Final Report

Can a Wage Subsidy be used to Improve Women's Formal Employment in Zambia?

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Abstract

The number of women employed in the Zambian formal sector is low. This has contributed to the low level of empowerment of women in the country. Due to this, the government of Zambia is willing to adopt policies that can positively contribute to the number of women employed in the formal sector. Based on this policy objective, this research proposes the use of a wage subsidy program targeting women with the aim of increasing their participation in the formal sector. It considers the best design in terms of implementation. In order to achieve the objective of this research, a Computable General Equilibrium (CGE) methodology is used calibrated to an engendered Social Accounting Matrix (SAM) that takes skills and type of employment into account. The findings of this study suggest that a wage subsidy program that targets women will increase their participation in the formal sector. This is will potentially lead to an increase in production in various sectors and income of the households. Based on its design, government revenue will be affected which will in turn reduce government income and possibly crowd out private investment especially if it is in form of a tax credit. However, private investment increases when all is considered is the introduction of a wage subsidy and funding is from external sources. The possible benefits in efforts to empower women ultimately outweigh the costs. Alternatively, to ensure that the costs are lowered when it is implemented in form of a tax credit, this wage subsidy can be focused in sectors which have a high female informal to formal sector employment ratio.

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Keywords: Computable General Equilibrium, Women, Participation, Wage subsidy.

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List of abbreviations

7NDP	Seventh National Development Plan
CSO	Central Statistics Office
CGE	Computable General Equilibrium
GDP	Gross Domestic Product
ILO	International Labour Organisation
LFS	Labour Force Survey
MNDP	Ministry of National Development Planning
OECD	Organisation of Economic Cooperation and Development
SAM	Social Accounting Matrix
SUT	Supply and Use Tables
TJTC	Targeted Jobs Tax Credit
VAT	Value Added Tax

1. Introduction

1.1 Context of the study

The Zambian government through its development road map, the Seventh National Development Plan (7NDP), for the period 2017 to 2021, aims to design and adopt policies that will increase the participation rate of women in the formal sector. This is in an effort to empower women in the country. Among the policies outlined in this plan, one is to focus on implementing employment creating interventions that will reduce informalities and improve working condition as well as improve the returns to labour (Ministry of National Development Planning (MNDP), 2017). Through the design and implementation of such policies, it is expected that the number of women employed in the formal sector will increase from 28.6% to 45% by 2021 (MNDP, 2017). However, the achievement of an increase in women's employment in the formal sector has been very slow. Women continue to be concentrated in the informal sector or care economy, in which they are not fully empowered or benefiting from better wages, social security and other entitlements.

Based on the 2014 Labour Force Survey (LFS), 63.5% of all employed women are contributing family workers compared to the 32.2% of men. Most of these workers do not get paid or have limited or no social security. This is despite the national level of employment rates that state that 52% of women are employed compared to 47% of men (Central Statistics Office (CSO), 2016). The formal sector, where wages are reasonably high, only employs 28.6% of women compared to the 71.4% men employed. Further, among the women considered as employed, 87.9% are in the informal sector while only 12.1% are in the formal sector (CSO, 2016). This situation has prompted policymakers to focus on designing and advocating for policies that will lead to an increase in employment of women. One form of empowerment is increasing their participation in the formal sector.

The wage subsidy program is expected to have two possible positive effects, depending on the design and implementation. It has the potential to increase the participation of women in the formal sector as well as a long term effect of improving their employability and hence their competitiveness in the labour market (Almeida, Orr & Robalino, 2014). The wage subsidy program, therefore, if properly designed, can greatly benefit the economy. It can also improve the well-being of women especially those that have been forced in the informal sector but possess the necessary skills required in the formal sector.

1.2 Wage Subsidy: Design, Target and Complimentary Policies

A wage subsidy is not a new phenomenon, it has been implemented in Organisation of Economic Cooperation and Development (OECD) countries (Katz, 1996; Samoy & Waterplas, 2012; Sjögren & Vikström, 2015; Wolff & Reinthaler, 2008). Despite this, countries are still learning on which design offers the most in terms of impacting the intended target (Katz, 1996; Sjögren & Vikström, 2015). Their implementation has been motivated by a desire to improve the working status of a perceived disadvantaged group. While this research focuses on a wage subsidy that aims to increase women's participation in the formal sector, it should be noted that some sort of subsidies are currently being implemented in Zambia at a very small extent. These mainly focus on people with disability.

A wage subsidy program can reduce labour cost and in turn increase labour demand and employment (Huttunen, Pirttila & Uusitalo, 2013; Samoy & Waterplas, 2012). According to Pauw & Edwards (2006), a wage subsidy program can be implemented through the government subsidising the wage paid by the firm without lowering the wage received by the worker. This can be in form of a direct cash subsidy or a tax credit towards future obligations. This subsidy can be financed through an increase in income and profit tax or through a deficit financing method. Given these advantages, a wage subsidy targeting women has the benefits of empowering women by giving them an opportunity to earn a better salary and other entitlements obtained in the formal sector. It also improves their future chances in the labour market through the confidence, skills and training they acquire by being employed in the formal sector (World Bank, 2012).

In spite of these benefits, the adoption and implementation of any wage subsidy is not without some challenges. Some challenges may include the possibility of unsubsidized workers being replaced by subsidized workers as companies might find it beneficial to employ those being subsidized. Some employers may also not be aware of what a wage subsidy is and this may entail low take up rate. Despite this, these challenges can be addressed by ensuring that there is good advertising of the program and there is simplicity in use to avoid low take-up rates (Robertson, n.d). Further, complimentary policies such as child care facilities in work place can be set up to encourage women to join the formal sector. According to Steinberg & Nakane (2012), in Japan, women often exit the labour force after the first child. Further, since long-

term career choices are made as soon as graduates enter the labour market, women are sorted into informal jobs with less long-term capital investment, leading to permanent divergence between men and women's labour market outcomes as well as wellbeing (International Labour Organisation (ILO), 2010). The wage subsidy program can be beneficial to women who entered the informal sector upon graduating by giving them an opportunity to enter the formal sector.

Under the strategies outlined in the 7NDP plan, there is nothing related to a wage subsidy focusing on women. This is because this policy has not been offered before as an alternative to improving women's employment in the formal sector. The current strategies only encourage institutions to employ a reasonable number of women or to consider employing a considerate number of women in their institutions but this depends on the preferences and priorities of the institutions. Most of these institutions are also influenced by their perception of women as only being suitable for informal work or being in the care economy. By introducing a wage subsidy program, women will have a higher chance of entering the formal sector.

1.3 The Zambian Labour Market

In 2014, Zambia's population was estimated at 14,983,315 comprising 50.9% female and 49.1% male (CSO, 2016). The employed population in the formal sector is mainly male dominated while the informal sector is female dominated as shown in Table 1.1. Arguably, this shows that most companies that are registered with tax or licensing authorities prefer to employ men rather than women while those not registered prefer to employ women rather than men. This hinders the possibility of women getting empowered.

Table 1.1: Selected Zambian Labour Market Statistics

Zambia's 2014 Population	14, 983, 315
Females (%)	50.9
Males (%)	49.1
Number Of Households	2,934,096
Rural Population (%)	58.4
Urban Population (%)	41.6
Total Employed In Formal Sector (%)	16.1
Total Employed In Informal Sector (%)	83.9
Males Employed In Formal Sector (%)	71
Females Employed In Formal Sector (%)	28.6

Males Employed In Informal Sector (%)	43
Females Employed In Informal Sector (%)	57
Males Employed In International Organizations (%)	83
Females Employed In International Organizations (%)	17.4

Source: Labour Force Survey, CSO (2016)

Proposed strategies that will be employed to achieve the empowerment of women in the 7NDP include job creation especially in the tourism and manufacturing sectors, mainstreaming of gender in public institutions and increasing the number of women undergoing training and reaching higher levels of education. Additional to these policies, this study proposes an introduction of a wage subsidy program that will increase the chances of these women entering the formal sector especially as jobs are being created. This will reduce the placement of women into the informal sector. Undeniably, there has been a slow absorption of women in formal sector employment. This is owing to several factors which range from cultural as well as women not meeting the required skills.

Most of the economically active population in Zambia have secondary education with 40.9% followed by primary education with 41.6%. In addition, a gender decomposition shows that of the total economically active men, 50.2% have secondary education while of the total economically active women, 36.2% have secondary education (CSO, 2016). In terms of formality within a given gender, 94.6% of the total number of females employed have informal employment while only 5.4% have formal employment. As for men, of the total number of men employed, 83.4% have informal employment while 16.6% have formal employment (CSO, 2016). Currently, the Zambian formal sector is small. However, the government has strategies that it hopes to implement that will expand the formal sector as outlined in the 7NDP. These strategies can be implemented together with the wage subsidy program, so that women are also given an opportunity to benefit.

1.4 Research questions and objectives

The main objective of this research is to analyse the effect of a wage subsidy program in increasing the number of women employed in the formal sector. In order to propose the best wage subsidy program, this research considers the following questions;

- What is the best possible design of the wage subsidy program?
- How can the intended targeted women benefit from the implementation of this program?
- What will be the economy wide effect of adopting the wage subsidy program?

The research carries out its analysis using a methodology that will capture how the adoption of the wage subsidy program will be transmitted through-out the economy. It considers the effect on various macroeconomic variables, sectors and households. It also shows various designs of the wage subsidy program through the application of various simulations. It offers policy makers with alternative ways in which to implement this program and the possible effects of these various ways.

2 Literature review

Wage subsidy programs are not new phenomenon in the labour market. These programs date back as far as the early 20th century. The Targeted Jobs Tax Credit (TJTC), a form of wage subsidy program in the United States of America (USA), has been in existence since 1978 with the aim of creating employment for the youths (Robertson, n.d). In South Africa (Burns et al., 2010; Levinsohn & Pugatch, 2014; Pauw, 2003; Pauws & Edwards, 2010) various studies have considered the economy wide effect of wage subsidies aimed at increasing employment for various targeted groups. These studies have the advantage of working on subsidies that were currently running. They offer valuable insight in terms of the challenges experienced as well as the ability of the wage subsidy program in achieving its objective. These studies (Burns et al., 2010; Pauw, 2003; Pauws & Edwards, 2010) suggest that financing of the wage subsidy implemented in South Africa was a challenge. Despite this, the objectives of these wage subsidy programs was meet and the intended targets benefited from the programs. Pauw (2003) analyses the effect of a wage subsidy program on unemployment in South Africa using a Computable General Equilibrium (CGE) model. Unlike what this study intends to analyse, Pauw (2003) does not disaggregate by gender and type of employment. In spite of this, the study findings suggest that the direct employment effect of the wage subsidy is counteracted because of the need to raise revenue to fund the subsidy. However, the study notes that effective targeting of labour-intensive industries would reduce the cost of the subsidy significantly. Still analysing the wage subsidy program implemented by

the South African government using a CGE model and this time focusing on the youths, Pauw and Edwards (2006) obtained results that are of interest to countries that would like to adopt a more targeted wage subsidy. Their results suggested that employment for the targeted group increased due to the wage subsidy. The major challenge with their proposed wage subsidy program was the increased financial costs. Meanwhile, Burns et al (2010) still looking at a wage subsidy program in South Africa using CGE, suggests that the funding burden falls more on wealthy households while the unemployed who are more likely to be located in poorer households, benefit the most. Burns et al (2010) makes an important assumption in assuming that the unemployed people possess the skills necessary to immediately engage in employment.

Betcherman, Daysal and Pages (2010) analysed the employment subsidy schemes that were implemented in Turkey. This study discovered that the employment subsidy schemes lead to higher registered jobs in the targeted areas. However, these schemes suffered from dead weight losses. This is a possibility as most subsidies do sufferer from dead weight loss as well as substitution effect (Almeida et al., 2014). Betcherman et al. (2010) acknowledged that they did not have adequate data. Further, based on the form of analysis used, they study did not take into account the interdependency that exist in the economy as it used a difference in difference methodological approach.

Despite using a different methodology and not focused in the labour market, Wolff and Reinthaler (2008) offered insight on the possible benefits of a wage subsidy. Wolff and Reinthaler (2008) looked at the effectiveness of wage subsidies focused towards research and development. Using an instrumental regression model, the results showed that due to a subsidy on research and development, the wages for scientists were increased and the expenditure towards research and development was also increased.

Although, this research is not focusing on trying to increase the wages of women in the formal sector, the increase in income is a potential effect as discovered in studies such as Erero et al., 2013; Kaiser & Kuhn, 2016; Levinsohn & Pugatch, 2014.

Also focusing on youth employment as Pauw and Edwards (2006), Levinsohn and Pugatch (2014) analysed the wage subsidy that has been implemented by the government in order to reduce the unemployment levels of youths in Cape Town. The study used a structural search

model and incorporate the aspect of reservation wage. The results suggested that a wage subsidy paid to employers leads to an increase in the wages as well as a reduction in youth unemployment.

Another study done in a developing country using a CGE model that provided positive results of a wage subsidy program is that by Erero et al. (2013). Erero et al. (2013) looked at a wage subsidy for lower skilled workers in the Democratic Republic of Congo. The results suggested that through the wage subsidy, government is able to increase the real disposable income of households. The results also showed a reduction in the income gap between the informal and formal sectors as well as an increase in real GDP. The increase in income for the targeted group was also discovered by a study done by Kaiser and Kuhn (2016). Kaiser and Kuhn (2016) looked at the effect of the wage subsidy program in Denmark on individuals and firms participating in the program. The study had an advantage of using people and firms that have gone through the program as their data source. It used the propensity matching score to match the treatment and control groups and then ran a multivariate regression on the obtained data. The results suggested that the program had a positive effect on employment and earnings before it expired.

Other studies that are worth noting are those done using CGE models and focusing on the labour market. A study by Fontana (2002) is of interest as it focuses on the effects of trade on women in Zambia. This is done using a gendered CGE model calibrated to a 1995 Zambian SAM. The study considers leisure and the time use by households. Fontana (2002) finds that liberalisation of manufactured imports, although effective, causes smaller employment and wage gains for women than for men. However, reallocation of assets from maize to female-intensive crops makes women more productive but reduces their leisure time. Fontana (2002) suggests that women need programs that focus on them in order to be made better off.

Decaluwe and Cockburn (2003) looks at a CGE model for Nepalese economy to analyse the effects of trade on gender work in the market and at home. Similar to Fontana (2002) it also incorporated leisure. The study findings show that the complete elimination of tariffs on imported goods in Nepal benefits women more than men in term of income distribution.

Agramont et al, 2017, evaluate the possible impact of the labour and wage policy in Bolivia's economy in the event of a reduction in the price of exports using a CGE model. A labour

supply function allows migration between formality and informality. Their study shows that a correction in labour and wage policy depending on the external market condition is needed. Additionally, the study proposes that informal workers should be part of the debate on salary increments.

3 Data: Social Accounting Matrix Creation

The 2010 Supply and Use Tables (SUT) was used as a starting point in the creation of a Social Accounting Matrix (SAM) used in this study. The SUT is a matrix that involves the compilation of a set of integrated production and generation of income accounts for industries (European Commission, 2003). The SUT was compiled by the Central Statistics Office as part of the implementation of the 2008 System of National Accounts. In this study, the 2010 SUT was used to obtain the activities and commodities for the SAM as it provided information on all the accounts apart from transfers and a breakdown of the taxes account. In order to obtain this, various assumption were made guided by official documents. Also, based on literature some assumption had to be made concerning factor incomes and particularly mixed income.

3.1 Social Accounting Matrix Benchmark Statistics

The SAM used in this study is comprised of two factors of production, namely; capital and labour. The disaggregation of factors attempts to capture the transmission of sectoral shocks to household income by taking into account differences in the structure of factor endowments among household categories. Labour is decomposed into eight categories based on gender, skill and formality. Thus we have labour female skilled formal, female unskilled formal, female skilled informal, female unskilled informal, male skilled formal, male unskilled formal, male skilled informal and male unskilled informal. The model distinguishes between 13 sectors while the households are distinguished by location. Hence we have rural households and urban households.

Using the SAM, some benchmark statistics are computed to characterize the structure of the economy. Given the large dimension of the SAM, such statistics are helpful in trying to understand the complex economy that it represents. The microeconomic data in the SAM is used to describe the economy in terms of shares and thereby give an overview of the economy without losing detail. Burfisher (2010) argues that it also allows for quick comparisons and to

identify the most important features of the economy. It also becomes invaluable when interpreting the results. Table 3.1 highlights the structure of production and the pattern of foreign trade in the Zambian economy.

Table 3.1: Production Structure and Trade in Zambia

	Share of GDP	Labour	Capital	Intermediates	Exports	Imports
Agriculture	8.9	4.5	5.8	8.2	3.5	0.3
Mining and Quarrying	12.2	8.8	23.8	17.6	75.3	21.5
Manufacturing	7.7	9.1	11.7	28.9	14.5	70.4
Electricity, water and gas	2.0	1.4	4.0	1.3	0.3	0.0
Construction	10.2	18.0	4.0	9.4	0.0	2.7
Private Services	47.9	26.0	45.5	27.6	6.0	5.1
Public Services	11.1	32.1	5.2	6.9	0.4	0.0
Total	**100**	**100**	**100**	**100**	**100**	**100**

Source: Author's calculations based on 2010 SAM

Table 3.1 shows that the private services sector is the largest contributor to GDP accounting for about 47.9% followed by public and construction sectors at 11.1% and 10.2% respectively. In terms of employment of labour, the public sector has the highest employment level at 32.1% followed by the private sector at 26%. The private services sector also uses about 45.5% of the capital stock followed by the mining and quarrying sector at 23.8%. Manufacturing is the highest demander for intermediate commodities accounting for about 28.9% followed by private services at 27.6%. Interestingly, mining contributes about 12.2% to GDP but it is the largest source of exports accounting for about 75.3% of total exports. Also, the manufacturing sector contributes about 7.7% of GDP but it is the largest demander of imports accounting for about 70.4% of all the imports in the country.

Table 3.2 shows the value added composition in the economy. It shows that for the informal sector, male labour is comparably more important for the construction, manufacturing and mining sectors while female labour is more important for the agriculture and services sectors. For the formal sector, male labour is almost dominant in all the sectors except education and

services sectors. For capital, it is more important for the electricity, mining and manufacturing sectors.

Table 3.2: Value-Added Composition

	MALSI	MALUI	FEMSI	FEMUI	MALSF	MALUF	FEMSF	FEMUF	CAP	Total
AFF	0.1	26.3	0.1	29.4	0.0	1.3	0.0	0.5	42.4	100
MAQ	0.6	2.8	0.2	1.2	2.4	12.0	0.2	1.2	79.3	100
MAN	0.9	13.9	0.6	8.9	0.7	10.1	0.1	1.7	63.1	100
ELE	0.5	2.2	0.7	3.6	1.7	8.2	0.5	2.3	80.4	100
CON	1.7	55.9	0.1	2.5	0.4	13.7	0.0	0.4	25.3	100
WTS	0.8	15.6	0.9	16.8	0.4	6.9	0.1	2.3	56.2	100
ACF	0.6	6.0	1.2	12.4	1.0	10.2	0.6	6.2	61.9	100
IAC	1.5	10.5	1.0	7.1	1.2	8.6	0.8	5.6	63.7	100
FAI	1.8	2.9	0.9	1.6	7.5	12.2	7.3	11.9	53.9	100
REA	1.8	7.6	2.3	9.4	1.0	4.0	0.6	2.6	70.6	100
PUB	1.5	8.1	0.3	1.7	7.2	39.1	1.6	8.6	31.8	100
EDU	1.7	1.9	1.7	1.9	16.3	18.0	15.2	16.9	26.3	100
SER	2.7	14.7	9.7	52.4	0.7	3.6	0.6	3.5	12.1	100

Source: Author's calculations based on 2010 SAM[1]

MALSI=Male skilled informal, MALUI=Male unskilled informal, FEMSI=Female skilled informal, FEMUI=Female unskilled informal, MALSF=Male skilled formal, MALUF=Male unskilled formal, FEMSF=Female skilled formal, FEMUF=Female unskilled formal, CAP=Capital

In terms of the tax structure table 3.3 gives a summary of the tax accounts. In general, total tax revenue comprises of about 12% of GDP. Personal income tax is the largest contributor to tax revenue followed by Value Added Tax (VAT) and corporate income tax respectively. Import tariff accounts for about 18.15% of total tax revenue while other product taxes account from 13.37%.

Table 3.3: Tax Structure in Zambia

Category	Percent of Total	Percent of GDP

[1] Where AFF=Agriculture, MAQ=Mining, ELE=Electricity and water supply, CON=Construction, WTS= Wholesale, trade and transport, ACF=Accommodation, IAC=Information and Communication, FAI= Financial and insurance, REA=Real estate, PUB=Public, EDU=Education, SER=other services.

	Revenue	
Direct Taxes		
Personal Income Tax	35.40	4.40
Corporate Tax	22.33	2.77
Indirect Taxes		
VAT	25.01	3.11
Sales Tax	0.00	0.00
Import Tariff	18.15	2.25
Product subsidies	-14.15	-1.76
Other product taxes	13.37	1.66
Activity Taxes		
Export Tax	0.00	0.00
Total	**100**	**12**

Source: Author's calculations based on 2010 SAM

4 The methodology

The standard PEP 1-1 CGE model developed by Decaluwe, Lemelin, Robichuad & Maisonnave (2013) has been extended in order to carry out the analysis for this research. Labour is disaggregated according to skill, gender and formality. It is assumed that it is possible for a female worker to move from the informal sector into the formal sector. The formal sector has both skilled and unskilled workers which makes it possible for females of various skills to move from the informal to the formal sector. The major distinction between these sectors is the social security coverage and other entitlements received by the worker regardless of the skills they possess.

The wage rate in the formal is fixed so that the movement of workers into the formal sector does not lead to a fall in this wage rate. Labour supply for formal workers is fixed while that for informal workers is endogenous. Further, the model assumes that female and male workers are imperfect substitutes.

To ensure that the above assumptions are captured in the model, the labour in the production structure is disaggregated as follows;

$L = \{F_{UI}, F_{SI}, F_{UF}, F_{SF}, M_{UI}, M_{SI}, M_{UF}, M_{SF}\}$

$Where\ F_{UI} = Female\ unskilled\ informal\ ;\ F_{SI} = Female\ skilled\ informal\ ;$

$F_{UF} = Female\ unskiled\ formal\ ;\ F_{SF} = Female\ skilled\ formal;$

$M_{UI} = Male\ unskilled\ informal\ ;\ M_{SI} = Male\ skilled\ informal\ ;$

$M_{UF} = Male\ unskiled\ formal\ ;\ M_{SF} = Male\ skilled\ formal$

The labour is broken down into subsets that capture the different skills that are incorporated into the model. In order to do so, the varying skills of labour are considered as subset of the labour represented in production as follows;

$l_{skilled} \in L = \{F_{SI}, F_{SF}, M_{SI}, M_{SF}\}$

$l_{unskilled} \in L = \{F_{UI}, F_{UF}, M_{UI}, M_{UF},\}$

The skilled subset of labour are further disaggregated according to gender which is then broken down into formal and informal sector employment. Given this, the equation defining the different types of labour demanded by an industry is defined as follows;

$$LD_{lj} = \left[\frac{\beta_{lj}^{LD} W_l}{WTI_{lj}}\right]^{\sigma_j^{LD}} \left(B_j^{LD}\right)^{\sigma_j^{LD}-1} LD_{sg} \qquad \text{Equation 1}$$

$where\ LD_{lj} = type\ of\ labour\ demanded\ by\ industry\ j;$

$B_j^{LD} = is\ the\ Scale\ parameter\ for\ type\ l\ of\ labour;$

$\sigma_j^{LD} = elasticity\ of\ substitution,;$

$W_l = wage\ rate\ received\ by\ type\ l\ labour;$

$WTI_{lj} = wage\ rate\ paid\ by\ industry\ j\ for\ type\ l\ labour\ (including\ payroll\ taxes);$

$LD_{sg} = type\ l\ labour\ demand\ classified\ by\ type\ of\ skill\ and\ gender.$

The variable LD_{sg} is the modification introduced in the standard PEP 1.1 model. This captures the different types of labour based on skill, gender and informality as well as the associated price of the various types of labour.

In order to achieve the objective of this research two approaches are used. These approach involves a further extension of the standard PEP 1-1 model. The first approach captures the cost of implementing a wage subsidy that will increase female employment in the formal sector. So far the government has increased the number of female in the formal sector by 28.6% but intends to achieve the number to 45%. This will entail that there is need to achieve a 16.4% increase of female in the formal sector.

The wage subsidy is a function of the total revenue government obtains on this worker relative to the amount paid for the labour demanded less the tax rate on a particular worker. This is represented by the following equation;

$$wsub_l = \frac{GRT_{lj}}{LD_{lj}.\ W_l} - Tax_{ij}$$ Equation 2

$where$

$GRT_{lj} = government\ revenue\ from\ payroll\ taxes\ on\ type\ l\ labour\ in\ industry\ j;$

$Tax_{ij} = tax\ rate\ on\ type\ l\ worker\ compensation\ in\ industry\ j;$

$wsub_l = wage\ subsidy\ rate$

By introducing the wage subsidy in this format, the cost of increasing women in the formal sector will be captured and the implication on the economy will also be captured. Based on this, this research offers financing options available to policymakers.

The second approach considers a possible financing approach that leads to an increase in female employment in the formal sector while female employment in the informal sector reduces. This occurs due to the introduction of a migration link that ensures that female workers move from the informal to the formal sector. To achieve this, migration of labour is defined as:

$$LM_{in\rightarrow fo} = \rho \sum_{in\rightarrow fo} \sum_j LD$$ Equation 3

Where $LM_{in\rightarrow fo}$= Labour migrated from the informal to the formal sector,

ρ=migration share from informal to formal labour

Due to this classification of migrated labour, informal labour supply is defined as follows;

$$LS_{in} = {\sum_j LD}\Big/{1 - unemp} + \sum_{in\rightarrow fo} LM$$ Equation 4

Where; $LS_{in} = informal\ labour\ supply,$

$unemp = unemployment\ rate.$

In order to take into account that workers have moved from the informal to the formal sector, formal labour supply is defined as follows;

$$LS_{fo} = \sum_j LD - \sum_{in\rightarrow fo} LM$$ Equation 5

Where LS_{fo}= formal labour supply

The introduction of a migration variable enables this research to offer a possible design of a wage subsidy. In this approach the wage subsidy rate (wsub) is equated to zero. However, the wage subsidy is designed as a tax credit rather than a direct cash subsidy. The tax credit ensures that the wage received by the female worker does not reduce due to the increase of female workers in the formal sector. However, the amount paid by the industry is reduced

through a reduction in the amount of payroll tax they pay towards government. This can be done in two ways; either by reducing the tax rate or by reducing the taxes on female formal workers provided by each industry. Designing the wage subsidy in such a manner provides an alternative to financing options for the program.

4.1 Simulations

Three simulations are implemented in this study. The closures used for all these simulations are considered to be close approximations of the functioning of the Zambian economy. Capital is assumed to be sector specific to capture the different types of capital used by different activities. Savings is endogenous while government expenditure is fixed.

Given these closures, simulation 1 (SIM3) uses the first approach to the model extension. This gives us the cost of increasing the number of female workers in the formal sector by 16.4%. Based on this, the research offers financing option guided by an understanding of the structure of the economy and the policy implementation process.

Meanwhile, simulation 2 (SIM2), simulation 3 (SIM3) and simulation 4 (SIM4) involve the implementation of the wage subsidy in form of a tax credit. This tax credit is only offered to female workers in the formal sector. These simulation offer an option of dealing with the financing part of the wage subsidy to achieve an increase in female employment in the formal sector. Further, all the three simulation use the second approach that includes a migration variable that captures the movement of female workers from the informal into the formal sector Simulation 2 involves the implementation of the wage subsidy in all the sectors by reducing the tax rate by 65%. Simulation 3 involves the reduction of the tax as a lump sum in each industry. To achieve an increase closer to 16.4% of female workers in the formal sector, the tax obtained from these female workers in the formal sector has to be reduce by 24%. Simulation 4 involves implementing the same subsidy designed for simulation 3 but in only the three industries that employ a large number of female workers in the informal sector. These industries are the agriculture, manufacturing and wholesale, trade and transport.

5 Application and Results[2]

[2] A sensitivity analysis was carried out on the elasticities used in the model.

In analysing the effects of the various simulations, the study focuses on how it will affect the labour market, production and prices of the local products. It also considers how government, households and the macroeconomy will be affected.

5.1 Impact on the Labour Market

All the simulations lead to an increase in labour supply as shown in table 5.1. The increase is greater for unskilled female formal workers than the skilled female formal workers. It is easier for females to move into the formal sector with the same set of skills. Given that there are few females in the informal sector that have skills, it is expected that the increase for skilled female workers in the formal sector is lower for SIM2 and SIM3. SIM4 experiences the lowest incremental change of female workers in the formal sector. This is expected as the wage subsidy is only focused in three industries. SIM1, which captures the cost of the subsidy shows a greater reduction in skilled female informal workers by 27.750% while unskilled female for informal workers reduce by 5.368%. This is expected as the sum of the percentage change is equivalent to the increase of female workers in the formal sector.

Table 5.1: Percentage change in labour supply

Labour supply	SIM1	SIM2	SIM3	SIM4
Female skilled informal (FEMSI)	-27.750	-0.372	-0.157	-0.004
Female unskilled informal (FEMUI)	-5.368	-0.117	-0.090	-0.011
Female skilled formal (FEMSF)	16.400	14.529	16.221	0.208
Female unskilled formal (FEMUF)	16.400	16.206	18.763	1.564

Source: Authors' own calculations

On the demand side[3], industry wages for female workers in the formal sector reduces as expected since the program is in the form of a tax credit. This entails that employing female workers in the formal sector is relatively cheaper as the labour cost is low. Studies by Pauw, 2003; Pauw & Edwards, 2006, highlighted this positive effect of a wage subsidy.

5.2 Impact on Production and Prices

[3] The table in appendix 1 shows the percentage reduction in the wage rate for all three simulations.

Since the cost of employing female workers in the formal sector is relatively cheaper. Most industries are able to produce more as they employ more female workers in the formal sector. However, the negative change in the construction industry, for all simulations is expected as it is a male dominated sector with 97% male workers while 3% are female workers. This can be seen in table 5.2.

Table 5.2: Percentage change in total aggregate output of industry j production.

Industry	SIM1	SIM2	SIM3	SIM4
Agriculture	-0.592	0.233	0.091	0.018
Mining and Quarrying	0.019	0.247	0.103	-0.001
Manufacturing	-0.529	0.209	0.081	0.030
Electricity and water supply	0.258	0.260	0.091	0.005
Construction	-0.460	-0.108	-0.037	-0.005
Wholesale, Trade and Transport	-0.407	0.188	0.073	0.012
Accommodation and Food	0.028	0.280	0.113	0.003
Information and communication	0.252	0.341	0.142	0.007
Financial and Insurance	0.705	0.881	0.336	0.007
Real Estate	-0.185	0.223	0.089	0.002
Public administration	0.584	1.084	0.431	0.008
Education	3.107	1.376	0.528	0.007
Other Services	-2.329	2.122	1.076	0.003

Source: Authors' own calculations

The increase in production by the various industries leads to an increase in the domestic supply of the products produced by these industries. This leads to a reduction in the relative price of the local products sold on the domestic market. The overall fall in these prices is greater in SIM2.

Table 5.3: Percentage change in price of local product I sold on the domestic market

Product	SIM1	SIM2	SIM3	SIM4
Agriculture	3.085	-0.204	-0.098	-0.013
Mining and Quarrying	0.406	-0.249	-0.109	0.001
Electricity and water supply	1.515	-0.339	-0.160	0.003
Construction	1.198	-0.461	-0.206	-0.013
Wholesale, Trade and Transport	2.577	-0.054	-0.035	-0.020
Accommodation and Food	1.182	-0.070	-0.035	-0.002
Information and communication	0.957	-0.020	-0.023	-0.002
Financial and Insurance	-3.234	-3.312	-1.253	0.001
Real Estate	2.387	0.021	-0.010	-0.004

Public administration	-0.574	-1.251	-0.506	-0.007
Education	-3.425	-1.776	-0.693	-0.004
Other Services	4.195	-1.851	-0.985	-0.005
Food processing	2.247	-0.089	-0.052	-0.025
Textile and other Manufacturing	1.695	-0.250	-0.230	-0.025

Source: Authors' own calculations

Table 5.3 shows that the prices fall more in SIM2 followed by SIM3. However, SIM4 experiences a fall in prices for products were the shock is focused and/or has strong linkages with sectors were the shock is focused.

5.3 Impact on Government Revenue

Since the wage subsidy design affects payroll taxes, the revenue received by government from these taxes falls more compared to any source of government revenue. It falls more in SIM1 by 36.925% and falls less in SIM4 by 0.392%.

Table 5.4: Percentage change in sources of government revenue

Source of Government Revenue	SIM1	SIM2	SIM3	SIM4
Payroll Taxes	-36.925	-18.282	-7.100	-0.392
Import Duties	1.010	0.190	0.065	0.005
Business Income taxes	1.370	0.014	-0.010	-0.006
Indirect taxes of commodities	0.739	0.164	0.060	-0.008
Production Taxes	2.717	0.137	0.026	-0.009

Source: Authors' own calculations

Meanwhile, import duties increase. This increase can be attributed to the increase in the amount of imports in most of the sectors. The production taxes also increase in SIM1 and SIM3 by 2.717% and 0.026% respectively. This is expected as the wage subsidy program leads to an increase in production for most industries. However, production taxes for SIM4 fall by 0.009% as this is only focused in three industries.

5.4 Impact on Income and Savings

Due to a fall in government revenue, government income also falls. It falls more when the program is implemented by reducing the tax rate in all the sectors by 1.110% in SIM1. The rural and urban households' total income increases in all three simulations. This is expected as

suggested by studies done by Erero et al., 2013; Kaiser & Kuhn, 2016; Levinsohn & Pugatch, 2014. This can be attributed to an increase in labour incomes as more female workers enter the formal sector. However, firm's income falls in SIM2, SIM3 and SIM4. This is expected since government transfers to the firm falls more than the income the firms get from capital. In SIM4 rural and urban households increase a very small fall in their total income, which is equivalent to a lack of change in their total income.

Table 5.5: Percentage change in income by agents.

Agent	SIM1	SIM2	SIM3	SIM4
Government	-1.015	-1.110	-0.449	-0.028
Rural Household	2.186	0.107	0.017	-0.001
Urban Household	2.299	0.143	0.028	-0.000
Firm	0.456	-0.481	-0.188	-0.016
Labour income				
Rural Household	3.337	0.530	0.177	0.009
Urban Household	3.060	0.440	0.132	0.007
Real GDP at Market Prices	1.361	0.280	0.199	0.005

Source: Authors' own calculations

As shown in table 5.5 above, the overall effect on the economy is an increase in real GDP at market prices. The economy experience a greater increase in SIM1 by 1.361%.

In terms of savings, since the closure implemented in all the simulations involves fixing government expenditure while savings is determined endogenously. Government and firms' savings fall while that of the households increases as shown in table 5.6. This can be attributed to the fall in income for government and firms. However, firms' savings increase in SIM1 due to the increase in their income experienced in this simulation. Further, SIM1 leads to a greater increase in savings for households.

Table 5.6: Percentage change in savings by agents

Agents	SIM1	SIM2	SIM3	SIM4
Government	-30.800	-19.116	-7.511	-0.468
Firms	0.384	-0.481	-0.203	-0.016
Rural Household	2.186	0.107	0.017	-0.001
Urban Household	2.299	0.143	0.028	-0.000

Total investment expenditure	0.691	-0.652	-0.278	-0.020

Source: Authors' own calculations

The fall in savings by the government leads to a fall in total investment expenditure in SIM2, SIM3 and SIM4 while it increases in SIM1.

6 Conclusions and policy implications

The implementation of a wage subsidy strategy has the possibility of leading to an increase in female workers in the formal sector. On one hand, the wage subsidy strategy can lead to female empowerment as some more females are able to have access to formal work that offers better income and other entitlements. Their increased income may lead to an increase in households' income as well. The low labour cost leads to an increase in production and a fall in prices of goods and services on the domestic market. This further can possibly improve the welfare of the households. This effect is greater when a wage subsidy is directly introduced in the formal sector. Overall the economy can benefit from an increase in GDP at market prices.

On the other hand, the wage subsidy strategy may lead to a reduction in government revenue which affects government income negatively. The fall in government income may lead to a fall in government savings. Due to government expenditure being fixed, it has the possibility of leading to a deficit that may crowd out private investment when it is designed as a tax credit.

Based on the change in variables affecting female workers, the benefits seem to outweigh the costs of the wage subsidy strategy. It improves the well-being of the female workers which trickles down to the households through their increase in income. This effect is higher when the funds are not obtained from employment taxes. Furthermore, the economy benefits through an increase in production and a reduction in prices of goods and services. This research has shown that increasing labour supply by introducing a subsidy, although reduces government revenue results higher income for both rural and urban household. This has shown that the benefits of the subsidy outweigh the cost on welfare grounds. Policymakers have the option of mobilising funds from external sources or from transferring a certain amount earned from payroll taxes towards employing females in the formal sector. Alternatively, policymakers could consider implementing the wage subsidy in form of a tax credit for sectors that have a high female informal to formal sector employment ratio. This has the possibility of

increasing female formal sector participation while minimally affecting government revenue. However, the effect on the female employment in the formal sector is very small compared to other options. The effect on government revenue adversely affects its income and savings which ultimately affects private investment. In spite of this, this study acknowledges that there is need to have further research that will turn the model into a dynamic model. This will have the advantage of determining how long the wage subsidy will need to be implemented in order to achieve the objective of increasing female employment in the formal sector from 28.6% to 45%. It will also determine how long government will be able to handle a reduction in revenue and the subsequent effects on investment.

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Appendices

Appendix 1: Percentage change in wage rate paid by industry J

Simulation 1

	MALSI	MALUI	FEMSI	FEMUI	FEMSF	FEMUF
AFF	-1.702	2.488	37.43	8.459	-14.69	-13.284
MAQ	-1.702	2.488	37.43	8.459	-13.561	-12.263
MAN	-1.702	2.488	37.43	8.459	-14.851	-13.429
ELE	-1.702	2.488	37.43	8.459	-13.984	-12.646
CON	-1.702	2.488	37.43	8.459	-16.026	-14.493
WTS	-1.702	2.488	37.43	8.459	-15.789	-14.278
ACF	-1.702	2.488	37.43	8.459	-15.681	-14.181
IAC	-1.702	2.488	37.43	8.459	-16.014	-14.481
FAI	-1.702	2.488	37.43	8.459	-13.592	-12.292
REA	-1.702	2.488	37.43	8.459	-15.902	-14.381
PUB	-1.702	2.488	37.43	8.459	-13.563	-12.265
EDU	-1.702	2.488	37.43	8.459	-14.906	-13.479
SER	-1.702	2.488	37.43	8.459	-8.165	-7.384

Source: Authors' own calculations

Simulation 2

	MALSI	MALUI	MALSF	MALUF	FEMSF	FEMUF
AFF	-0.708	-0.225	-0.993	-0.468	-6.150	-6.150
MAQ	-0.708	-0.225	-0.993	-0.468	-10.674	-10.674
MAN	-0.708	-0.225	-0.993	-0.468	-5.508	-5.508
ELE	-0.708	-0.225	-0.993	-0.468	-8.980	-8.980
CON	-0.708	-0.225	-0.993	-0.468	-0.797	-0.797
WTS	-0.708	-0.225	-0.993	-0.468	-1.747	-1.747
ACF	-0.708	-0.225	-0.993	-0.468	-2.180	-2.180
IAC	-0.708	-0.225	-0.993	-0.468	-0.848	-0.848
FAI	-0.708	-0.225	-0.993	-0.468	-10.548	-10.548
REA	-0.708	-0.225	-0.993	-0.468	-1.294	-1.294
PUB	-0.708	-0.225	-0.993	-0.468	-10.667	-10.667

EDU	-0.708	-0.225	-0.993	-0.468	-5.288	-5.288
SER	-0.708	-0.225	-0.993	-0.468	-32.290	-32.290

Source: Authors' own calculations

Simulation 3

	MALSI	MALUI	MALSF	MALUF	FEMSF	FEMUF
AFF	-0.354	-0.136	-0.445	-0.225	-2.470	-2.470
MAQ	-0.354	-0.136	-0.415	-0.192	-4.547	-4.547
MAN	-0.354	-0.136	-0.434	-0.213	-2.185	-2.185
ELE	-0.354	-0.136	-0.388	-0.166	-3.710	-3.710
CON	-0.354	-0.136	-0.432	-0.214	-0.295	-0.295
WTS	-0.354	-0.136	-0.436	-0.217	-0.660	-0.660
ACF	-0.354	-0.136	-0.437	-0.218	-0.829	-0.829
IAC	-0.354	-0.136	-0.438	-0.219	-0.319	-0.319
FAI	-0.354	-0.136	-0.159	0.065	-4.309	-4.309
REA	-0.354	-0.136	-0.438	-0.219	-0.488	-0.488
PUB	-0.354	-0.136	-0.373	-0.151	-4.515	-4.515
EDU	-0.354	-0.136	-0.397	-0.177	-2.064	-2.064
SER	-0.354	-0.136	0.462	0.707	-19.808	-19.808

Simulation 4

	MALSI	MALUI	MALSF	MALUF	FEMSF	FEMUF
AFF	-0.007	-0.016	-0.003	-0.013	-2.465	-2.465
MAQ	-0.007	-0.016	-0.001	-0.011	0.002	0.002
MAN	-0.007	-0.016	0.002	-0.008	-2.185	-2.185
ELE	-0.007	-0.016	-0.006	-0.016	-0.002	-0.002
CON	-0.007	-0.016	-0.003	-0.013	0.000	0.000
WTS	-0.007	-0.016	-0.003	-0.013	-0.659	-0.659
ACF	-0.007	-0.016	-0.004	-0.013	0.000	0.000
IAC	-0.007	-0.016	-0.004	-0.013	0.000	0.000
FAI	-0.007	-0.016	-0.005	-0.015	-0.001	-0.001
REA	-0.007	-0.016	-0.003	-0.013	0.000	0.000
PUB	-0.007	-0.016	-0.004	-0.014	0.000	0.000
EDU	-0.007	-0.016	-0.004	-0.014	0.000	0.000
SER	-0.007	-0.016	-0.003	-0.014	0.001	0.001

Source: Authors' own calculations

Various GAMS Codes

```
Set definition
All industries
AFF    Agriculture foresty fishing
MAQ    Mining and quarrying
MAN    Manufacturing
ELE    electricity and water
CON    Construction
WTS    Wholesale and transport
ACF    accommodation
IAC    Information
FAI    Financial
REA    Real estate
PUB    Public and administration
EDU    Education
SER    Other services
I All commodities
AFF     Agriculture foresty fishing
MAQ     Mining and quarrying
FOOD    Food processing
TEX     Textile and other manufacturing
ELE     Electricity and Water
CON     Construction
WTS     Wholesale and transport
ACF     Accomodation
IAC     Information
FAI     Financial
REA     Real estate
PUB     Public and administration
EDU     Education
SER     Other services
Production factors
L Labor categories
MALSI Male skilled informal
MALUI Male unskilled informal
FEMSI Female skilled informal
FEMUI Female unskilled informal
MALSF Male skilled Formal
MALUF Male unskilled informal
```

```
FEMSF Female skilled Formal
FEMUF Female unskilled Formal

Capital categories
 CAP  Capital

Agents
AG All agents
 RHH          Rural households
 UHH          Urban households
 Firm         Firms
 Gvt          Government
 ROW          Rest of the world

PARAMETERS
 aij(i,j)          Input output coefficient
 B_KD(j)           Scale parameter (CES - composite capital)
 B_LD(j)           Scale parameter (CES - composite labor)
 B_LD1(j)          Scale parameter (CES - composite unskilled labor)
************************************************************
 B_LD2(j)          Scale parameter (CES - composite informal labor)
 B_LD3(j)          Scale parameter (CES - composite informal labor)
 B_LD4(j)          Scale parameter (CES - composite informal labor)
 B_LD5(j)          Scale parameter (CES - composite informal labor)

 B_M(i)            Scale parameter (CES - composite commodity)
 B_VA(j)           Scale parameter (CES - value added)
 B_VA1(j)          Scale parameter (CES - lds and ldu)
 B_VA2(j)          Scale parameter (CES - lds and ldu)
 B_VA3(j)          Scale parameter (CES - lds and ldu)
 B_X(j,i)          Scale parameter (CET - exports and local sales)
 B_XT(j)           Scale parameter (CET - total output)
 beta_KD(k,j)      Share parameter (CES - composite capital)
 beta_LD(lsk,j)    Share parameter (CES - composite skilled labour)
 beta_LD1(lu,j)    Share parameter (CES - composite unskilled labour)

************************************************************************
 beta_LD2(MS,j)      Share parameter (CES - composite labor)
 beta_LD3(FS,j)      Share parameter (CES - composite labor)
 beta_LD4(MU,j)      Share parameter (CES - composite labor)
 beta_LD5(FU,j)      Share parameter (CES - composite labor)

 beta_M(i)         Share parameter (CES - composite commodity)
```

```
 beta_VA(j)         Share parameter (CES - value added)
 beta_VA1(j)         Share parameter (CES - value added)
 beta_VA2(j)         Share parameter (CES - value added)
 beta_VA3(j)         Share parameter (CES - value added)
 beta_X(j,i)        Share parameter (CET - exports and local sales)
 beta_XT(j,i)       Share parameter (CET - total output)
 eta                Price elasticity of indexed transfers and parameters
 frisch(h)          Frisch parameter (LES function)
 gamma_GVT(i)         Share of commodity i in total current public expenditures on
goods and services
 gamma_INV(i)       Share of commodity i in total investment expenditures
 gamma_LES(i,h)     Marginal share of commodity i in household h consumption budget
 io(j)              Coefficient (Leontief - intermediate consumption)
 kmob               Flag parameter (1 if capital is mobile)
 lambda_RK(ag,k)    Share of type k capital income received by agent ag
 lambda_TR(ag,agj) Share parameter (transfer functions)
 lambda_WL(h,l)     Share of type l labor income received by type h households
 lambda_SC(ag,l)       Share of social contribution paid by activity j received by
agent ag
  rho_KD(j)          Elasticity parameter (CES - composite capital)
 rho_LD(j)          Elasticity parameter (CES - composite labor)
 rho_LD1(j)          Elasticity parameter (CES - composite labor)
*******************************************************
 rho_LD2(j)          Elasticity parameter (CES - composite labor)
 rho_LD3(j)          Elasticity parameter (CES - composite labor)
 rho_LD4(j)          Elasticity parameter (CES - composite labor)
 rho_LD5(j)          Elasticity parameter (CES - composite labor)

 rho_M(i)           Elasticity parameter (CES - composite commodity)
 rho_VA(j)          Elasticity parameter (CES - value added)
 rho_VA1(j)          Elasticity parameter (CES - value added)
 rho_VA2(j)          Elasticity parameter (CES - value added)
 rho_VA3(j)          Elasticity parameter (CES - value added)
 rho_X(j,i)         Elasticity parameter (CET - exports and local sales)
 rho_XT(j)          Elasticity parameter (CET - total output)
 sigma_KD(j)        Elasticity (CES - composite capital)
 sigma_LD(j)        Elasticity (CES - composite labor)
 sigma_LD1(j)        Elasticity (CES - composite labor)
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 sigma_LD2(j)        Elasticity (CES - composite labor)
 sigma_LD3(j)        Elasticity (CES - composite labor)
 sigma_LD4(j)        Elasticity (CES - composite labor)
 sigma_LD5(j)        Elasticity (CES - composite labor)
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 sigma_M(i)        Elasticity (CES - composite commodity)
 sigma_VA(j)       Elasticity (CES - value added)
 sigma_VA1(j)       Elasticity (CES - value added)
 sigma_VA2(j)       Elasticity (CES - value added)
 sigma_VA3(j)       Elasticity (CES - value added)
 sigma_X(j,i)      Elasticity (CET - exports and local sales)
 sigma_XT(j)       Elasticity (CET - total output)
 sigma_XD(i)       Price elasticity of the world demand for exports of product i
 sigma_Y(i,h)      Income elasticity of consumption
 tmrg(i,ij)        Rate of margin i applied to commodity ij
 tmrg_X(i,ij)      Rate of margin i applied to exported commodity i
 v(j)              Coefficient (Leontief - value added)

VARIABLES
Volume variables
 C(i,h)          Consumption of commodity i by type h households
 CG(i)           Public final consumption of commodity i
 CI(j)           Total intermediate consumption of industry j
 CMIN(i,h)       Minimum consumption of commodity i by type h households
 CTH_REAL(h)     Real consumption budget of type h households
 DD(i)           Domestic demand for commodity i produced locally
 DI(i,j)         Intermediate consumption of commodity i by industry j
 DIT(i)          Total intermediate demand for commodity i
 DS(j,i)         Supply of commodity i by sector j to the domestic market
 EX(j,i)         Quantity of product i exported by sector j
 EXD(i)          World demand for exports of product x
 G_REAL          Real current government expenditures on goods and services
 GDP_BP_REAL     Real GDP at basic prices
 GDP_MP_REAL     Real GDP at market prices
 GFCF_REAL       Real gross fixed capital formation
 IM(i)           Quantity of product i imported
 INV(i)          Final demand of commodity i for investment purposes (GFCF)
 KD(k,j)         Demand for type k capital by industry j
 KDC(j)          Industry j demand for composite capital
 KS(k)           Supply of type k capital
 LD(l,j)         Demand for type l labor by industry j
 LDC(j)          Industry j demand for composite labor
 LDS(j)          Industry j demand for composite labor
 LDU(j)          Industry j demand for composite labor
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 LDSF(j)          Industry j demand for composite labor
 LDSM(j)          Industry j demand for composite labor
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 LDUM(j)          Industry j demand for composite labor
 LDUF(j)          Industry j demand for composite labor
 LS(l)           Supply of type l labor
 MRGN(i)         Demand for commodity i as a trade or transport margin
 Q(i)            Quantity demanded of composite commodity i
 VA(j)           Value added of industry j
 VSTK(i)         Inventory change of commodity i
 XS(j,i)         Industry j production of commodity i
 XST(j)          Total aggregate output of industry j

Price variables
 e               Exchange rate (price of foreign currency in local currency)
 P(j,i)          Basic price of industry j's production of commodity i
 PC(i)             Purchaser price of composite comodity i (including all taxes and
margins)
 PCI(j)          Intermediate consumption price index of industry j
 PD(i)           Price of local product i sold on the domestic market (including all
taxes and margins)
 PE(i)           Price received for exported commodity i (excluding export taxes)
 PE_FOB(i)       FOB price of exported commodity i (in local currency)
 PIXCON          Consumer price index
 PIXGDP          GDP deflator
 PIXGVT          Public expenditures price index
 PIXINV          Investment price index
 PL(i)           Price of local product i (excluding all taxes on products)
 PM(i)           Price of imported product i (including all taxes and tariffs)
 PP(j)           Industry j unit cost including taxes directly related to the use of
capital and labor but excluding other taxes on production
 PT(j)           Basic price of industry j's output
 PVA(j)             Price of industry j value added (including taxes on production
directly related to the use of capital and labor)
 PWM(i)          World price of imported product i (expressed in foreign currency)
 PWX(i)          World price of exported product i (expressed in foreign currency)
 R(k,j)          Rental rate of type k capital in industry j
 RC(j)           Rental rate of industry j composite capital
 RK(k)           Rental rate of type k capital (if capital is mobile)
 RTI(k,j)        Rental rate paid by industry j for type k capital including capital
taxes
 W(l)            Wage rate of type l labor
 WC(j)           Wage rate of industry j composite labor
 WS(j)           Wage rate of industry j composite labor
 WU(j)           Wage rate of industry j composite labor
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WSF(j)	Wage rate of industry j composite labor
WSM(j)	Wage rate of industry j composite labor
WUF(j)	Wage rate of industry j composite labor
WUM(j)	Wage rate of industry j composite labor
WTI(l,j)	Wage rate paid by industry j for type l labor including payroll taxes

Nominal (value) variables

CAB	Current account balance
CTH(h)	Consumption budget of type h households
G	Current government expenditures on goods and services
GDP_BP	GDP at basic prices
GDP_FD	GDP at purchasers' prices from the perspective of final demand
GDP_IB	GDP at market prices (income-based)
GDP_MP	GDP at market prices
GFCF	Gross fixed capital formation
IT	Total investment expenditures
SF(f)	Savings of type f businesses
SG	Government savings
SH(h)	Savings of type h households
SROW	Rest-of-the-world savings
TDF(f)	Income taxes of type f businesses
TDFT	Total government revenue from business income taxes
TDH(h)	Income taxes of type h households
TDHT	Total government revenue from household income taxes
TIC(i)	Government revenue from indirect taxes on product i
TICT	Total government receipts of indirect taxes on commodities
TIK(k,j)	Government revenue from taxes on type k capital used by industry j
TIKT	Total government revenue from from taxes on capital
TIM(i)	Government revenue from import duties on product i
TIMT	Total government revenue from import duties
TIP(j)	Government revenue from taxes on industry j production (excluding taxes directly related to the use of capital and labor)
TIPT	Total government revenue from production taxes (excluding taxes directly related to the use of capital and labor)
TIW(l,j)	Government revenue from payroll taxes on type l labor in industry j
TIWT	Total government revenue from payroll taxes
TIX(i)	Government revenue from export taxes on product i
TIXT	Total government revenue from export taxes
TPRCTS	Total government revenue from taxes on products and imports
TPRODN	Total government revenue from other taxes on production
TR(ag,agj)	Transfers from agent agj to agent ag

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 YDF(f)          Disposable income of type f businesses
 YDH(h)          Disposable income of type h households
 YF(f)           Total income of type f businesses
 YFK(f)          Capital income of type f businesses
 YFTR(f)         Transfer income of type f businesses
 YG              Total government income
 YGK             Government capital income
 YGTR            Government transfer income
 YH(h)           Total income of type h households
 YHK(h)          Capital income of type h households
 YHL(h)          Labor income of type h households
 YHTR(h)         Transfer income of type h households
 YROW            Rest-of-the-world income

Rates and intercepts
 sh0(h)          Intercept (type h household savings)
 sh1(h)          Slope (type h household savings)
 tr0(h)          Intercept (transfers by type h households to government)
 tr1(h)          Marginal rate of transfers by type h households to government
 ttdf0(f)        Intercept (income taxes of type f businesses)
 ttdf1(f)        Marginal income tax rate of type f businesses
 ttdh0(h)        Intercept (income taxes of type h households)
 ttdh1(h)        Marginal income tax rate of type h households
 ttic(i)         Tax rate on commodity i
 ttik(k,j)       Tax rate on type k capital used in industry j
 ttim(i)         Rate of taxes and duties on imports of commodity i
 ttip(j)         Tax rate on the production of industry j
 ttiw(l,j)       Tax rate on type l worker compensation in industry j
 ttix(i)         Export tax rate on exported commodity i
 un(l)           Unemployment rate
 LEON            Excess supply on the last market
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