The entry of women into the labour market, and their permanence after the experience of motherhood, remains difficult. Obstacles to the dual participation households' diffusion are multiple and can be of different kinds. The unequal division of family responsibilities between partners, the reduced access of young women to quality and stable jobs (with a good degree of protection, in case of maternity), the lack of flexible working conditions (timetable management, teleworking, etc.) and the lack of appropriate and affordable services for children, elderly and disabled. Furthermore, the persistence of stereotypes that penalize women in all spheres of life, private, professional and social represent an obstacle to female labour participation.

Italy is among the European countries with the lower level of adults' free time , and this is particularly true for women, the second lowest ranking of the use of free

time (after the French) (Eurostat, 2006). The reduced availability of daily free time especially for women characterizes all countries; however, the gap is particularly high in Italy where the leisure dimension shows a strong and generalized gender gap. In all stages of life, women have less free time than men and this is mainly due to the higher overall workload (paid and family) that falls back on women's day. There are many tasks that fall within the sphere of woman's responsibility both for culture, ability or availability, some of them are mandatory while others can be shared with other family members or replaced with the use of services.

Since the female participation is structurally related with the difficulty to balance different needs, the supply of actual support assumes in practice an higher priority. All those family-oriented policies designed to support working women in achieving work-life balance such as social benefits, employment-protected leave for parents, affordable formal arrangements for family care and a greater flexibility in the organization of work (part-time work, flexible working time and telework) can be identified as conciliation measures.

Several studies attest that the nursery represents the kind of service in which family's interest is mainly focused, confirming, for women, the role of custody defined in principle (OECD, 2014). Empirical and theoretical studies support the prediction that increasing child care cost lowers the female participation's probability. Several studies provide evidence suggesting that the lower rate of participation shown by mothers of preschoolers in comparison to all other women is closely related to the high child care costs faced (Blau and Robins, 1988; Connelly, 1992; Del Boca and Pasqua, 2002; Ferrero and Iza, 2004). The results of an OECD survey on public spending (OECD, 2011) stresses that Italy spends about 1.4% of GDP on benefits and service to support family with minors, compared with the OECD average of 2.2%, while the public expenditure on childcare in Italy is of 0.2% against the 0.4% of OECD average.

In Italy, about 21% of children under 3 years benefit from early childhood education, that is far lower than the percentage of children enrolled in preschool education, 90% of children between 3 and 5 years. Italy is characterized, on the one side, by the fact that southern regions have low coverage rates of educational services aimed at hosting children aged from 0 to 2. On the other side there is a great difficulty for relatives to bear education fees. Public nests are only partially

subsidized by the municipalities and an important share of the costs is charged to parents who pay a straight usually determined on the basis of family income. For many households, the monthly cost of the nursery is too high in relation to the salary received by the working mother. This explains the use of informal care (usually provided by grandparents), or the work's giving up, especially for women with medium-low levels of education. Difficulties even increase, if we consider new kinds of households that are forming nowadays, namely smaller-household membership, often with a single parent and more dependent children or single-income household.

The problem of low participation of women in production life has to be reduced or even solved, the attention should be focused on the balance of family-work that often weights especially on them.. This question represents the real goal for policy makers and therefore requires the identification of actions and appropriate tools to counteract the lack of facilities for pre-school children. Nowadays the increase and qualification of social and educational services are still too tied to the presence of a family protection network, like mother or grandparents.

The aim of this paper is to analyse the gender situation in Italy, design policies targeted to reconcile work, private and family life and test the impact that these policies can generate on the main macroeconomic variables, such as GDP, disposable income and final consumption, in terms of sustainability. The analysis is drawn on the gender-sensitive SAM for Italy for 2012 as data-base, in which data of national accounts are consistently harmonized with the gender issue.

Compared with a traditional input-output table, the gender-sensitive SAM, in addition to the interindustry flows, provides the quantitative evaluations of the income flows, and their modifications, through the primary and secondary distribution of incomes as well as the process of endogenous final demand's formation. On such gender-sensitive data base dynamic simulations are determined through the use of a dynamic computable general equilibrium model (DyCGE), in which variable definitions and relationships strictly respect the definitions and the roles envisaged for the corresponding accounting aggregates in the gender sensitive SAM. Simulations will determine the direct and indirect impacts of policies that enhance the supply of social and educational services for early childhood, as a tool for stimulating a larger inclusion of women in working life.



In order to encourage women work-life balance policies will be compared two policies for Italy that act in two different ways: in the first scenario, from the supply side, will be designed a gender policy in which the Italian government increases the level of investment in services for early childhood (children aged 0-3). In the second scenario, will be designed a policy that acts on the demand side providing incentives for households. Direct transfers constrained to the childhood services consumption will provide these incentives. The two policies outcomes will be evaluated on the main macroeconomic aggregates, in terms of GDP, disposable income and changes in final consumption. The comparison between the two scenarios will identify which of two gender policies mostly impacts the economic system, in a country like Italy still strongly characterized by the woman seen as a producer rather than final recipient of welfare.

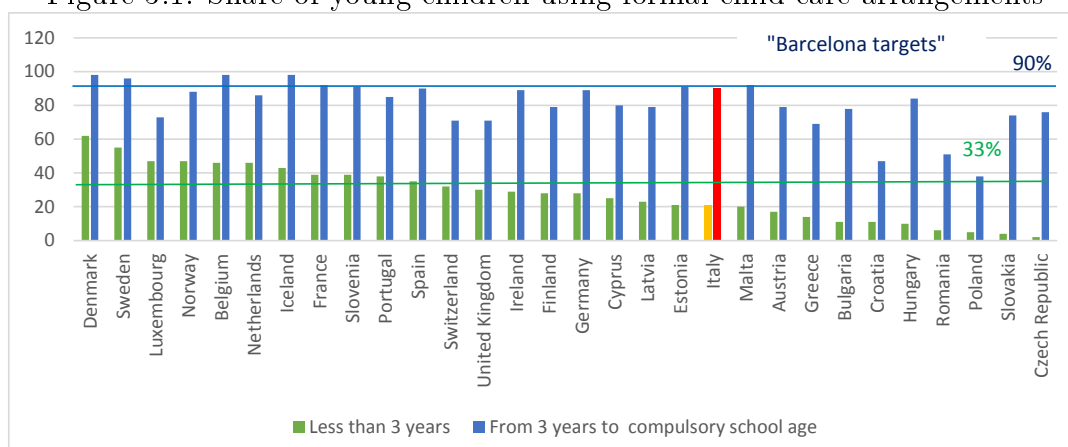
### **3.1 Childcare costs and policies in the Italian context**

Several studies provide evidence suggesting that the lower rate of participation shown by mothers of pre-schoolers in comparison to all other females is closely related to childcare services availability and affordability. Earlier research on the relationship between childcare and labour market participation in the U.S. and the U.K. has mainly focused on the effect of childcare costs on employment decisions (Heckman, 1974; Blau and Robins, 1988; Connelly, 1992; Ribar, 1992; Kimmel, 1998). These studies have used a variety of methodologies to estimate specific impacts and the results show that childcare costs are a very significant determinant of the demand for these services and employment decisions. Other studies have found that childcare costs are not an important barrier to labour market participation, but affect significantly the choice of childcare, recognizing that most working women choose informal childcare provided by relatives or family members with smaller or no direct costs. Therefore the decision to work by a woman is not directly dependent on the childcare costs but involves pondered decisions about quality and costs of informal and formal childcare (Cobb Clark et al., 2000). All this is closely related with the substantial differences between Southern European

and Northern European countries in terms of labour market and in terms of family policies attempting to improve work incentives for parents (Del Boca and Pasqua, 2005).

In Italy, Greece and Spain, there are the lowest participation rates in the labour market of mothers with young children. Italy, at the same time, presents high quality standards and offers significant subsidies in public childcare, as in Northern European countries, while the number of places available are limited and strongly regulated in terms of hours and rate of access. Private providers of day-care, instead, are still limited, in contrast to Northern European countries (Del Boca, 2002). In the last years, Italy has reached some progress towards meeting the "Barcelona targets"<sup>1</sup>. The number of childcare services has increased but it remains far below the objectives. However, many forms of limiting in supplies are present in the public service. The availability of childcare varies according to age group and location within Italy: there is wide coverage of services for children aged from 3 to mandatory school age.

Figure 3.1: Share of young children using formal child-care arrangements

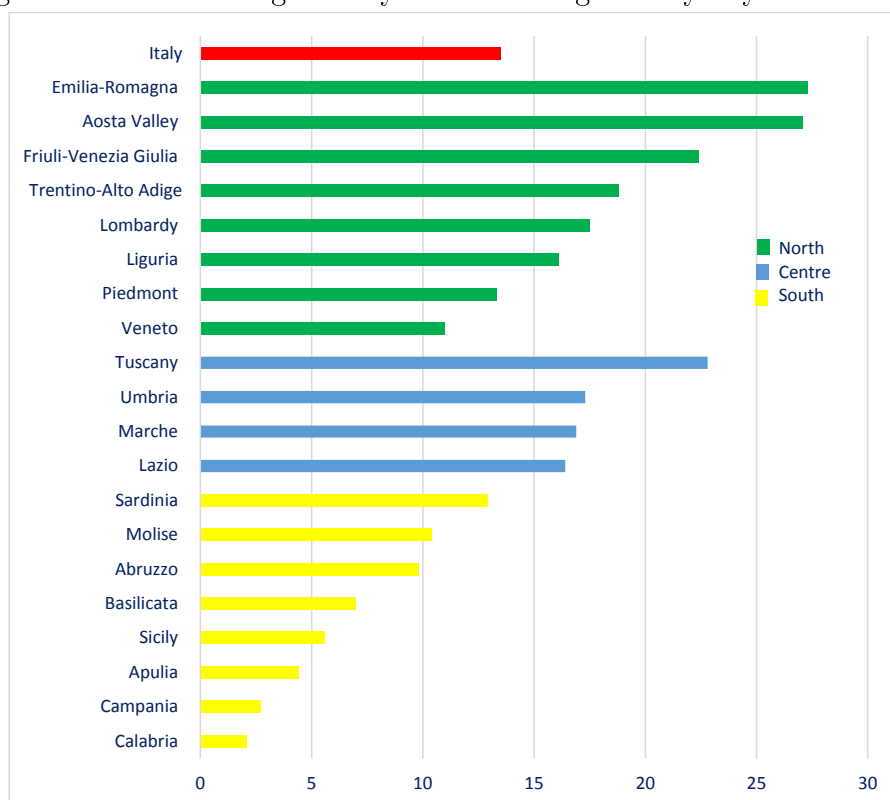


Source: Eurostat database "Income and living conditions" (2013)

<sup>1</sup>In 2002, the Barcelona European Council set objectives for the development of childcare facilities for young children in Europe with a view to sustainable and inclusive growth in this area. The main aim was to encourage Member States to remove disincentives to female labour force participation and strive, taking into account the demand for childcare facilities and to provide childcare by 2010 to at least 90% of children between 3 years old and the mandatory school age and at least 33% of children under 3 years of age (European Commission, 2013).

As shown in Figure 3.1, 90% of children older than 3 years enter childcare system perfectly in line with the Barcelona 2002 strategy objective represented by the blue horizontal line. This level is clearly in contrast with the share of children under 3 years registered in childcare services that is only by 21% against the European target that would have reached the 33% by 2010 (as shown by the green line in Figure 3.1). The availability of childcare for children older than 3 years is very homogeneous among the nation while for the other ones there are marked differences across regions. The proportion of children under 3 years of age enrolled in public childcare is about 27% in some areas of the North, but below 10% in most Southern areas (see Table 3.2 ).

Figure 3.2: Children aged 0-2 years attending infancy day-care services



Source: ISTAT "Socio-educational services for infancy day-care (2012)"

Especially in the South of Italy, public childcare is characterized by low availability and limited opening hours while private childcare is scarce in its supply and

development. This fact increases the use of non-parental childcare and represents a greater issue for working mothers in areas with lower working time flexibility. Moreover childcare costs also vary by age of the child and across regions. The cost of childcare for children under 3 years is higher than the cost for children older than 3 years, in both public and private sectors, while the amount differs from municipalities (Del Boca et al., 2014b). For all this disparities and rationing, in a country like Italy, government intervention seems to be necessary.

Policies in the childcare industry can take the form of direct supply financing of services or financing direct subsidies to parents. The policy choice of which type of subsidies is granted for financing childcare reflects different perspectives on the role of the society and parents towards raising children. Furthermore, recent research shows that in countries where childcare is publicly provided and highly regulated, use of childcare might be more influenced by the availability of childcare services than by the cost of childcare ((Kreyenfeld and Hank, 2000). In Italy the probability to purchase formal childcare is more influenced by availability than by a change in prices, while the female labour participation is more dependent upon the household's characteristics and the lack of informal care (Chiuri, 2000). Other studies find that both the probability of using formal childcare and the mother's participation in the labour market are increased by the availability more than the affordability of places ((Del Boca, 2002).

In Italy, the system of parenting support is characterized by high fragmentation of services due to the involvement of many local and regional actors. In European countries there are various models of funding for parenting support. Typically, programmes are funded from a variety of sources, including public funding, voluntary sector and non-governmental organizations (NGOs), parental organizations and private companies. Funding models often result from the organization of services - national versus decentralized systems - and the dominant welfare and social support models (European Commission, 2013). In Italy there is a large diversity of programmes. Parenting support financing is decentralized and comes from a variety of sources. As a result, parenting support services in Italy vary considerably across the country and are often provided by independent (voluntary) sector organizations contracted by local authorities, with a relatively low level of central state support and funding.

In this paper we want to analyse two kinds of policies that Italy has implemented in recent periods, aimed at improving national availability of childcare. This is done in order to compare different impacts on Italian households disposable income and final consumption. The first policy involves the direct public funding invested in the childcare sector, designed for providing a greater availability of childcare structures and services at national level. The second policy consists of direct transfers to worker mothers for the purchases of childcare specific services.

The direct public funding of childcare allows for a better quality of the services at the national level, warrants more strength in educators training and more equitable access than those systems based on direct subsidies to parents (OECD, 2011). In Italy regional policies on cohesion are financed through both European co-funding and national funds. Central government and regional administrations implement these policies with central coordination throughout the country, even if differences of intensity among regions are reported. The European cohesion policy establishes guidelines that are collected in the National Strategic Framework (NSF). NSF constitutes an organic proposal for the regional development policy inspiring the strategic priorities in the use of EU funds over the period 2007-2013. European financial instruments available in Italy are the European Regional Development Fund (ERDF) and the European Social Fund (ESF). The ERDF supports regional development programmes, the enhancement of competitiveness, investments in research and in sustainable development. The ESF is instead modelled on the European employment strategy and focuses on social inclusion and access to the labour market without gender discrimination. The full implementation of the Special Plan for the development of social and educational services for early childhood has started by signing an agreement between Government, Regions and Local Authorities on September 26th, 2007. This Special Plan aims to improve the availability of services for children from 0 to 3 years, to foster the overcoming of the significant imbalance between North and South and the overall growth of the national system bringing it closer to European standards. This truly extraordinary plan allows all regions, some for the first time, to adopt measures for expansion, consolidation and qualification of educational services for children under 3 years.

During the period from 2007 to 2009, by the 2008 finance law, the Plan has provided 727 million euro (446 State funding and 281 Local co-financing) aimed

at increasing the availability of childcare structures. In 2010 and 2012 government has allocated another significant portion of the Fund for family policies to support the development of a better system of early childhood services. Government has approximately allocated over 616 million for the development of formal childcare of children under the age of three from 2007 to 2013. However the financial monitoring of the projects involved has highlighted some regions difficulties, especially in the South, to plan and spend the available resources. To southern regions, presenting particularly low levels of coverage, were allocated more resources and specific technical assistance measures both in the use of resources and in planning services. However the National Statistical Office has pointed out that Calabria, Campania, Puglia and Sicily did not manage in ensuring the coverage of services for early childhood for more than 5.3%. This evidence has led the implementation of an extraordinary intervention program restricted to these four regions, to which 339 million euro are given, to be used for the development of early childcare services from 2013 to 2015, extended until June 2017.

The second policy concerns the financial assistance to families to cover the direct cost of children. This can include: family allowances, welfare benefits, tax breaks, and education and care services to cover some education or care expenses. In particular, the objective is to to strengthen the effect of cash benefit for working mothers. Several studies aim to examine the role of childcare costs in the labour supply decision of women reaching different conclusions, because of different targets and structures in government support. Cash payments to needy parents can limit strains on government budgets and improve their participation in working life but, by themselves, they may be insufficient to ensure good-quality of childcare services, especially in disadvantaged areas (Immervoll and Barber, 2006). Studying the effect of a reform in Norway, which provides cash benefit for mothers with children aged under 3 years, independently of their working status, have been demonstrated that the policy "increases intra-household specialization of work reducing the women's labour market participation" (Schöne, 2004; Naz, 2004) while benefits for single working mothers in the United Kingdom have entailed a substantial increase in female employment rates (Francesconi et al., 2007). In a model of household behaviour and child development, utilized to compare a broad class of transfer-based interventions, have been considered three types of

transfer programs: an "unrestricted" transfer in which the household receives a lump sum transfer with no restrictions on its use; a "restricted" transfer of child investment goods or services and a "conditional" (cash) transfer, finding that a conditional cash transfer program is the most cost efficient (Del Boca et al., 2014a). Indeed, the response to changes in childcare costs is not uniform across the entire female population because the obstacle imposed by childcare costs is different particularly between high-skilled women with high potential market wages and less-skilled women "for which the lack of low cost childcare may be a crucial determinant of their own employment decisions" (Anderson and Levine, 1999). For the period 2013-2015<sup>2</sup>, Italy has introduced, on an experimental basis, the possibility for working mothers to request "vouchers" for baby-sitting services purchase, or a contribution to meet the costs of the public or private childcare. Such request is to be made at the end of the maternity leave and not more than eight months after, as an alternative to parental leave, for up to six months. The benefit is divided in two forms of contribution, alternatives to each other; the first one consists in the contribution allowing working mothers to meet the financial burdens resulting from public or private childcare services purchase, otherwise the second involves voucher for the purchase of babysitting services. The amount of the contribution is 600 euro per month and is paid for a maximum period of six months.

## **3.2 The methodology used: SAM and DyCGE**

Assessing the disaggregate effects of a gender policy within the economic system in a long-term perspective requires a set of instruments able to draw and quantify the relations among all the agents involved in the production process, the generation and distribution of income. With this aim, the Dynamic General Equilibrium Model (DyCGE) formalises the agents behaviour over the time according to the gender type. The Social Accounting Matrix provides the fundamental data on the flows occurring in the economic system to calibrate the model.

### **3.2.1 The gender aspect in SAM**

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<sup>2</sup>Article 4, c. 24, l. b) law 28 June 2012, n.92

Table 3.1: Basic framework of Social Accounting Matrix (SAM)

	Primary Factors														Institutional Sectors													
	Commodities		Industries		Compensation of employees		Mixed income		Gross operating surplus		Taxes on products less subsidies		Firms		Government		Households		Rest of the World		Capital formation							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
commodities	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Industries	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Compensation of Employees	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mixed income	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Gross operating surpluses	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Taxes on products less subsidies	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Firms	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Government	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Households	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Rest of the World	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Capital formation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14



The basic framework of the gender-sensitive SAM refers to year 2012 and is presented in Table 3.1. Its structure is identified by seven blocks that describe the main phases of the income circular flow.

*i. The intermediate consumptions by commodity ii. The total output by industry iii. The generation of income or value added iv. The allocation of primary income v. The secondary distribution of income vi. The use of income vii. The capital formation*

### 3.2.2 The gender behaviour in DyCGE model

GenderDy15 is a dynamic CGE model developed in order to quantify the effectiveness of gender policies on the socio-economic system in a long-term perspective. The dynamic CGE model developed in this study captures the behaviour of households by gender and gives the picture of the contribution of male and female employment to GDP formation. Moreover, the model is dynamic and the base-year equilibrium is calibrated on the basis of the SAM for Italy (year 2012), that is able to draw the relations among all agents along the income circular flow (Ciaschini et al., 2013). The behaviour of all economic agents is analysed under the assumptions of a finite time horizon and adaptive expectations for all consumers disaggregated by gender. Following the phases of income circular flow (Ciaschini et al., 2015), the model calculates for every period the static equilibria and solves the intertemporal optimisation problem by means of the condition on capital accumulation (Lau et al., 2002).

Given the structure of the economy described in the SAM (see Chapter 1), to determine prices and quantities that maximize producers' profits and consumer's utility in each period, have been solved the Arrow-Debreu (1954) problem as an optimization problem of the agents subject to income, technology and feasibility constraints. The maximization problem is turned into a Mixed Complementarity Problem (MCP) and solved as a system of non-linear equations. Therefore, the model is solved as an optimization problem of the operators subject to intertemporal income, technology and capital accumulation conditions.

More specifically, in each period the model considers an open economy with 3 components of value added (compensation of employees, mixed income, gross

operating surplus), taxes on production and imports less subsidies, and 4 Institutional Sectors (Firms, Households, Government, and Rest of the World). In particular, since the aim is studying the impact of gender policies within the economic system Households and value added components have been disaggregated by gender and added the related equations and budget constraints to the model. Labour (compensation of employees) and capital (mixed income and gross operating surplus) have been splitted into male and female and added one additional nest in the production function. The same goes for Households that have been disaggregated according to gender characteristics of the principal earner. In each period the blocks of behavioural equations and income constrains for agents reflect the structure of the Table 3.2 reporting the main relationships of the model. Total output by commodity ( $\mathbf{X}$ ) includes the sum of domestic and imported out-

Table 3.2: Fundamental framework of Dynamic General Equilibrium model

				Primary Factors				Institutional Sectors				Capital account			
		commodities	industries	Compensation of employees		Mixed income		Gross operating surplus	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
	commodities	1		$B(x,p)$							$G(rd,p)$	$C(rd,p)$		$E(e,p)$	$i(p)$
	industries	2	$X(x,p)$												
Primary Factors	Compensation of Employees	3													
		4													
	Mixed income	5													
		6		$Y(x, pc)$											
	Gross operating surplues	7													
Institutional Sectors	Firms	8													
	Government	9													
	Households	10					$R(y)$				$T_{ij}(x)$		$T_{ij}(r,a)$		
		11													
	Rest of the World	12	$M(x,e)$	$NT(x,pc)$											
Capital account	Capital formation	13										$Si(rd,pt)$			

put per each good ( $\mathbf{M}$ )<sup>3</sup> with taxes on output ( $\mathbf{T}$ ). To verify the market clearing conditions for all markets, this output must be equal to the sum of intermediate demand ( $\mathbf{B}$ ), final consumption expenditures by agents ( $\mathbf{C}$  represents private male and female households consumption and  $\mathbf{G}$  is the Government expenditure), gross

<sup>3</sup>Following the Armington's hypothesis (1969), imported and domestically produced commodities are not perfect substitutes. This solves the problem that the same kind of good is found to be both exported and imported.

fixed capital formation (**I**) and exports (**E**). The zero profit conditions in each period are verified when the equilibrium price, obtained solving the market clearing condition, equals the average cost to produce each unit of output by commodity. This latter is obtained solving the duality problem associated to the production of each commodity. In this work is considered a nested production function where domestic output is the combination (assuming Leontief technology) of intermediate goods (**B**), that depend on total output and prices, and value added (**Y**) that is affected by total production and primary factors compensations ( $p_L$  and  $p_K$ ). Then assuming a CES technology, value added is generated by combining capital and labour aggregates (**K** and **L**) that are perfectly mobile across activities. The elasticity of substitution is set equal to 0.4 for all productions, according to the estimation approach that focuses on long-run relations (Chirinko et al., 2011). As mentioned before, both labour and capital aggregates derive from the combination of male and female components using a CES function<sup>4</sup>. As for budget constraints, institutional sectors disposable income stems from the income generated by the production as endowments plus ( $R_i$ ) net transfers/taxes from the other agents in the secondary income distribution phase ( $T_{ri}$  and  $T_i$ ). In particular, both male and female Households receive incomes from the primary factors they possess, that can be both male and female labour and capital incomes. And than they pay/receive transfers to/from the other institutional sectors regardless of the gender. Disposable income can be allocated between final consumption (**C**, **G**) and savings ( $S_i$ ) according to the inter-temporal utility function of each Institutional Sector. More precisely, all the Institutional Sectors maximise the present value of their intertemporal utility function<sup>5</sup> which depends on final consumption expenditure (**C** and **G**) and gross saving ( $S_i$ ) subject to the lifetime budget constraint (Ciaschini et al., 2015). These conditions are replicated both for male and female groups. The model is closed with the capital accumulation condition stating that the capital stock in period  $t + 1$  is equal to the capital stock in period  $t(K_t)$ <sup>6</sup>, less depreciation ( $\delta K_t$ ) plus gross fixed capital formation in period  $t(I_t)$

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<sup>4</sup>The elasticity of substitution between male and female labour is set equal to 0.1, the elasticity of substitution between male and female capital is set equal to 0.3.

<sup>5</sup>We follow the Ramsey model assumptions.

<sup>6</sup>The capital stock in period  $t$  is calibrated on the SAM data following (Paltsev, 2004).

### 3.2.2.1 GenderDy15' specification

GenderDy15 is a dynamic CGE in which the gender aspect concerning the value added formation and households classification has been included.

The intertemporal optimization problem for all consumers has been settled as:

$$\max \sum_{t=0}^T \left( \frac{1}{1+\rho} \right)^t u[C_t^l]$$

s.t.

$$C_t^l = \xi_l(x[K_t^j, L_t^j, MI_t^j, M_t^j, Ta_t^j] - B_t^j - T_t^j - E_t^j)$$

$$K_{t+1}^j = (1 - \delta^j)K_t^j + I_t^j$$

where  $t = 1; \dots; T$  is the time period,  $\rho$  is the individual time-preference parameter,  $u$  is the utility function, institutional sectors are  $l = 1, \dots, i$ , the commodities  $j = 1, \dots, m$ ,  $C_t^l$  is the consumption of each institutional sector in each period,  $\xi_l$  is the share of consumption by institutional sector. The first order conditions deriving from this maximisation problem are:

$$P_t^j = \sum_l \xi_l \left( \frac{1}{1+\rho} \right)^t \frac{\delta u(C_t^l)}{\delta C_t^l}$$

$$PK_t^j = (1 - \delta)PK_{t+1}^j + P_t^j \frac{\delta x(K_t^j, L_t^j, MI_t^j, M_t^j, Ta_t^j)}{\delta K_t^j}$$

$$P_t^j = PK_{t+1}^j$$

where  $P_t^j$  is the price of output,  $PK_t^j$  is the price of capital paid by each sector. Than the corresponding mixed complimentary problem can be formulated as a sequence of conditions on markets, profits and budget constraints. Market clearing conditions holds for all commodities and primary factors markets. These conditions posit that the value of excess demand is always non positive. Analytically we can write:

$$X_t^j \geq B_t^j + \sum_l C_t^j(P_t^j, RA^l) + I_t^j + E_t^j \perp P_t^j \geq 0, P_t^j(X_t^j - B_t^j - \sum_l C_t^j(P_t^j, RA^l) - I_t^j - E_t^j) = 0;$$

$$\begin{aligned}
L_t^g &\geq \sum_j X_t^j \frac{\delta x(RK_t, PL_t^g, PMI_t^g, PM_t^j, Ta_t^j)}{\delta PL_t^g} \perp PL_t^g \geq 0, PL_t^g (L_t^g - \sum_j X_t^j \frac{\delta x(RK_t, PL_t^g, PMI_t^g, PM_t^j, Ta_t^j)}{\delta PL_t^g}) = 0; \\
MI_t^g &\geq \sum_j X_t^j \frac{\delta x(RK_t, PL_t^g, PMI_t^g, PM_t^j, Ta_t^j)}{\delta PMI_t^g} \perp PMI_t^g \geq 0, PMI_t^g (MI_t^g - \sum_j X_t^j \frac{\delta x(RK_t, PL_t^g, PMI_t^g, PM_t^j, Ta_t^j)}{\delta PMI_t^g}) = 0; \\
K_t &\geq \sum_j X_t^j \frac{\delta x(RK_t, PL_t^g, PMI_t^g, PM_t^j, Ta_t^j)}{\delta RK_t} \perp RK_t \geq 0, RK_t (K_t - \sum_j X_t^j \frac{\delta x(RK_t, PL_t^g, PMI_t^g, PM_t^j, Ta_t^j)}{\delta RK_t}) = 0; \\
M_t^j &\geq X_t^j \frac{\delta x(RK_t, PL_t, PMI_t^g, PM_t^j, Ta_t^j)}{\delta PM_t^j} \perp PM_t^j \geq 0, PM_t^j (K_t - X_t^j \frac{\delta x(RK_t, PL_t, PMI_t^g, PM_t^j, Ta_t^j)}{\delta PM_t^j}) = 0;
\end{aligned}$$

where  $RA^l$  is the consumers disposable income,  $RK_t$  is the rental of capital,  $PL_t$  is the wage (combination of the wage paid by gender  $PL_t^g$ ),  $PMI_t$  is the self employed income (combination of mixed income by gender  $PMI_t^g$ ) and  $PM_t^j$  is the price of imported goods. The condition on profits posits that total supply in each commodity market is determined by the perfect competitive market condition, that is to say, price equals average total cost (profit are zero). Analytically we have:

$$PK_t \geq RK_t + (1 - \delta)PK_{t+1}, K_t \geq 0, K_t(PK_t - RK_t - (1 - \delta)PK_{t+1}) = 0;$$

$$AC^j(RK_t, PL_t, PMI_t, PM_t^j, Ta_t^j) \geq P_t^j, X_t^j \geq 0, X_t^j(AC^j(RK_t, PL_t, PMI_t, PM_t^j, Ta_t^j) - P_t^j) = 0;$$

Income balance conditions derive from the budget constraint:

$$RA^l = PK_0 K_0^l + \sum_{t=0}^l (PL_t L_t + PMI_t MI_t + PM_t^j M_t^{lj} - Ta_t^j) - PK_{T+1} KT + 1^l.$$

### 3.3 Policy results for the Italian Economy

Encouraging mothers to participate in the labour market is a key mechanism to reduce the gender gap in labour force participation and to avoid the loss of human capital and labour market experience. For these reasons, European governments have set policies supporting the labour market participation of women and of mothers in particular. The focus is mainly on childcare services support, essential not

only for enabling mothers to participate in the labour market, but also in improving children’s development and reducing social inequalities (OECD, 2014). Italy has been already pursuing these objectives in the last years, implementing various policies aimed at improving the national availability and affordability of childcare services. This work wants to put under scrutiny the direct and indirect effects that two different policies activated in the Italian economy. These policies act in both on the supply and on the demand side, particularly the first scenario shows a policy in which European and national funding are invested in strengthening childcare services. The second is designed at stimulating the households demand of childcare services.

**a. Gender Policy Scenario 1: supply approach**

The Cohesion Action Plan for childcare services launched with the 2007 budget for the period 2007-2009, has provided state funding amounting to 446 million euro in the increase of places available in childcare services up to 3 years, in addition to approximately 281 million local co-financing, for a total of 727 million euro allocated. In 2010 and 2012 this figure was reinforced by the allocation of other measures in favour of families, amounting to 170 million for a total amount of 897 million euros in five years as shown in table 3.3.

Table 3.3: Cohesion Action Plan found for 2007-2012 (million of EURO)

years	European Structural Funds	Local co-financing	total
2007-2009	446	281	727
2010	100		100
2012	70		70
Total	616	281	897

In the context of updating the Cohesion Action Plan, an additional action for care services for early childhood has been launched in the four regions of the 2007-2013 Convergence area (Campania, Puglia, Calabria and Sicilia) with the allocation of additional 339 million euro for the period 2013-2017. The financing includes

measures concerning the establishment of infrastructure for childcare (early childhood centres and approved day nurseries; supplementary and innovative services), support for facilities management, demand and introduction of new facilities as well as targeted contributions improving the quality and management of social and educational services. In order to test the effects of this policy is presented how the resources are allocated between industries providing childcare and early childhood services within the SAM (see table 3.4).

Policy scenario 1 involves in the obtainment of an increase in educational services oriented to socio-educational training for early childhood, whose shortage is principally associated with the women’s exit from the labour market. The evaluation of this positive change, highly desirable from a social point of view, has to be done in terms of its impact on the current GDP in a definite time horizon (2015-2025). In scenario 1, the resulting GDP growth is rather small given the limited amount of resources allocated for this aim.

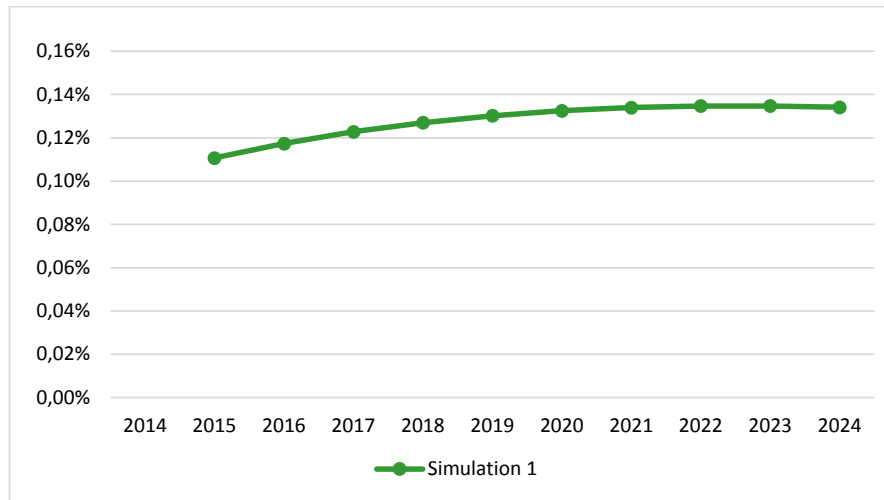
Table 3.4: Cohesion Action Plan Fund: Industries allocation

Policy Instrument	n.	Industry	Policy Amount	Share
Purchase of goods and services	58	Social work services	50.9	15%
	56	Education services	186.6	55%
	57	Human health activities	17	5%
Infrastructures	27	Constructions and construction works total	85	25%
			339	

However GDP growth exceeds the benchmark mainly for the reason that such a policy is implemented without compensating the debt position arising within the Government balance. In other words, the policy is operated through an increase of public deficit or as result of a deficit incurred by a supranational institution. The GDP growth rate settles at around 0,8%, after this first phase it progressively declines. GDP percent changes differences from the benchmark are shown in figure 3.3

Subsidies to childcare services production, which enable women to continue their activities in the labour market, show then a positive impact on the GDP trend. This result is due to the absence of recessionary pressure usually represented

Figure 3.3: GDP differences from Benchmark (% change)



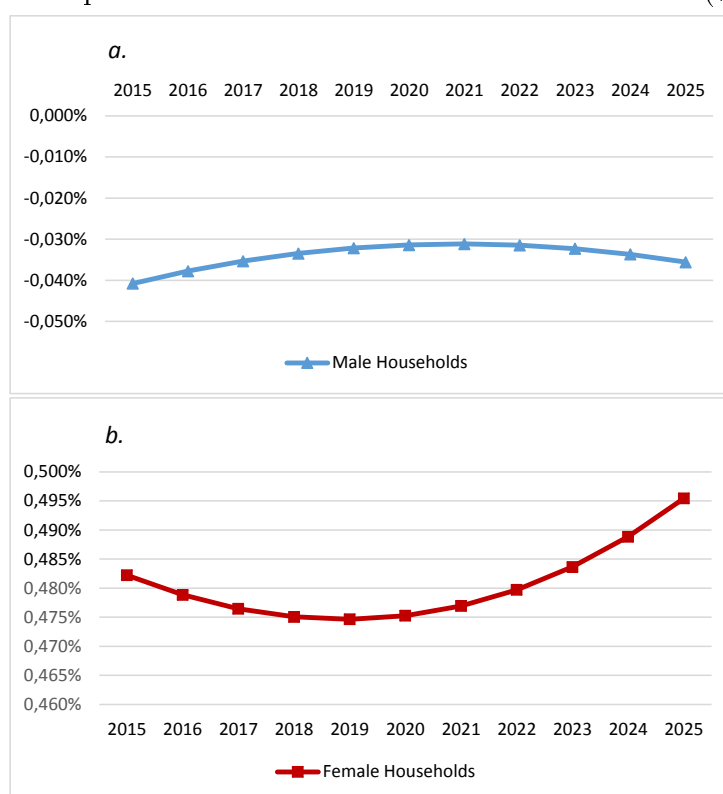
by an increase in taxation or by a reduction in the expenditure that could mitigate the expansion generated by the transfer. However the most interesting feature of this analysis consists in the possibility to make explicit the potential composition of the policy impacts on the macroeconomic variables whose definition is integrated with the link to the gender issue.

Among the main macroeconomic aggregates, for which it was possible to supplement their qualitative and quantitative definition with the gender issue, there is disposable income. Disposable income by institutional sectors and in particular disposable income of households can be defined according the gender of the principal earner. The results display the characteristic difference in the disposable income levels between the two kinds of households. The variable dynamics shows that in both cases the growth rate is positive. In detail, Male Households' (HHM) disposable income rises by approximately 3.5% while for Female Households (HHF) the proportion amounts to 4.15% in the first year, these rates tend to reduce in both cases afterwards. The difference between the two trends of disposable incomes is probably due to the fact that industries with high female labour intensity contribute to a greater extent to form the disposable income of HHF. For this reason, supporting high female labour intensity industries results in allowing a



composition effect through time on disposable incomes. Analysing the differences from the benchmark is evident a clear gap. Disposable income for HHM registers a negative difference with the benchmark while, for HHF, it draws an U-shaped curve, even if in a small scale. After the shock, the disposable income of HHF grows with a slowdown for the first years and then speeds up again. Both trends are observable in Figure 3.4 a,b.

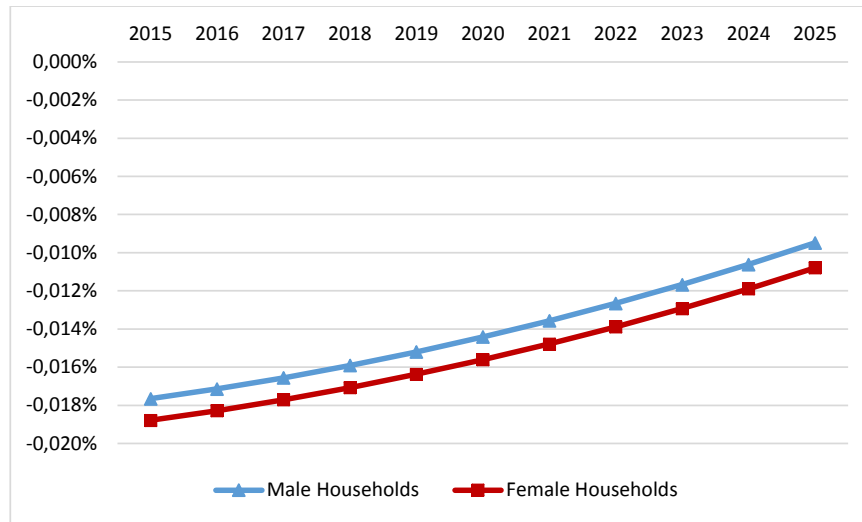
Figure 3.4: Disposable income: differences from Benchmark (% change)



As to the final demand formation, the focus is on the household's final consumption. Figure 3.5 shows how the gap tends to close in 10 years after the policy introduction for both type of the households. The difference between HHM and HHF remains substantially constant.

Probably the reason is that the profile of disposable income previously highlighted, influences savings to the greatest extent. The HHF records a significant propensity to save, higher than for HHM. The economic justification for this result

Figure 3.5: Consumption differences from benchmark (% change)



may be found in the dynamics of disposable income between HHM and HHF. The increase in disposable income of HHF generates an increased propensity to save of the institutional sector from 19% to 39%. Therefore, a higher level of income is associated with a higher propensity to save.

### b. Gender Policy Scenario 2: demand approach

The second policy scenario considers the effect of direct transfers restricted to working mothers for the purchase of public or private childcare services. The transfer is of 600 Euro per month, for a maximum of 6 months for full-time employees, while part-time employees will receive a reduced transfer proportional to the hours worked and for the self-employed workers, the transfer is of 600 euro per month, for a maximum of 3 months. The (potential) amount of the policy estimated for three years is about 3,349 million euro. The funds allocation that compose the final demand of childcare services by households is shown in table 3.5. In Simulation 2 the policy aim is that of generating a significant increase in demand for education services oriented to formation and/or custody of children by working women. This type of intervention can reduce the dropout rate and

can facilitate the return in the labour market for mothers. The demand increase of educational services for early childhood, in addition to its relevance from a social standpoint, can generate direct and indirect effects on the GDP performance. Unlike the first policy scenario, where resources had origin in a supranational institution, in this scenario, the increase in the final demand for this type of services, through consumer incentives given to households, requires the identification of a coverage in the Government's budget.

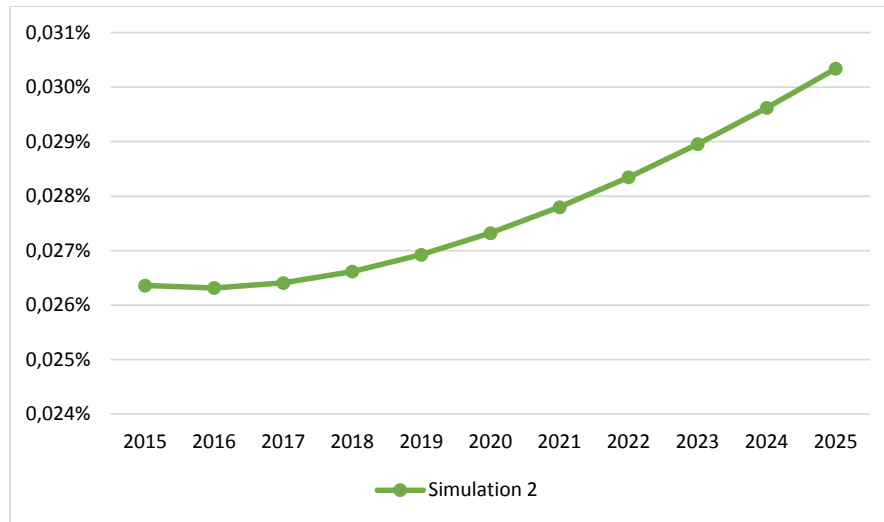
Table 3.5: Households final demand for childcare services

n.	Industry	Households Expenditure for Industry
56	Education services	620
58	Social work services	2,272
64	Activities of Households as employers; undifferentiated goods- and services producing activities of Households for own use total	456
		3,349

Therefore, the Fiscal Compact adoption requires to act through the fiscal lever by increasing taxation or reducing government spending. The level of tax burden in Italy has oriented the choice towards spending cuts, in particular of production sector 55 "Public administration and defence services; compulsory social security services". Figure 3.6 shows how the policy measure does not shift the system from the growth path represented by the benchmark. GDP, immediately after the introduction of the shock, records an increase of 1,47% then attests at approximately 0.81%. Regarding the trend of GDP, compared with the absence of shock, is possible to observe how the initial positive effect tends to consolidate over time. In fact, it passes from a gap of 0.027% approximately to 0.030%. Even if small, this result represents an important feature when we drive the attention on the desirability of the same macroeconomic manoeuvre. After having established that the policy does not cause the slowdown in the growth rate of GDP, the role of gender in the analysis is in fact that of measuring the performance and distribution of disposable income between HHM and HHF. Figure 3.6 shows the positive difference between the GDP trend and its value in the benchmark.

The incentive to the demand of early childhood educational services, for which

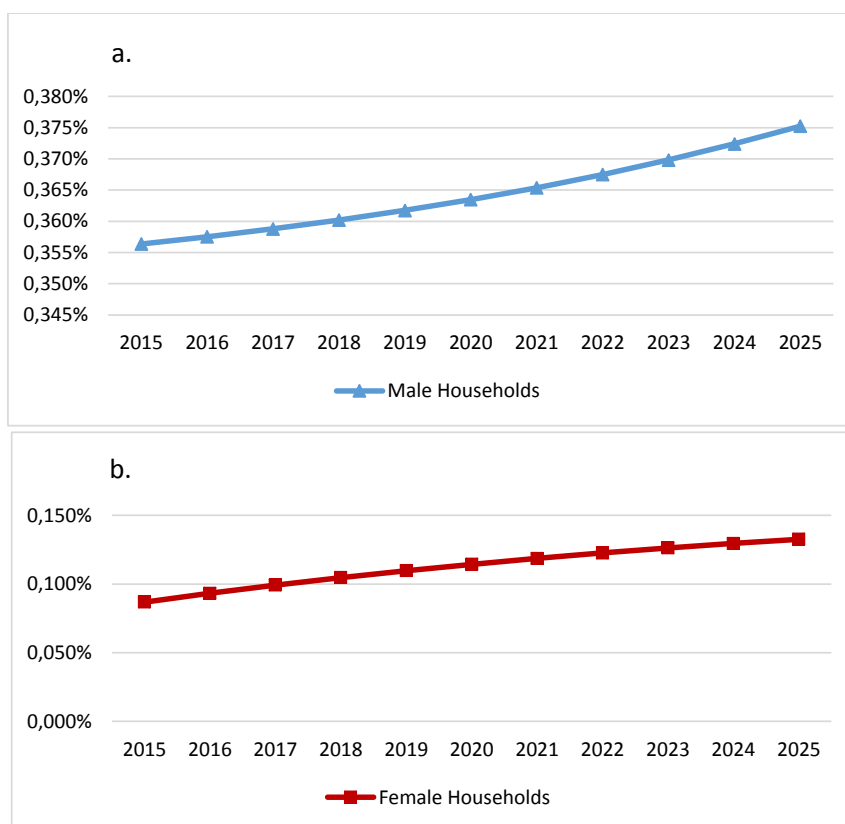
Figure 3.6: GDP from 2015 to 2025: Differences from Benchmark (% change)



women would be enabled to continue their work after childbirth, have a positive impact on the GDP. This positive result is higher than the benchmark despite the coverage of the policy obtained by a reduction in spending, which is normally associated with a recessive boost in the system that mitigates or balances the expansion activated by the policy.

The impacts that this policy has on the disposable income of male and female households can be observed in the trend of disposable incomes after the policy in a finite time horizon. In both kinds of Household the growth rate is positive. Analyzing the differences from the benchmark, emerges that disposable income for both households register a positive difference with the benchmark. For HHM is positive and growing while for HHF the same trend is characterized by a weaker rate of change. In Figure 3.7, in addition to the changes in levels due to the different number of HHM compared to HHF recorded in the dataset, the disposable income of HHM presents a positive growth rate of about 4.5% that slows down to 3%; while HHF record an increase of 4.6% that reaches 3.7% per annum in 2025. Compared to the absence of policy in Figures 3.7 a,b , the trend of disposable income is positive and growing for HHM, while, even if recording the same pattern, for HHF a more attenuated rate of change is detected.

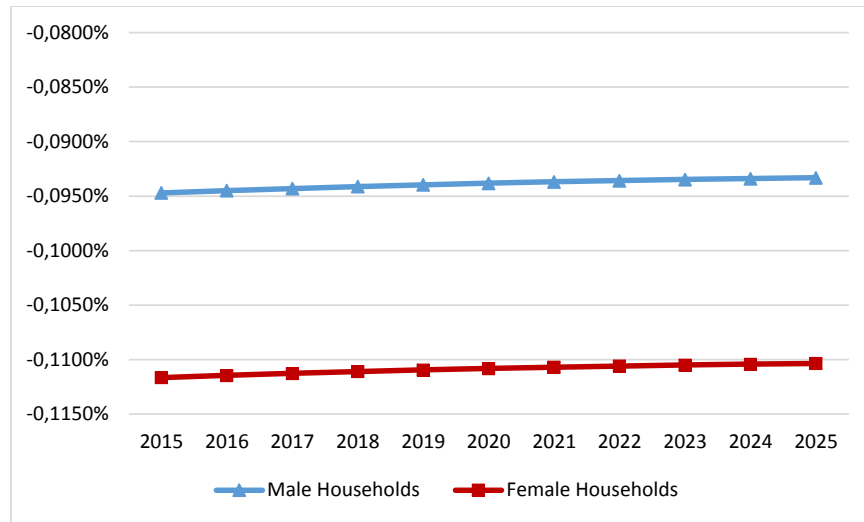
Figure 3.7: Disposable income: differences from Benchmark (% change)



Total consumption for the two classes of Households register a positive trend. The HHM and HHF show a similar increasing trend in particular starting from about 1% in 2015 grow up to a maximum of 1.27% in 2025. Shifting the focus on consumption trend compared with the benchmark, Figure 3.8, shows a small gaps that tend to be constant over time.

Finally, comparing to the use of disposable income, the average propensity to save for HHM raises from 23% in 2015 to 38.9% in 2025, while the HHF shows a similar trend with slight differences in the percentages that are respectively 19.4% in 2015 and 39.2% in 2025.

Figure 3.8: Consumption differences from benchmark (% change)



### 3.4 Final Considerations

The relevance of the gender issue in Italy poses basic problems of economic sustainability due to the persistent lack of resources specifically for policy actions currently underway or already adopted in this field. In particular, public funding of programs that support women and households through the provision of educational services for children, requires careful analysis of their social desirability vis a' vis their possibility of remaining economically feasible. The supply of these services could be left to the market operation. However in many cases critical social and economic issues emerge for specific and frequent cases of market failures, with relevant and generalized penalization of women, and consequently of families, in which educational services for children have become an irreplaceable obligation.

The implementation of educational services for children, intended also as a support of women work, emerges then as a focus of attention on the system issues relating to the economic coverage and financial sustainability. It is therefore essential to support the policy maker during the planning phase by highlighting the economic desirability of this type of services, quantifying the overall results on the main macroeconomic aggregates. As a result the analysis focuses on the economic effects linked to these policies, in order to exclude the possible recessive traits that

some of these manoeuvres can generate and hence bring out the compatibility or the absence of trade-offs between their social and economic features. To follow this target the use of models and methods in a framework of general equilibrium has been decisive, given the large degree of disaggregation allowed. The opportunity of determining the impacts of categorical policies, such as those of gender, in explicit and quantitative terms allows for the correct evaluation of the attainment of their declared aim and exclude the emergence of potential recessionary impacts through the indirect effects.

This approach makes use of a SAM as data-base, in which the gender issue is incorporated, and a CGE model as structural model. The gender issue is quantified in various places of the data base. The value added flows generated by industries are allocated to components among which Compensation of Employees and Mixed Income which are then assigned to institutional sectors. Among them, the breakdown of households into the gender of the principal earner within the household have been realized.

This dual character of the SAM suggests two different ideas of policy. The first policy that is directly addressed to the primary labour factor, evaluates the achievement of gender substitution effects within the labour force in the production processes: of male with female or vice versa if incentives to female employment are introduced. The second feature allows for a database where households expenditures can be disaggregated also by gender according the gender of the household's principal earner, going beyond the analysis of the single gender, with the obtainment of gender-comparative results with respect to households supporting policies.

The SAM thus obtained represents a database which is well suited for a general equilibrium analysis and in particular for the use of a CGE model built with the same type of breakdown. The CGE model for its characteristic, dynamic and unbundled, evaluates the direct and indirect effects of gender policies in the economy, both in the sphere of production and redistribution and use of income. The policies modelled and tested through the use of SAM and CGE model move in two directions. The first focuses on the supply side and production processes. The primary factors are the recipients of production subsidies in order to encourage the production of educational services for children. The motivations of this approach are related to the need of encouraging such types of production deemed as lacking.

The second policy operates from the final demand side providing to households an incentive to the consumption of educational services for children through the provision of a direct transfer bound to consumption.

The difference between the two scenarios matters also under the viewpoint of the debt coverage. In the case of production subsidies, no domestic coverage is assumed, in the hypothesis of transfers from the rest of the world as coverage for the manoeuvre. Otherwise in the case of transfers with the constraint of expenditure the coverage has been implemented through the assumption of balanced budget by reducing the final demand of Industry 55 (Public administration and defence services; compulsory social security services).

In general, the results obtained from the simulation performed with the two scenarios allows to exclude the recessive effect of the policies. In other words, it highlights the absence of a trade-off between the demand increase of educational services for children and the GDP trend in both cases. In particular in the first scenario the increase in GDP is positive and exceeds the benchmark, principally for the nature of the policy that does not consider an economic coverage in the government balance. The GDP growth presents a small increase given by the exiguous amount of resources allocated to this activity by the actual policy makers. In the second scenario the policy action does not remove the system from the growth path represented by the benchmark. The result, even if in small scale, has a relevance with reference to the desirability of the same macroeconomic manoeuvre. With the positive impact in the aggregate, the redistributive effects on household disposable income between female-households and male-households is interesting. In both cases, the growth rate of disposable income is positive for both types of households, but by focusing on final consumption formation, in all the simulated scenarios, final consumption grows but less than in the case of policy absence. The motivation must be sought probably in the fact that the increase in income is mainly due to a larger share in savings.

Both policies appear to be desirable from the social and economic point of view, since in the two different scenarios we do not have a trade-off between increasing childcare services demand and supply and the main macroeconomic variables. The synergy between a more substantial investment plan and the implementation of a long-term strategy - aimed at increasing the availability and consistency of struc-



tures for young children services, throughout the country - and to support their families in the use of such services, could generate an impact on employment and income growth for the entire Italian economy.



# Conclusions

The gender notion is characterized by the complex of actions with each society transforms the biological sexuality in a set of implicit and explicit rules governing the relationships between men and women and according to which different assignments are attributed to each other. The gender issue represents a complex and heterogeneous combination of processes, behaviors and relationships focused on inequalities between men and women that take place in different spheres of the socio economic background.

Gender inequalities are a recurring topic in the scientific and political debate, so that the European Commission has recently underlined the necessity for Member States to promote equal opportunities in the next few years. In particular, the Commission highlights the necessity to consider gender equality in all of its policies along five specific fields of action. Economic independence, which should be achieved in particular by combating discrimination, educational stereotypes, labour market segregation, precarious employment conditions, involuntary part-time work and the unbalanced sharing of care responsibilities with men. Equal pay for women and men (for equal work or work of equal value). The representation of women in decision-making and positions of power, positions where they are still under-represented in comparison to men, in the public and private sectors. Respect for women's dignity and integrity, but also an end to gender-based violence, including harmful customary or traditional practices (European-Commission, 2015). The Commission undertakes to act for fairer representation of women, in particular by adopting incentives at EU level.

In order to respond to European priorities, therefore seem necessary to orient

positive actions and interventions towards a gender perspective. In particular is necessary to implement policies designed to overcome the horizontal and vertical segregation in the labour market, encouraging changes in work organization and to promote a more equitable gender system, able to stimulate a greater sharing of family responsibilities between man and woman, and achieve a better balance between career and private life.

Considering the European goals in terms of gender equality, is particular interesting to analyze the Italian situation where gender represents one of the most pronounced inequality aspect. It is doubtless that in Italy has been a progressive reduction of gender asymmetries, especially in the field of education and participation in the labour market. In the education sector, the number of women enrolled has been increasingly with a progressive reduction in the gender gap, until the overtaking of girls respect boys, both in quantity and school performance' terms. Even in the labour market, in recent decades, the number of women employed is increased. In spite of the improvement for women's conditions, criticality continues to persist, especially in terms of female labour participation. Female employment's year growth rate is very low and the share of women on the total employed workforce in Italy is still far below the EU average.

In particular, Italy has not achieved the goals set in Lisbon in 2010 yet, and does not seem to be in line also with the employment objectives set by "Europe 2020" strategy. It is among last in Europe, for female labour force participation. This means that in Italy strong obstacles to the development and emancipation of women's inclusion in the labour market still persevere. Working women are concentrated in only few professional fields and the top positions in organizations and public institutions are most frequently held by men. This condition produces evident differentials in power and wage between men and women. Families in which the woman earns more than the man are still a minority. Furthermore, in Italy the gender gap in employment appear to be closely related to the lack of effective policies to support maternity and childcare activities. Thus, the entry into adult life and the related family responsibilities joined with the presence of a family-based welfare characterized by a poor development of services aimed at promoting the reconciliation between familiar and working needs, continue to strongly influence the woman's participation in social and economic life.

Considering variables more closely related to the social and economic position of women, Italy slips in the lowest positions of the international rankings of gender indicators. Bridging the gap in terms of educational level was not enough to significantly reduce the gender gap in the labour market and, consequently, to guarantee financial autonomy to women. In our society, the path made towards equality has significantly changed women and men's life but it certainly not be considered completed, so that the evident signs of delay have been described as the "The unfinished revolution" (Esping-Andersen, 2011). If at judicial level, rights and equal opportunities have been ratified, at substantial level, these have not been achieved yet.

Different studies and researches have highlighted the costs of delays and inefficiencies. The lack of gender equity has been accessed in relation to many factors. Under an economic point of view, women are considered an essential resource for growth and development: an higher female employment would respond to some social and economic challenges in Italy, such as the innovation in the production process and the sustainability of social security system helping to reduce household's poverty risk. Reducing the gender gap in the labour market does not respond only to equal opportunity and social justice criteria, but it would ensure the beginning of a virtuous circle for the economy (Ferrera, 2008).

In this thesis, more attention has been paid to the study of gender issues in the context of female employment with particularly regard to the effects that policies aimed at integrating women into the labour market may have on the Italian economic system. A larger women inclusion in economic and social life might have a direct impact on households disposable income, on consumption and on total output especially in countries like Italy where persists economic social and cultural disparities between men and women. For this purpose, the female and male participation in the labour market should be scrutinized along the whole income circular flow and the policy-maker decisions should secure the integration path whether any unbalance that discourage female participation emerges. This becomes possible by choosing the proper policy measure that can encourage and stimulate the demand of female labour without neglecting the employment rate and the growth path of the economic system. For this reason, the multisectoral analysis provided in this thesis represents a useful and innovative tool able to

detect how the income generates from different kind of labour, disaggregated on a gender viewpoint, and how the income is allocated and distributed by gender. This kind of analysis, also allows to proper measure the direct and indirect effects of any gender policy on the economy.

The Social Accounting Matrix with gender attributes for Italy for 2012, described in the first chapter, which captures transactions and transfers between all economic agents in the system, responds to the need of tracing the process of income generation, primary and secondary distribution across institutional sectors under a gender prospective. The gender disaggregation included in the SAM, both in the production process, for value added, and in primary and secondary distribution of income, with the disaggregation of Households institutional sector has allowed for a deep study of all the relations that take place along the income circular flow in terms of gender differences. The introduction of gender disaggregation in the value added components of compensation of employees and mixed income, according to the sex of the worker, has permitted to measure the contribution of the female and male labour factor to the sectoral value added generation, highlighting how gender aspects might influence this allocation. Thus, it has emerged a prevalence of male employment in almost all economic sectors except for healthcare, education, public administration and other services that present high concentration of employed and self-employed women, while a higher propensity in self-employment for men is registered in nearly all production industries.

Households have been divided into two main groups according to gender of the main earner, so the sample results composed by 67% of male-households and 33% of female-households, demonstrating once again that households in which the woman earns more than the man are a minority. This kind of disaggregation has allowed for a gender analysis of the allocation of primary income looking at how different groups of households receive incomes from different kinds of labour. Primary income allocated to male Households results the 60% on total primary income of which 56% and 11% respectively from male and female compensation of employee, while 29% and 4% from male and female mixed income. The amount of primary income assigned to female Households is the 40% on the total composed by 25% and 60% correspondingly of male and female compensation and 4% and 11% of male and female mixed income.

For a deep study on final demand is possible to detect Household's final consumption for each industry by the two different kind of households. In order to differentiate income from labour, households and final consumption between female and male has been necessary the integration of two different source of microdata. Only by integrating the dataset of surveys on income on the one hand and consumption on the other hand has been possible to have the highly disaggregated SAM which contribution both in term of information content and in terms of potential analysis is very strong.

Including gender disaggregation and other gender connected economic variables within the data base to get a gender-sensitive SAM has been done in order to design simulation experiments for assessing the impact of policies designed for stimulate the female employment on the main macroeconomic variables in national accounts. The SAM clearly shows the linkage between income distribution and economic structure, moreover by representing a useful analytical framework for modelling, providing an integral part of the benchmark data set required for calibrating CGE models.

In this work have been implemented two different models for the evaluation of policies aimed at improve the women's inclusion in the labour market. The first model is a static and disaggregated CGE formalized for the evaluation of a policy aimed at reducing the female cost of labour for Firms in those sectors with high level of gender imbalance. For this purpose taxes on female labour compensation of employee has been cut by 1.5%. The policy has been implemented without compensating the debt position arising within the Government balance given by the reduction of input tax flow deriving from Firms.

The peculiarity of this model is the introduction of non-perfect competition hypothesis into the labour market. In fact the labour price presents in the model does not clear the market, in this way into the labour market is possible to detect a rate of "involuntary unemployment". The "involuntary unemployment" does not satisfy the Walrasian hypothesis where full price flexibility ensures full employment at market clearing wage level. Thus, the key assumption characterizing the competitive model in which both firms and workers are price takers in labour market and wages are set at the level where aggregate demand for labour is equal to the aggregate supply is replaced by a wages bargaining approach. Workers are sup-

posed to be organized in Union and wages are determined after a bargain between Firms and Union. The wage negotiation is modelled as a “right to manage” Nash-bargaining approach in which Union and Firm bargain over wages but the Firm chooses the level of employment that maximizes profits by taking the negotiated wage as given (Pissarides, 1998).

The CGE model, by identifying the interdependencies between economic sectors, has highlighted that the policy scenario matches the best results in terms of GDP and employment revealing the strategic key role of female employment in the Italian economy. In particular, a decrease in female labour cost has generated a positive impact on GDP. This positive impact is mainly derived from a growth in Public Expenditure, Investment and Exports, which has generated a rise in total output. Furthermore, a reduction in female labour costs has raised the labour demand with a reduction in the unemployment rate. Moreover, the model has produced some unexpected results on the Households disposable income and consequently on final consumption and savings. Probably because the reduction in female labour taxation has generated a reduction in wages accompanied by a decline in Household’s disposable income accordingly with a slowdown in Households’ final consumption and savings. The indirect effects on investments seem to be stronger than the direct effects on Households’ income. The only reduction in labour costs seems to be more advantages for Firms and Government than for Households. The implementation of the policy has not removed the main macro aggregates from the path of growth, but maybe itself does not represent the best solution for a greater female inclusion in the labour market considering that from an increase in female labour demand has not corresponded an increase in Household’s disposable income. Is also important to consider, that for an better improvement in female employment is probably necessary the combination of different policies with different nature: both in terms of direct incentives to firms and households that in terms of services for households.

The second model implemented in this work is a dynamic CGE model developed in order to quantify the effectiveness of gender policies on the socio-economic system in a long-term perspective. The model has allowed to capture the behavior of Households by gender by giving the picture of the contribution of male and female employment to GDP formation. Since the female participation is struc-



turally related with the difficulty to balance different needs, this model has been utilized for analyzing family-oriented policies designed to support working women in achieving work-life balance thorough social benefits and formal arrangements for family care. In particular have been compared two policies for Italy that act in two different ways. The first from the supply side in which the Italian government increases the level of investment in services for early childhood (children aged 0-3) in order to encourage such types of production deemed as lacking. This policy has been operated through an increase of public deficit or as result of a deficit incurred by a supranational institution. The second one, from a demand side has been designed in order to provide direct transfers constrained to the childhood services consumption for households. This second policy's coverage has been obtained by a reduction in spending in "Public administration and defense services; compulsory social security services" sector (Industry n.55 in SAM). The two policies have been evaluated on the main macroeconomic aggregates, in terms of GDP, disposable income and changes in final consumption. The main objective of this analysis has been to exclude the possible recessive traits that some of these maneuvers can generate and hence bring out the compatibility or the absence of trade-offs between their social and economic features.

In general, the results obtained from the simulation performed with the two scenarios has allowed to exclude the recessive effect of the policies given the absence of a trade-off between the demand increase of educational services for children and the GDP trend in both cases. In particular, in both scenarios the increase in GDP was positive and exceeded the benchmark, this results, even if in small scale given the reduced amount of resources addressed to the policies, have a relevance with reference to the desirability of the same macroeconomic policy actions. An interesting redistributive effect on Household disposable income between female-Households and male-Households has been observed. In both cases, disposable income for both types of Households has recorded a growth with respect to the benchmark values, but by focusing on final consumption formation, in all the simulated scenarios this has grown but less than in the case of policy absence. This is probably due by the fact that the increased income has mainly generated a greater propensity to save for both groups of Households.

In both models, policies scenarios appear to be desirable from the social and

economic point of view, since the different scenarios do not present a trade-off between the policy implementation and the main macroeconomic variables. Probably is with the combination of this different policies, both with conciliation and incentive nature that a greater impact on the economic system by pushing the female employment would be generated.

Furthermore, in order to be able to properly assess the overall impact of these policies in increasing female labour supply, an important issue that policy-makers should consider is the complementarity and substitution between men and women in the production process, and how the substitution between the two types of "labour-input" impacts on such policies results. Therefore, is important not to focus only on the direct instrument of gender policy but must necessarily think of structural measures capable in increasing the substitutability between male and female labour. Inequality between women and men is a relational issue and for this reason inequalities is not going to be resolved through a focus only on women rather more attention need to be brought to the relations between the two different genres, with particular attention to those socio economic elements in which gender disparities are mainly confined. Thus, the policy makers should consider "women" as a target group, and gender equality as a development goal.

The present work was aimed to assess the economic desirability of some policies oriented towards the greater inclusion of women in the labour market. To follow this goal the use of models and methods in a framework of general equilibrium has been decisive, given the large degree of disaggregation allowed. The opportunity of determining the impacts of gender in explicit and quantitative terms has allowed for the correct evaluation of the achievement of the socio-economic aim by excluding the emergence of potential recessionary impacts through the indirect effects.

One of the main advantages of multisectoral analysis is the flexible nature of this kind of models that allows for including measures of flexibility both in the degree of disaggregation and in the emphasis placed on different parts of the economic system by integrating data from the basic framework. For this reason, it could be interesting to improve the analysis provided into this work through further disaggregation. As widely described in this thesis, inequalities between man and woman appears during their life cycle and in particular they are almost non-existent in the education phase but born with the entry into the labour market

and are amplified with the family's formation and the fertility's choices. Especially in the South of Italy, education plays a protective role in participation in the labour market and represents a critical tool for access to work. Thus, it could be interesting to provide a further disaggregation into the gender components of the model. For example, a disaggregation of labour input and households institutional sector according to the education level, age, and the presence of children or elderly parents in the family could allow for a more precise analysis and better policy recommendations. In this way, policy makers could improve the implementation of specific and targeted policies to reduce the gap in the labour market that is configured not only as a discrimination matter but also as a huge waste of talent and a lack of economic growth.



# Appendix

## The SAM for Italian Economy for 2012

Table A: Aggregated SAM with gender disaggregated accounts for Italy (2012)  
(millions of Euros)

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

## Classification of Commodities and Industries in the SAM

Table B: Classification of Commodities and Industries in the SAM

<b>N.</b>	<b>Commodities and Industries</b>
1	Agriculture and hunting etc.
2	Forestry and logging etc.
3	Fisheries
4	Mining and quarrying
5	Food beverages and tobacco
6	Textiles
7	Wood other than furniture
8	Paper
9	Printing and recording
10	Coke and refined petroleum
11	Chemicals
12	Pharmaceutical
13	Rubber and plastics
14	Other non-metallic minerals
15	Basic metals
16	Fabricated metals
17	Computer, electronic and optical
18	Electrical equipment
19	Machinery and equipment
20	Motor vehicles, trailers and semi-trailers
21	Other transport equipment
22	Furniture
23	Repair and installation
24	Electricity, gas, steam and air-conditioning
25	Natural water and water treatment
26	Sewerage and materials recovery
27	Constructions
28	Wholesale and retail trade and repair of motor vehicles and motorcycles
29	Wholesale trade, except of motor vehicles and motorcycles
30	Retail trade, except of motor vehicles and motorcycles
31	Land transport services and transport services via pipelines
32	Water transport services
33	Air transport services
34	Warehousing and support services for transportation
35	Postal and courier services
36	Accommodation and food services
37	Publishing services
38	Motion picture, video and television programme production services, sound recording and music publishing; programming and broadcasting services
39	Telecommunications services
40	Computer programming, consultancy and related services; information services
41	Financial services, except insurance and pension funding
42	Insurance, reinsurance and pension funding services, except compulsory social
43	Services auxiliary to financial services and insurance services
44	Real estate services (excluding imputed rent)
45	Imputed rents of owner-occupied dwellings
46	Legal and accounting services; services of head offices; management consulting services
47	Architectural and engineering services; technical testing and analysis services
48	Scientific research and development services
49	Advertising and market research services
50	Other professional, scientific and technical services; veterinary services
51	Rental and leasing services
52	Employment services
53	Travel agency, tour operator and other reservation services and related services
54	Security and investigation services; services to buildings and landscape; office administrative, office support and other business support services
55	Public administration and defence services; compulsory social security services
56	Education services
57	Human health services
58	Social work services
59	Creative, arts and entertainment services; library, archive, museum and other cultural services; gambling and betting services
60	Sporting services and amusement and recreation services
61	Services furnished by membership organisations
62	Repair services of computers and personal and household goods
63	Other personal services
64	Services of households as employers; undifferentiated goods and services produced by households for own use

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