

Key sectors for gender pay gap reduction: a multiplier effects analysis for Chilean economy

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Abstract

Recently, the Chilean government embarked on a phase of redefining fiscal policies with the aim of addressing gender pay equity (*Equidad Salarial*). In this context, this paper emphasizes the crucial role that a disaggregated and general equilibrium approach can play in supporting the Chilean policymakers, particularly in the formulation of policies for the reduction of gender pay gap in specific sectors and the integration of female employment. The analysis is carried out using a gender Computable General Equilibrium model based on the gender Social Accounting Matrix for Chile. The simulations reproduce an expansion of final demand for investment by commodity under different assumption on elasticity of substitution between male and female labour. The results suggest that some productive sectors, more than others, have aptitudes to reduce the gender pay gap and stimulate employment and economic growth, if stimulated by fiscal policies.

Keywords: CGE, Social Accounting Matrix, Policy Making, Gender Equality

JEL Classification Codes: D58, E16, E61, J16

1. Introduction

The concept of economic inequality by gender encompasses a multitude of interpretative and quantitative dimensions. The gender gap has a significant impact on various aspects of women's lives, including their participation in the labour market, involvement in decision-making processes, and educational attainment (Bettio & Verashchagina, 2008). Consequently, the transition towards gender equality and women's empowerment represents one of the primary policy objectives pursued and encouraged by international institutions across the globe. From the Sustainable Development Goals (UN General Assembly, 2015) to the World Bank Group Gender Strategy 2016-2023 (World Bank, 2015) and the European Union gender equality target by 2025 (European Commission, 2020), there is a clear global consensus on the necessity of achieving gender balance in decision-making and politics.

The gender pay gap (GPG) refers to the average difference between the gross hourly wages received by men and women. In order to gain a comprehensive understanding of this phenomenon, it is necessary to consider a diverse range of factors, including contractual status, occupational field, age, and educational qualifications. By combining these variables, an aggregate value can be derived that reflects the average remuneration gap between men and women in the workforce (Bishu & Alkadry, 2017). The average gap is currently one of the most widely used metrics for outlining policies to close the gender wage gap. However, since the factors affecting the GPG are linked to the characteristics of the economic activity to which it refers (Gannon, et al., 2007), the existing literature does not express a unanimous position on the technique. In order to estimate the gender pay gap (Kunze, 2008), it is nevertheless confirmed that policymakers must intervene in a differentiated and precise manner, with selected policy instruments capable of dealing effectively with the observed peculiarities.

In recent years, Chile has made notable advancements in its gender policy, addressing issues related to gender equality and women's rights. In 2020, Chileans voted to draft a new constitution, which is expected to include provisions for gender equality and women's rights (Piscopo & Siavelis, 2021). The drafting body was composed of an equal number of women and men, ensuring gender parity throughout the process. Chile has implemented gender quotas for political representation, which has significantly increased the number of women in parliament and other political offices. The UN Economic Commission for Latin America and the Caribbean (ECLAC) estimates that Chile has the largest share of women in the ministerial cabinet in the whole Latin America, with 58% of total members. Despite these advancements, Chile continues to face challenges in achieving full gender equality. Issues such as gender pay gaps, underrepresentation of women in certain sectors, and cultural attitudes towards gender roles hinder the country's progress.

Women's access to the Chilean labour market has occurred relatively recently. During COVID-19 the female labour force participation rate returned to the levels of ten years earlier. The main reasons for this drop in women's participation rate were family care and domestic work (Economic Commission for Latin America and the Caribbean, 2023). A substantial body of research (Eurofound, 2020; Hupkau & Petrongolo, 2020; Alon, et al., 2020; Blundell, et al., 2020; Andrew, et al., 2022; Eichengreen, et al., 2024) indicates that the economic and social consequences of the COVID-19 pandemic and associated lockdowns have had a detrimental impact on women's employment and financial security, in contrast to the effects observed in previous global economic crises. This has served to exacerbate the gender gap.

The cited analyses illustrate the extensive and multifaceted nature of economic gender disparities, which encompass a multitude of policy instruments that cannot be exhaustively addressed in a single work. However, a common feature of these studies is that policymakers frequently perpetuate gender-blind policy formulations, particularly with regard to specific economic activities. From our perspective, a limitation of these studies is the aggregate approach to the issue of the gender pay gap, which is directly related to the diversity of production processes and the different types of labour markets. In this context, this paper aims to contribute to the ongoing debate in the literature by emphasising the crucial role that a disaggregated and general equilibrium approach can play in supporting policymakers, particularly in the formulation of policies for the reduction of gender pay gap in specific sectors and the integration of female employment (Severini, et al., 2019).

The focus is on the Chilean economy, given that the government has recently approved guidelines aimed at closing the gender pay gap. The policy instrument currently under government implementation is regulation, with the objective of enhancing the governance of the principle of equal remuneration for women

and men¹. In this regard, the government is in the process of amending the Code of Labour, with a particular attention being directed towards article 62 bis, which is being modified to state that employers must comply with the principle of equal remuneration for men and women performing the same work, or for work to which equal value, function or responsibility is attributed. Moreover, employers are obligated to establish remuneration structures and scales on the basis of job analysis and job descriptions, evaluating each job using the analytical method of job evaluation established by the Directorate of Labour. Article 62 ter stipulates that companies are obligated to conduct an annual analytical job evaluation. For companies with a workforce of more than 50 employees, the legislation requires the establishment of a job evaluation committee, comprising an equal number of male and female representatives. The outcome of the analytical evaluation will inform the formulation of an equal pay plan, which will be the subject of collective bargaining with the trade union constituted within the company. The plan is required to report on the number of male and female workers, the respective positions or functions they occupy, the remuneration received by men and women, and measures to address existing pay gaps.

In this perspective, we build a static Computable General Equilibrium (CGE) model based on the Social Accounting Matrix (SAM) for the Chilean economy. The use of SAM-based CGE models integrated with gender specifications is acknowledged in the literature as an effective approach to economy-wide analysis, particularly in relation to gender issues (Fontana, 2013; Kabir & Dudu, 2020). Therefore, this study structures a SAM that accounts for compensation of employees by economic activity, disaggregated by gender, within the context of the entire circular flow of income. This dataset provides the necessary data source for the calibration of the CGE model, whereby the wage setting for the labour market takes into account the wages of women and men by economic activity. This methodological approach allows the understanding of the extent to which sectoral policies oriented at fostering technological innovation, which are strongly interrelated with a surge in investments, can positively influence the labour market in terms of GPG reduction and employment expansion, while ensuring a GDP improvement. The analysis proposed is intended to raise policymakers' awareness of the response of the economic system and the labour market to sectoral interventions designed to stimulate a technological advancement in the Chilean economic system. Although such measures are not inherently gender-related, they provide a foundation for targeted gender-specific policies.

The paper is structured into four sections. Section two is exclusively dedicated to the methodology, which outlines the static CGE model based on the SAM for Chile. Subsection 2.1 describes the procedure followed to construct the gender-SAM for Chile, with a particular attention to the splitting of compensation of employees by gender, based on data on the gender pay gap in Chile. Subsection 2.2 provides a detailed description of the CGE model, encompassing the characteristics of the production function, the behavioural relations formalised in the model, and the functioning of the markets of commodities and primary factors, which includes the disaggregation of labour by gender. Section 3 describes the simulation scenarios analysed, and Section 4 presents the final results of the policy measures in both aggregate and disaggregated terms. Ultimately, Section 5 offers concluding remarks.

2. The methodology

2.1 The gender SAM for Chile

The SAM provides a comprehensive and adaptable representation of all transactions between different production activities, the use of primary factors in production processes, the distribution of incomes generated by production factors to the institutional sectors, transactions between institutional sectors, and the utilization of disposable income (Stone, 1961). This accounting tool integrates the information on intermediate transactions, value added formation, and final demand included in the Input-Output (IO) table with the entire circular flow of income (United Nations, 2010). The SAM allows for the emergence of the flows related to the primary distribution, the secondary distribution, and the utilization of income between consumption and savings (Pyatt & Round, 1985).

It takes the form of a balanced square matrix, in which each row and corresponding column describes the operations of the agents under consideration (e.g., households, industries, or factors). The outflows or expenditures are listed in the columns and the revenues or receipts are entered in the rows. Moreover, the SAM

¹ *Proyecto de ley que modifica el Código del Trabajo con el objeto de perfeccionar la regulación del principio de igualdad de remuneraciones entre hombres y mujeres (Boletín n° 10.576-13, 12.719-13 Y 14.139-34, refundidos).*

can be disaggregated to a considerable extent, depending on the objective of the analysis. The focus of this study is to gain insight into the manner in which internal economic relations in Chile may influence the effectiveness of sector-specific policies especially in terms of gender-related implications. For these reasons, Chile's SAM must include an important level of disaggregation within the production sphere (industries and commodities). At the same time, it must incorporate gender-specific data, which is indispensable for measuring the effects of policies on the gender pay gap. This aspect can be captured by splitting the compensation of employees by gender within the components of value added.

Therefore, the SAM originates from the Supply and Use tables provided by Banco Central de Chile for the year 2019.² The data encompasses 181 commodities,³ 111 activities,⁴ and three components of value added: compensation of employees, gross operating surplus, and indirect net taxes. In order to encompass the entire circular flow of income, we have included the economic flows related to the primary allocation of income to the institutional sectors and the secondary distribution of income by integrating the national accounts data (*Cuentas no financieras de la Economía Nacional y de los sectores institucionales*) from Banco Central de Chile⁵ with the Supply and Use tables. The data sources from the Chilean national accounts enable the identification of the income inflows and outflows of six institutional sectors: financial and non-financial corporations, households, non-profit institutions serving households (NPISHs), the government, and the Rest of the World (RoW). The table closes with the capital formation account that includes gross fixed investment and changes in inventories.

In order to disaggregate the compensation of employees by gender, data on the gender pay gap from the Chilean Instituto Nacional de Estadísticas (INE) for 19 types of industries are used, as reported in Table 1.

Table 1. The gender pay gap by production activity in Chile.

Activity	GPG
Agriculture, hunting, forestry and fishing	-33.01
Mining	-34.25
Manufacturing	-32.50
Electricity	-6.95
Water supply	-12.01
Construction	-13.46
Wholesale and retail trade	-39.52
Transportation and storage	-7.87
Accommodation and food service activities	-25.70
Information and communication	-25.49
Financial and insurance activities	-45.57
Real estate activities	-28.70
Professional, scientific and technical activities	-36.81
Administrative and support service activities	-11.69
Public administration	-14.91
Education	-24.98
Human health	-43.82
Arts and entertainment	-12.54
Other service activities	-26.50

Source: Own elaboration on data from INE Chile.

Data shows that the largest GPG is -43.82% in the Human health industry. It means that, on average, women employed in Human health services are 43.82% less likely to receive an equal wage in comparison to men employed in the same industry.

The gender pay gap by activity j , expressed as a percentage, is calculated as the ratio of the difference between the average income from the principal occupation of employed women WF_j and the average income from the

² Available at: https://si3.bcentral.cl/estadisticas/principal/enlaces/informes/anuariosccnn/anuario_ccnn_2023.html

³ The classification of commodities in the Chilean SAM is provided in Appendix A.1.

⁴ The classification of activities in the Chilean SAM is listed in Appendix A.2.

⁵ Available at: https://si3.bcentral.cl/estadisticas/principal/enlaces/informes/anuariosccnn/anuario_ccnn_2023.html

principal occupation of employed men WM_j to the average income from the principal occupation of employed men:

$$GPG_j = \frac{WF_j - WM_j}{WM_j} * 100 \quad (1)$$

The variables WF_j and WM_j represent the average annual wages of women and men by activity. In order to estimate the change in GPG in response to the fiscal policies, it is necessary to quantify the extent to which male and female compensation of employees are affected by the change in the respective labour price. The missing information is the average annual labour income of women and men. This information can be calculated by setting the following system of equations:

$$\begin{cases} WF_j \cdot E_{Fj} + WM_j \cdot E_{Mj} = L_j \\ \frac{WF_j - WM_j}{WM_j} \cdot 100 = GPG_j \end{cases} \quad (2)$$

WF_j and WM_j represent the unknowns of the system; E_{Fj} and E_{Mj} represent the number of female and male employees, respectively. L_j is the total value of compensation of employees by activity, and it derives from the SAM, while data on employment by gender and type of activity (E_{Fj} and E_{Mj}) derives from the Chilean Central Bank Statistical Database and are available both in levels and in percentages⁶. Using these data, the average annual labour income is consistent with the flows of compensation of employees in the SAM, and it is also consistent with the official GPG value. The solution of the system produces the estimates of annual labour income by gender as reported in Table 2.

Table 2. Average annual labour income by gender in Chile (Chilean pesos).

Activity	Male	Female
Agriculture, hunting, forestry and fishing	3,179,980	2,130,230
Mining	13,275,340	8,728,252
Manufacturing	8,432,479	5,691,817
Electricity	11,885,620	11,059,175
Water supply	9,536,209	8,391,032
Construction	8,311,793	7,193,293
Wholesale and retail trade	7,605,189	4,599,475
Transportation and storage	7,243,114	6,673,283
Accommodation and food service activities	6,124,408	4,550,169
Information and communication	16,999,648	12,666,826
Financial and insurance activities	44,352,502	24,140,481
Real estate activities	7,768,739	5,538,824
Professional, scientific and technical activities	17,642,852	11,149,224
Administrative and support service activities	13,972,678	12,339,191
Public administration	16,499,191	14,038,745
Education	13,835,727	10,380,147
Human health	20,893,313	11,738,236
Arts and entertainment	7,496,959	6,557,203
Other service activities	7,132,634	5,242,635

Source: authors' elaboration.

The average annual labour income allows for the disaggregation of compensation of employees in the SAM by distinguishing between males and females:

⁶ According to the Chilean Central Bank Statistical Database, Employment by activity is defined as all persons of working age who, during the reference week, worked for one hour or more, for pay or profit, in the context of an employee/employer relationship or as an own account worker.

$$LF_j = WF_j \cdot E_{F_j}$$

$$LM_j = WM_j \cdot E_{M_j}$$

$$L_j = LF_j + LM_j$$

The final structure of the gender SAM for Chile is presented in Figure 1.

2.2 The gender CGE model calibrated on the SAM

The CGE model is designed to conduct economic policy analysis (Scrieciu, 2007; Socci, et al., 2021), with the objective of evaluating the impacts of such policies on the supply side (Deriu, et al., 2021) and the demand side (Severini, et al., 2020). The model is developed through a system of simultaneous linear and non-linear equations (Scarf, 1967), which frame the set of commodity markets in the economy. In addition, these equations incorporate the processes of utility optimisation by consumers subject to the income constraint and profit maximisation by firms compatibly with the production function. A vector of endogenous prices ensures that demand equals supply in all markets.

The objective of CGE models is to analyse the effects that exogenous perturbations can have on resource allocation, efficiency, collective well-being, as well as the formation and redistribution of income among institutional sectors (Socci, et al., 2021). The formalisation and resolution of the CGE model comprise a series of steps (Shoven & Whalley, 1984). These include the selection of the model and functional forms, along with the specification of parameters and variables. This process assumes that the system is in equilibrium and that the policy responses originate from this equilibrium. As a result, the model allows for the comparison of the initial equilibrium (the benchmark equilibrium) and a counterfactual equilibrium derived from policies that influence the price and quantity formation of each aggregate, with the possibility of providing information on impacts in nominal and real terms. In particular, the CGE model follows the structure of the SAM in order to replicate the production structure and the institutional sectors' behaviour. Figure 2 illustrates the structure of the production function and the market balance by commodity.

Figure 1. The gender SAM for Chile.

	COMMODITY <i>i</i> = 1,...,181	ACTIVITY <i>j</i> = 1,...,111	NET TAXES ON COMMODITIES	LABOUR		CAPITAL	NET TAXES ON ACTIVITIES	FINANCIAL AND NON- FINANCIAL CORPORATIONS	HOUSEHOLDS AND NPISHs	GOVERNMENT	REST OF THE WORLD	CAPITAL FORMATION
				Male	Female							
COMMODITY <i>i</i> = 1,...,181		Intermediate consumption							Final consumption	Final consumption	Exports	Gross fixed investment and changes in inventories
ACTIVITY <i>j</i> = 1,...,111	Domestic production											
NET TAXES ON COMMODITIES	Net taxes on commodities											
LABOUR												
Male												
Female												
CAPITAL		Primary factors										
NET TAXES ON ACTIVITIES		Net taxes on activities										
FINANCIAL AND NON- FINANCIAL CORPORATIONS												
HOUSEHOLDS AND NPISHs												
GOVERNMENT			Net taxes on commodities revenues				Net taxes on activities revenues					
REST OF THE WORLD	Imports											
CAPITAL FORMATION									Savings		Net lending / net borrowing	

Source: authors' elaboration.

The core nesting stage defines the formation of total production and the generation of relative prices by commodity. Total production is derived by combining domestic production with imports from the Rest of the World, under the assumption of imperfect substitutability between domestic and imported goods (Armington, 1969). The dual cost function is the following:

$$P_i(1 - t_{out_i}) = \left(\delta_i^{dom} P_{dom,i}^{(1-\sigma_{Q_{dom}})} + (1 - \delta_i^{dom}) P m_i^{(1-\sigma_{Q_{dom}})} \right)^{\frac{1}{1-\sigma_{Q_{dom}}}} \quad (3)$$

The subscript $i = 1, \dots, 181$ indicates commodities. The variable P_i represents the price of commodities, t_{out_i} are net taxes on commodities, $P_{dom,i}$ is the price of domestic goods, and $P m_i$ is the price of imports from the Rest of the World. The coefficient δ_i^{dom} is the share of domestic commodities in total production by commodity, and $\sigma_{Q_{dom}}$ is the null elasticity of substitution between domestic and imported commodities, thus implying that their combination is based on a Leontief production function.

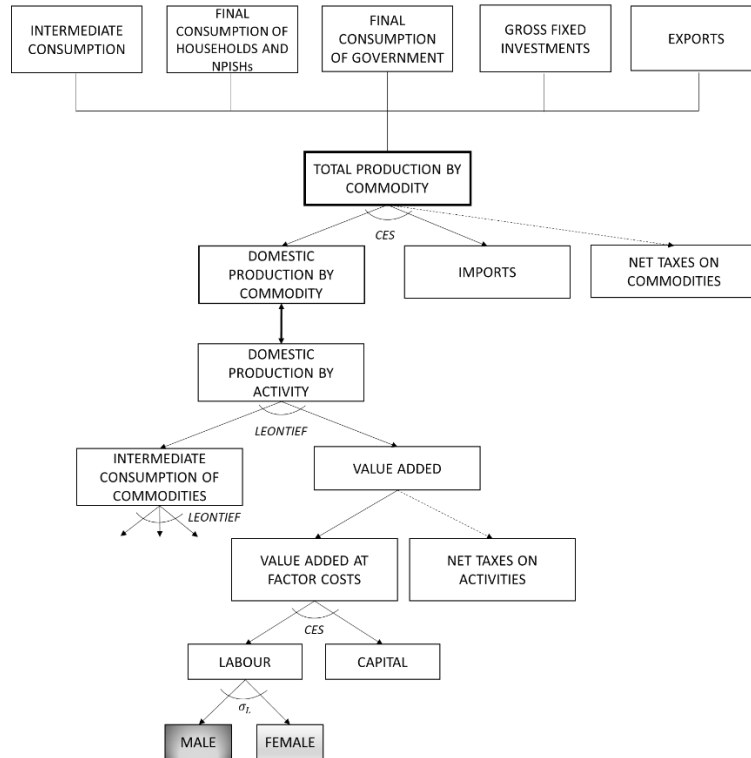
The second nesting stage entails the transition from domestic production by commodity to domestic production by activity through the link in the make-and-use structure of the SAM. Indeed, the production of each type of commodity can be observed from two distinct perspectives, as it can be produced by different production activities, according to the definitions of primary and secondary production. Domestic production by activity is derived by aggregating value added and intermediate goods.

In particular, the price of domestic production by activity is:

$$P_{int,j}(1 - t_{act_j}) = \left(\delta_j^D P b_{ij}^{(1-\sigma_D)} + (1 - \delta_j^D) P v a_j^{(1-\sigma_D)} \right)^{\frac{1}{1-\sigma_D}} \quad (4)$$

The subscript $j = 1, \dots, 111$ identifies production activities. The variable $P b_{ij}$ is the price of intermediate inputs, t_{act_j} represents net taxes on activities, and $P v a_j$ is the price of value added. The coefficient δ_j^D is the share of intermediate inputs in domestic production, and σ_D is the elasticity of substitution between intermediate goods and value added.

Figure 2. The production cost structure and the composition of demand in the CGE model for Chile.



Source: authors' elaboration.

The aggregate for intermediate commodities originates from the combination of the different types of intermediate goods:

$$Pbi_j = \sum_i \left(\delta_{i,j} P_j^{(1-\sigma_{BI})} \right)^{\frac{1}{1-\sigma_{BI}}} \quad (5)$$

The variable P_j is the average price of goods generated by the *market clearing condition*. The coefficient $\delta_{i,j}$ is the cost share of intermediate goods in total costs, and σ_{BI} is the elasticity of substitution between intermediate goods.

Value added is obtained through the combination of the primary factors, labour and capital. The respective prices of these factors are determined by the equilibrium between supply and demand:

$$Pva_j = \left(\delta_j^v \cdot PL_j^{(1-\sigma_v)} + (1 - \delta_j^v) \cdot PK^{(1-\sigma_v)} \right)^{\frac{1}{1-\sigma_v}} \quad (6)$$

The variables PL_j and PK represent the price of the labour aggregate by activity and the price of capital, respectively. The coefficient δ_j^v is the proportion of the labour aggregate in total primary factors and σ_v is the elasticity of substitution between the labour aggregate and capital.

The model reflects the gender characteristics as reproduced by the SAM, therefore the price of the labour aggregate by activity PL_j is obtained by combining the price of male labour PLM_j and the price of female labour PLF_j as follows:

$$PL_j = \left(\delta_j^L \cdot PLM_j^{(1-\sigma_L)} + (1 - \delta_j^L) \cdot PLF_j^{(1-\sigma_L)} \right)^{\frac{1}{1-\sigma_L}} \quad (7)$$

The parameter δ_j^L is the share of male labour in the total labour factor by activity, as obtained from the SAM. The parameter σ_L is the elasticity of substitution between male and female labour.

The market clearing conditions in the markets of labour and capital ensure that the demand for factors equals the supply. We assume that the labour market is imperfectly competitive, with the equilibrium between the labour demand and the labour supply ensured by the variation of the unemployment rate by gender u_g , where $g = \{M, F\}$ denotes the gender subset for male and female subgroups.

$$(1 - u_g) \sum_{is} L_g^{is} = \sum_j L_{j,g} \quad (8)$$

The variable L_g^{is} represents the labour endowment by institutional sector and gender, and $L_{j,g}$ is labour demand by gender expressed by each activity. In particular, the variable u_g is set equal to zero in the calibration of the model, and it is linked to real wages according to the following wage setting function:

$$PLM = PC \cdot F(u_M) \quad (9)$$

$$PLF = PC \cdot F(u_F) \quad (10)$$

The variable PC is the consumer price index, which is calculated endogenously as a function of household consumption.

The market clearing condition for capital is shown in equation (11). The variable K^{is} represents capital endowments by institutional sector, while K_j is capital demand by activity.

$$\sum_{is} K^{is} = \sum_j K_j \quad (11)$$

The variables in equations (8) and (11) are expressed in nominal terms.

The total production Q_i , which corresponds to domestic production and imports, is fully absorbed by each of the components of final demand, including intermediate consumption $\sum_j bi_{i,j}$, final consumption by households and NPISHs C_i^{hh} , government consumption G_i^{pub} , gross investment I_i , and exports E_i^{row} :

$$Q_i = \sum_j bi_{i,j} + C_i^{hh} + G_i^{pub} + I_i + E_i^{rest_w} \quad (12)$$

From the income perspective, the institutional sectors receive income in two principal forms: compensation of employees and gross operating surplus. Accordingly, the formation of primary income can be expressed as follows:

$$Y^{is} = L_g^{is} + K^{is} \quad (13)$$

The formation of disposable income is defined as the sum of primary incomes plus inflows and outflows representing taxes and transfers between institutional sectors. These accounting entities are partly exogenous and partly a function of primary income. The disposable income formation varies according to the institutional sectors, namely households and NPISHs (*hh*), financial and nonfinancial corporations (*corp*), the government (*pub*) and the Rest of the World (*row*):

$$\begin{aligned} Ydisp^{hh} = & Y^{hh} + \sum_{is_in} Y^{hh} tr_{is_in}^{hh} + Tr_{pub}^{hh} + Tr_{row}^{hh} \\ & - \sum_{t_inc} Y^{hh} ty_{t_inc}^{hh} - \sum_{is_out} Y^{hh} tr_{is_out}^{hh} \end{aligned} \quad (14)$$

$$\begin{aligned} Ydisp^{corp} = & Y^{corp} + \sum_{is_in} Y^{corp} tr_{is_in}^{corp} + Tr_{pub}^{corp} + Tr_{row}^{corp} \\ & - \sum_{t_inc} Y^{corp} ty_{t_inc}^{corp} - \sum_{is_out} Y^{corp} tr_{is_out}^{corp} \end{aligned} \quad (15)$$

$$\begin{aligned} Ydisp^{pub} = & Y^{pub} \\ & + \gamma_{t_out}^{pub} \sum_i tq_{i,t_out} P_i Q_i \\ & + \gamma_{t_act}^{pub} \sum_j tq_{j,t_act} P_j X_j \\ & + \sum_{t_inc} Y^{priv} ty_{t_inc}^{priv} + \sum_{is_in} Y^{priv} tr_{is_in}^{priv} + Tr_{row}^{in} - Tr_{row}^{out} \end{aligned} \quad (16)$$

$$\begin{aligned} Ydisp^{row} = & Y^{row} + \sum_i M_i \\ & + \gamma_{t_out}^{row} \sum_i tq_{i,t_out} P_i Q_i \\ & + \gamma_{t_act}^{row} \sum_j tq_{j,t_act} P_j X_j + \sum_{is_in} Y^{priv} tr_{is_in}^{priv} + Tr_{pub}^{in} \\ & - \sum_{t_inc} Y^{row} ty_{t_inc}^{row} - Tr_{row}^{out} \end{aligned} \quad (17)$$

The variables Tr_{pub}^{is} and Tr_{row}^{is} indicate the flows of transfers received by the government and the Rest of the world, which are assumed to be exogenous; X_j is domestic production by activity; Y^{priv} is the sum of the primary incomes of the private institutional sectors (*priv*) – households and NPISHs, financial and nonfinancial corporations. The coefficient ty_{t_inc} is the implicit rate of income taxes paid, tr_{is_in} and tr_{is_out} represent, respectively, the implicit rates of transfers paid and received by the institutional sectors; $tq_i^{t_out}$ are implicit tax rates on output; $tq_i^{t_act}$ are the implicit rates on activities; $\gamma_{t_out}^{pub}$ and $\gamma_{t_act}^{pub}$ are the shares of taxes on commodities and activities collected by the government; $\gamma_{t_out}^{row}$ and $\gamma_{t_act}^{row}$ represent the shares of taxes on commodities and activities collected by the Rest of the World. The variable M_i denotes imports.

The maximisation of the utility functions of households and NPISHs allows for the determination of the levels of consumption and savings compatible with disposable income according to the following relation:

$$Ydisp^{hh} = C^{hh} + S^{hh} \quad (18)$$

The variables C^{hh} and S^{hh} are the levels of consumption and savings, respectively.

As regards the government, the institutional sector does not operate with the objective of maximising the utility function. On the contrary, the government implements fiscal policies and measures that result in either a deficit ($S^{pub} < 0$) or a surplus ($S^{pub} > 0$). The government deficit or surplus is determined residually as follows:

$$S^{pub} = Ydisp^{pub} - G^{pub} \quad (19)$$

The government deficit or surplus is obtained as the difference between government revenues $Ydisp^{pub}$ (see equation 16) and the level of public expenditure G^{pub} .

The disposable income of financial and nonfinancial corporations corresponds to the level of savings, as these institutional sectors do not carry out final demand for consumption:

$$Ydisp^{corp} = S^{corp} \quad (20)$$

The closure condition on the Rest of the World states that the level of net lending or net borrowing of the Chilean economy towards the RoW depends on the difference between exports and $Ydisp^{row}$ (see eq. 17):

$$S^{row} = X^{row} - Ydisp^{row} \quad (21)$$

The variable X^{row} represents exports to the Rest of the World and the variable S^{row} is indebtedness. In particular, foreign demand, as identified by exports, is a function of the endogenous domestic prices of commodities, the exogenous foreign prices of commodities, the exogenous income of the Rest of the World, and the exogenous nominal exchange rate.

In addition, gross investment is assumed to be equivalent to gross savings:

$$\sum_i I_i = \sum_{is} S^{is} \quad (22)$$

3. Policy scenarios

The efforts to close the gender pay gap in Chile and achieve “the same wage for the same job value” between women and men necessitates the implementation of reforms that extend beyond the labour market. The construction of such policy actions requires a careful examination of the labour market structure and its response in the absence of specific gender-oriented policy interventions. Indeed, changes in employment and gender pay gap are often indirect effects of other policies not strictly related to the labour market, but intended to affect other macroeconomic variables, such as the GDP.

If we consider, for instance, the advancement of production processes due to the introduction of innovations, this generally implies a change in the level of investment for selected commodities. Thus, assessing how the implementation of targeted sectoral-investment measures might contribute to the reduction of gender gaps can

be considered of great use for the policymaker, for two main reasons: i) it allows collecting the gender effects of policies not directly dealing with this issue; ii) it provides the policymaker with valuable indications on sector-specific gender policy instruments. In the latter case, the efficacy of the measures on labour demand may be undermined or amplified based on the economic and productive structure, which may be more or less adaptable in overcoming inequalities (in employability or wages) due to structural pre-conditions.

Accordingly, this study implements a sector-specific change in investment by commodity with the objective of uncovering which production process shows a GDP multiplier greater than one and is able to drive a decrease in the gender pay gap.

The simulations are conducted individually, that is to say expanding the final demand for investment for each of the 181 commodities by 0.1% of GDP, under three assumptions on the elasticities of substitution between female and male labour (Scenario 1 - $\sigma_L = 0.5$; Scenario 2 - $\sigma_L = 1$; Scenario 3 - $\sigma_L = 1.5$). Therefore, the total number of simulations is 543. The amount of the policy shock is exogenously determined and is applied to all those commodities that are produced for investment purposes.⁷ The three elasticities of substitution between female and male labour show different levels of gender integration/substitutability in the labour market. When $\sigma_L = 0.5$, we assume that the Chilean labour market is affected by a rigidity in the gender composition of the labour market. In turn, in the case of $\sigma_L = 1.5$, we consider the absence of gender discrimination and substitutability between male and female in all industries.

This analysis may provide the policymaker with indications of the key production processes able to stimulate the economy narrowing gender pay gap, thus informing the design and implementation of gender policies. Subsequent gender policies would thus indicate the specific activities or commodities capable of achieving the objective of closing the gender pay gap without compromising the performance of the economic system. Furthermore, such policies would facilitate gender balance and representativeness by enabling the substitution of women and men in the labour market.

4. Sectoral policies and gender effects: simulation results

The sectoral policies on investments are implemented separately for each commodity under three scenarios that diverges for the assumption on the value of the elasticity of substitution between female and male labour. The main aggregate results of the scenarios (a shock to investment in each commodity and three levels of elasticity of substitution between male and female labour) are summarised in tables 3, 4 and 5. The heading “GPG” indicates the percentage change in the gender pay gap generated in the economic system as a whole when the shock in investment affects a specific commodity. “EMP_M” and “EMP_F” indicate, respectively, the percentage change in male and female employment compared to the benchmark. The “GDP Multiplier” indicates the multiplier associated with the shock, that is to say, the response in terms of GDP to a unitary change in investment by commodity. The 15 commodities showed in all tables are ranked according to the most positive performance in terms of reduction of the gender pay gap. The results in terms of gender employment and GDP multiplier are also reported in order to assess the compatibility of composite policy targets (gender equality and economic growth).

In Scenario 1, the elasticity of substitution between male and female labour equal to 0.5, meaning that a change in the ratio between female and male salaries do not affect much the respective demand by industry (see table 3). However, we can observe that the sectorial shocks on investment activate different policy transmission channels and returns a quite differentiated macroeconomic picture. In this sense, the most important information we can extract from this simulation is the direction of the change in macroeconomic variables and the compatibility of the gender equality and economic targets. Moreover, we can identify the key sectors that the policymaker should stimulate to successfully achieve this multi-faceted objective.

In particular, when stimulated, “research and development” allows for the most significant decrease in the gender pay gap, amounting to -0.05%, still keeping the most pronounced multiplicative effects on GDP. Furthermore, this scenario exhibits the most pronounced increase in female employment, at +0.25%. Similarly, an increase in investments in “real estate services” also results in substantial multiplicative effects, although these lead to more mitigated impacts on both women and men employability.

With the exception of the initial three sectors in the ranking, all other instances in which a reduction in GPG is observed pertain to investment stimuli in manufacturing products. However, despite the reduction in GPG,

⁷ When the value of Investment by commodity is equal to zero in the SAM, it means that the commodity is not demanded for investment purposes at all.

the impact of these stimuli on GDP is not substantial. Indeed, these sectors employ a significant proportion of male labour relative to female labour. Consequently, the increase in production linked to the increase in demand for investment mainly stimulates the demand for male labour, thus lowering its price and leading to a decrease in GPG.

Table 3. Impact of Scenario 1 on the GPG, employment and GDP multiplier – 15 best performances (percent deviation from the benchmark).

SCENARIO 1				
$\sigma_L = 0.5$				
Commodity	GPG	EMP M	EMP F	GDP Multiplier
Research and development	-0.0505	0.227	0.252	1.97
Repair and installation of machinery and equipment, except transport	-0.0094	0.283	0.233	1.86
Real estate services	-0.0050	0.169	0.138	1.96
Liquefied gas and other fuels	-0.0025	0.119	0.096	0.99
Footwear	-0.0021	0.108	0.086	0.95
Other motor vehicles	-0.0018	0.039	0.033	0.28
Computers and their components	-0.0016	0.045	0.037	0.41
Mobile phones	-0.0016	0.053	0.044	0.51
Cars	-0.0015	0.026	0.023	0.31
Televisions	-0.0015	0.039	0.033	0.41
Buses	-0.0013	0.015	0.013	0.20
Other manufactured products and waste	-0.0009	0.128	0.101	1.09
Clothing	-0.0009	0.082	0.065	0.74
Other office machinery and apparatus	-0.0008	0.056	0.044	0.44
Diesel	-0.0007	0.039	0.032	0.35

Source: authors' estimations based on the CGE model.

Scenario 2 assumes the same sector-specific shock on commodity's investment as the previous one, but with an elasticity of substitution between female and male labour of 1 (see table 4). The ranking of the first five commodities remains unchanged in comparison to Scenario 1. However, the increase in the substitutability between male and female labour improves the performance of other services in the ranking, specifically "legal and accounting services" and "architectural and engineering services." The rising responsiveness of production activities to the substitutability between male and female labour at varying relative prices is beneficial for those sectors that typically employ a greater proportion of female labour relative to male labour. This allows for an expansion of the number of cases in which the reduction of the gender pay gap is coupled with a positive GDP multiplier.

Table 4. Impact of Scenario 2 on the GPG, employment and GDP multiplier – 15 best performances (percent deviation from the benchmark).

SCENARIO 2				
$\sigma_L = 1$				
Commodity	GPG	EMP M	EMP F	GDP Multiplier
Research and development	-0.0411	0.201	0.218	1.92
Repair and installation of machinery and equipment, except transport	-0.0090	0.252	0.209	1.86
Real estate services	-0.0059	0.148	0.123	1.93
Liquefied gas and other fuels	-0.0033	0.101	0.083	0.95
Footwear	-0.0029	0.091	0.075	0.92
Mobile phones	-0.0024	0.049	0.042	0.51
Other manufactured products and waste	-0.0022	0.108	0.087	1.06
Computers and their components	-0.0022	0.042	0.036	0.41
Televisions	-0.0020	0.037	0.032	0.41
Legal and accounting services	-0.0019	0.174	0.138	2.13
Other motor vehicles	-0.0019	0.035	0.030	0.28
Other office machinery and apparatus	-0.0019	0.052	0.043	0.44
Architectural and engineering services	-0.0018	0.185	0.146	1.89
Toiletries and cosmetics Other products	-0.0017	0.110	0.088	1.08

Clothing	-0.0017	0.069	0.056	0.72
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Source: authors' estimations based on the CGE model.

In Scenario 3, we consider the elasticity of substitution between male and female labour to be equal to 1.5 (see table 5). This means that male and female labour are regarded as highly substitutable, which in turn influences the determination of their respective salaries within the labour market. Indeed, when the male labour is readily substitutable with female labour, the labour market does not experience the demand pressures that would otherwise elevate the price of one gender category over the other. This results in a smaller effect in terms of changes in the gender pay gap. In this particular case of Scenario 3, we observe that the investment shock on services improves their economic performance by raising its position in the ranking. However, there are still few sectors that achieve both the objectives of the reduced gender pay gap and the economic target. The results show that, in comparison to the preceding Scenarios, the gender pay gap is reduced by at least -0.002% across all scenarios. The more substantial reduction of -0.035% is the result of the increase in investment in “research and development.”

Table 5. Impact of Scenario 3 on the GPG, employment and GDP multiplier – 15 best performances (percent deviation from the benchmark).

SCENARIO 3				
$\sigma_L = 1.5$				
Commodity	GPG	EMP M	EMP F	GDP Multiplier
Research and development	-0.0350	0.179	0.192	1.87
Repair and installation of machinery and equipment, except transport	-0.0091	0.224	0.187	1.82
Real estate services	-0.0061	0.130	0.110	1.90
Liquefied gas and other fuels	-0.0036	0.087	0.073	0.93
Footwear	-0.0032	0.079	0.066	0.90
Legal and accounting services	-0.0031	0.153	0.123	2.10
Architectural and engineering services	-0.0031	0.162	0.130	1.86
Other land transport equipment and parts thereof	-0.0029	0.090	0.074	0.85
Other manufactured products and waste	-0.0027	0.094	0.077	1.03
Toiletries and cosmetics Other products	-0.0027	0.098	0.080	1.07
Clothing	-0.0026	0.066	0.055	0.72
Pharmaceuticals	-0.0025	0.097	0.078	1.09
Mobile phones	-0.0024	0.043	0.037	0.50
Computers and their components	-0.0022	0.037	0.032	0.40
Leather and articles thereof	-0.0022	0.065	0.053	0.73

Source: authors' estimations based on the CGE model.

It is worth saying that the extent of the reduction in the gender pay gap is closely linked to the magnitude of the sectoral investment shock. Nevertheless, an understanding of the key production processes and their gender breakdown, both in terms of wages and employment, enables a more profound exploration of the economic structure of the country and its capacity to trigger changes in the labour market. The analysis of the three Scenarios reveals a consistent classification of production processes that lead to the most pronounced reduction of the gender pay gap, in presence of rising elasticities of substitution between male and female labour. Moreover, as the degree of gender flexibility in the labour market increases, and discrimination in the workplace declines, certain manufacturing sectors demonstrate a notable capacity to employ both women and men, and to mitigate the gender pay gap to a similar extent as is the case in the service sector.

5. Conclusions

Chile is making notable progress in the regulation of the gender income inequality. The government has recently issued the initial guidelines for the drafting of the law of *Equidad Salarial*. However, the direct regulation of the labour market to reduce the gender pay gap requires a comprehensive understanding of the economic structure of the country, the extent of responsiveness and adaptability especially to gender-unrelated economic policies, such as sectoral policies aimed at fostering innovation.

The objective of this paper is to examine the functioning of the Chilean economic system and the relationship with the labour market and the gender pay gap when a sector-specific policy is in place, under different assumptions of substitution between female and male labour. The analysis benefits of the disaggregated approach that allows identifying the relations among several agents and markets, following the structure of the Social Accounting Matrix for the Chilean economy. The SAM serves the calibration of the CGE model that represents a powerful analysis instrument to support the policymaker in assessing *ex-ante* the implications of sectoral gender-(un)related economic policies. Indeed, it is deemed crucial to identify the distinctive structural characteristics of the economic system to devise a strategy that will address socioeconomic issues such as employability and wage inequalities.

In this perspective, the present study explores the potential effects of a change in investments, due to policies favourable to innovation, might affect the gender pay gap and employment, to collect valuable indications for the Chilean policy maker that expressed its interest for promoting the gender income equality.

The scenarios simulated in this paper intend to evaluate the impact of targeted investment stimulus on gender pay gaps, employment and GDP within the general equilibrium theory with the aim of identifying what are the key sectors for all these targets. The outcome is affected by the elasticity of substitution between male and female labour in production processes, thus we might say by the sensibility of the demand of labour by gender to the change in wage gaps. Assuming different values of elasticity of substitution in the Chilean labour market results in alterations to the intensity of the response to the policy shock, but in a partially different ranking of the best-performing commodities. The first five places remain unchanged, indicating that the structure of the economic system, as reflected in the rankings of the best-performing commodities, is only partly affected by the degree of gender substitution in the Chilean labour market.

The findings indicate that the investment shock has the effect of increasing the level of employment for both women and men, and narrowing the gender pay gap, particularly within the service sector. These results are in accordance with the prevailing literature on the topic but contribute a sector-specific gender dimension to the existing knowledge base. Indeed, the reduction of the gender pay gap appears to be more favourable to workers employed in service activities, such as research and development and real estate services, and is beneficial to the whole economic system, as evidenced by the multipliers.

The reduction in the gender pay gap is closely tied to the scale of sectoral investment shocks. However, analysing key production processes and their gender-related wage and employment responses offers a deeper understanding of a country's economic structure and its ability to facilitate labour market transformations. As gender representativeness in the labour market improves, some manufacturing sectors become increasingly adept at employing both men and women, thus narrowing the gender pay gap in a manner similar to that observed in the service sector.

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