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Impact of macroeconomic reform on labour markets and income in Zambia: Assessing ZAMMOD

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Foreword

Promoting productive employment is a major challenge for emerging and developing economies, and the challenge can be further compounded as a result of financial and economic crises. A better understanding of the labour market impacts of crises can provide critical lessons for policymakers, workers' and employers' organizations in their continued efforts to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all, Sustainable Development Goal No. 8 of the 2030 Agenda for Sustainable Development.

In recent years, particularly as copper prices have fallen, Zambia has faced acute economic and social challenges, including weak growth, a high level of public debt, deteriorating balance of payments, weak fiscal positions, youth unemployment, and lack of diversification. To address the challenges, the government of Zambia adopted the Economic Stabilization and Growth Programme (ESGP, commonly referred to as "Zambia Plus"). This paper, authored by Alemayehu Geda, John Weeks and Herryman Moono, reviews an econometric model (ZAMMOD) currently being used by the Zambia Ministry of Finance for forecasting, policy analysis and budget preparation; identifies some limitations to the labour market block of ZAMMOD, and makes specific recommendations on how the block could be enhanced. The authors then introduce these recommendation into the model and run two simulations: (i) examining the labour market impacts of the policy measures found in "Zambia-plus" and (ii) examining the labour market impacts of austerity measures that go beyond "Zambia-plus" by reducing public expenditure three percentage points below the level identified in "Zambia-plus." Under the first scenario, the unemployment rate is not expected to change significantly, but subsistence farmers are expected to experience the largest decline in monthly earnings. Simulations under the second scenario also point to limited changes to the unemployment rate, albeit more detrimental than under the first scenario. Monthly earnings for all households in the private sector, informal economy, and for subsistence farmers are expected to decline under the second scenario. These outcomes point to important distributional implications of the proposed policy reforms, and the need to design and implement policies to support and protect the most vulnerable.

The paper was undertaken as part of a research project on "*New forms of work and income security: global and country-specific perspectives*," funded by the Government of the Republic of Korea. With unemployment and underemployment levels remaining stubbornly high and insufficient job growth to reduce the incidence of working poverty in many parts of the world, against a backdrop of a rapidly changing world of work driven by new technologies, rapid shifts in the geography of production and trade, demographic change and other drivers, the project was undertaken with a view to building knowledge on the linkages between these areas. The support of the Government of Republic of Korea, and the ILO's Research Department, in particular Uma Rani Amara, who coordinated the project, are gratefully acknowledged.

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Contents

I. Introduction

The study attempts to addresses the analytics of macroeconomic and labour market developments in Zambia and the policy challenges associated with those developments. More specifically, we review and propose enhancements for the ZAMMOD -econometric model used by the Ministry of Finance to project the evolution of economic variables.

We propose specific enhancements for ZAMMOD. These are derived from practices common in the modelling process in other African countries. Having made our suggestions for improvement, we introduce them into the model in a manner consistent with the current interactive "block" structure of ZAMMOD. With the enhanced ZAMMOD we assess the impact of recent and proposed government policies on the labour market. The policy simulations include fiscal and monetary changes. Of particular importance are the simulations for the disaggregated employment categories.

While we deal with the major policy issues proposed by the Zambian government, including diversification of the economy, this is not a comprehensive study on the Zambian economy or the labour market. Rather, the output of this study aims both to examine the impact of significant macro policy reform using ZAMMOD as well as to enhance the ZAMMOD, which is a major tool used to evaluate the consequences of fiscal, monetary and other policy measures.

Previous studies by authors of this study have addressed macroeconomic issues in Zambia and the evolution of the labour market:1) general development strategy and poverty reduction (Weeks *et. al*. 2006); exchange rate management and balance of payments adjustment (Weeks, Patel & Mukumbe 2007, Weeks 2015, Geda& Weeks 2016): and exchange rate volatility and fiscal management (Geda and Moono 2016).

Our study comes at a time of substantial policy initiatives in Zambia. The government, re-elected in 2016, seeks to create a policy framework in which employment generation occurs in the context of sustainable public finances including the public debt, an increase in the rate of economic growth, moderate inflationary pressures, and diversification of the production structure. Taken together, these policies should support and enhance measures to reduce urban and rural poverty.

For thirty years democratically elected Zambia governments have sought to resolve difficult and persistent macroeconomic problems characteristic of small open economies with high export concentration. Copper, Zambia's major export has dominated the evolution of the economy except during the brief years of the sector's collapse in the 1990s. For the 53 years since independence perhaps the major policy challenge for Zambian governments has been to manage the copper-dominated economy to achieve national prosperity.

To a substantial extent the problems of unmanageable public debt, unsustainable fiscal balances and inflationary pressures derive from the volatility of the international copper market. It is the goal of the authors and of the ILO that this study will contribute to inform the possible implications of significant policy reforms under implementation and in the pipeline for labour market outcome as well as enhancing the policy tools that guide the current government as it manages the macro economy and produces poverty reducing labour market outcomes.

II. Labour Market challenges: An overview

2.1 An overview of the labour market: General

The labour market outcomes of reducing poverty, preventing excessive inequality, and generating adequate employment are among three most important goals of a macroeconomic strategy. Poverty, inequality and unemployment are complex phenomena and difficult to capture with a single measure, particularly in a low-income economy undergoing structural change. Deeper understanding of labour market developments requires complementary qualitative studies on the nature of employment conditions and relations.

Measured by the distribution of income, Zambia is among the most unequal countries in the Sub-Saharan region. The Gini coefficient falls into the .50 to .60 range, which places Zambia with South Africa, Namibia, and Botswana as the most unequal countries in the world. High inequality implies that – in order to improve the situation – poverty reducing growth rates must be very high. This poses a major policy challenge. It also means that there is significant scope for income redistribution through fiscal policies, social insurance, free health and education for the poor and direct employment creation provided that the government has enough revenue. The recent government initiatives include such measures.

Zambia is one of the most urbanised countries in the sub-Saharan region, which has important implications for labour market behaviour and employment elasticities. Urbanisation reached its peak in the decade after independence, when mining and manufacturing sectors prompted rural-urban migration. From the early 1990s this tendency reversed itself as mining declined and the rest of the urban economy contracted. As a result, urban population has decreased from forty percent in 1980 to thirty-five in 2000. This decline in urbanisation was virtually unprecedented since the middle of the twentieth century in the developed or developing world. Perhaps more than any other simple measure, it indicates the extent to which Zambian society and economy underwent a seismic shift and reversed economic transformation.

The recovery of mining and the national economy in the 2000s rejuvenated urbanization, which rose from about 37 per cent in 2005 to slightly over 41 per cent in 2016. The high and again rising level of urbanization means that employment and poverty reduction policies must be designed accordingly, addressing the characteristics of both urban and rural labour markets.

Data on unemployment should be taken with caution. Frequently those who declare themselves unemployed may have employment relations that fall outside the survey and census categories. The ambiguities associated with the unemployed category in Zambia prompt us to recommend that it be treated as the residual labour market category in ZAMMOD (see next section). This change in the ZAMMOD is especially important because of the empirically verified downward trend in formal wage employment in the 1990s and early 2000s. The decline in formal sector employment appears to have caused a shift of work to the informal sector rather than unemployment in the strict definition. Sporadic official data, indirect evidence from the LCMS, interviews with government experts and other informants in Lusaka, plus some qualitative evidence offer indications for this tendency towards informalisation in the 2000s (Weeks et. al. 2006, Chapter 3).

As part of this process women workers have been pushed from the formal to the informal sector, and concentrated in the service trades. It also appears that their activities are ones in which the income elasticity of demand is low, serving poor populations trades characterised by ease of entry and requiring little initial capital outlay. As a result, incomes tend to decline due to competition from new entrants. When formal sector employment

declines or grows slowly, surplus income seekers crowd into the urban and rural informal activities with low access barriers.

Labour market informalisation in Zambia since the 1990s has some similarity to trends in South Africa. In both countries we have seen in recent decades a shift of work from standard employment categories typical of the mining and manufacturing sectors. This shift poses a major policy challenge in both countries, especially for all those entering labour markets for their first employment. In addition to young workers, in Zambia women suffer disproportionately from slow formal sector employment growth. Prejudice against women tends to make them "first fired and last hired" in the formal sector. This labour market challenge should be met, among other policies, with effective legislation to prevent employment and pay discrimination in the formal sector.

But in the end, the central labour market challenge is creation of employment opportunities at a rate to match labour force growth and to do so at above poverty incomes. Meeting this challenge successfully will require substantial public and private investments, and effective pro-employment macroeconomic and sectoral policies, as well as effective active labour market policies. For the formal private sector, policy measures should include targeted incentives to promote employment creation in key employment-intensive sectors and that prevents worst forms of employment and contributes to increasingly better working conditions in order to step-by-step achieve the ultimate goal of 'decent work for all'. This also means focusing on improving working conditions for those jobs that are most occupied by the poorest workers, especially increasing wages, but also other benefits such as transport and meal allowances, nurseries, social responsibility programmes, and health and safety standards. Enforcement of decent work standards can be used as criteria for promoting industries and employers through fiscal and credit measures. Similar supportive policies to the informal sector, including their formalization, are also crucial as the informal sector is the main employer in the country.

2.2 An overview of the Labour Market: The recent pattern

The privatisation of state-owned enterprises in the mining and manufacturing sectors during the early 1990s shifted significantly the source and quality of employment from formal jobs with relatively stable and high incomes to informal employment with irregular and low incomes. The decline in formal mining and manufacturing jobs gave rise to the importance of the agricultural sector as a leading employer, employing about 48 per cent of the total Zambian labour force in 2014 (CSO, 2015). Notwithstanding this however, there has been some rapid and significant growth in the transport and communications and construction sectors. However, growth in these sectors has tended to be capital intensive, thereby creating fewer jobs, especially in the low-skill segment.

Disaggregation of the evolution of employment by subsectors (Table 1)shows that the Zambian construction sector is the highest in terms of employment growth, growing by 128 per cent between 2008 and 2014. Growth in the informal construction sector being more important. The rise in construction signals growing investment in infrastructure led by government as well as urban expansion. However, in terms the absolute size of employment, the "trade, wholesale and retail" sector followed by the "manufacturing sectors are found to be important.

Table 1: Distribution of employment by selected sub-sectors, Zambia, 2008-2014

Sector	Formal employment ('000s)			Informal employment ('000s)			Total employment ('000s)		
	2008	2012	2014	2008	2012	2014	2008	2012	2014
Agriculture, Forestry and Fishing	72	87	52	3 212	2785	2 812	3 284	2 872	2 864
Mining and Quarrying	62	68	57	31	21	25	93	88	83
Manufacturing	37	74	45	122	143	179	159	217	224
Electricity, Gas and Water	11	17	17	3	10	10	14	27	27
Construction	14	37	31	66	151	152	80	188	183
Trade, Wholesale and Retail	29	110	34	397	535	658	425	646	692
Transportation and Storage	29	62	29	65	76	123	95	137	152
Hotels and Restaurants	17	30	27	25	33	45	42	63	72
Financial and Insurance and Real Estate	13	15	13	6	8	10	19	22	22
Community, Social and Personal Services	226	348	325	161	892	1 215	387	1 240	1 540

Source: Labour Force Survey, 2014

In general, however, the relatively high economic and sector growth rates in Zambia are accompanied by low yet positive growth in employment. This reflects in part, the history of limited sustainable employment generation in the economy so far. For example, the bulk of employment in the construction sector has been temporal while the growth in mining FDI, as well as the increase in manufacturing activity has been associated with a move towards capital-intensive production, thus yielding low growth in employment. This move towards high capital intensity has generated higher demand for those with more education and technical skills but little demand for those with low levels of education who comprise the bulk of the workforce (Moono and Rankin, 2013).[1]

Arising from the structure of the Zambian economy, with growth driven largely by large scale capital intensive investments in the mining sector, the labour absorptive capacity of the private sector and the economy at large is limited. The sphere of Zambia's private sector is sharply divided into large enterprises and micro, small and medium enterprises (MSMEs). The large enterprises generate most of the economic growth, exports and tax revenues. However, they employ fewer workers than the small enterprises, in part due to the capital intensive nature of large private sector investments especially in the mining sector.

While Micro, Small and Medium Enterprises account for the bulk of all business in Zambia (estimated at over 90 per cent), employment generation of these MSMEs have been limited. This is in part due to subdued growth of these activities on account of limited access to finance; high costs of doing business (both labour and non-labour costs) and lack of business skills for those in the informal sector (Ministry of Commerce, Trade and Industry, 2008; Zambia Development Agency, 2016).

The 2014 Zambian Labour Force Survey (LFS)[2] shows that the Zambian population is estimated at 15 million, of which 49.1 per cent are males and 50.9 per cent females. Though Zambia is deemed to be a highly urbanised country, 58.4 per cent of the population lives in

[1] Consequently, there is a rise in informal sector activity as evidenced by the rise in informal employment, particularly rural agricultural employment.

[2] This is the latest Labour Force Survey available from the Zambian government.

rural areas. The bulk of the Zambian population is in the age group 15 – 64 years – the working age population- accounting for 51.8 per cent of the population.

Of the 15 million Zambians, the total number of working-age population (15 – 64 years) was estimated at 8,149,797 persons (54.4 per cent). Of these 6,329,076 were in the labour force,[3] representing a labour force participation rate (LFPR) of 77.7 per cent (CSO, 2015). Females had a higher labour force participation rate of 78.2 per cent compared to males (77.1 per cent). Distinguishing this by residence, rural areas' labour force participation rate stood at 80.2 per cent compared to urban areas at 72.6 per cent

Briefly examining the age distribution in labour force participation, the 2014 Labour Force survey shows that the age cohorts indicate a non-linear relationship between age and labour force participation rates. The participation rate reaches a maximum at the age group 45 – 49 year at 97.6 per cent and lowest in the age group 15 – 19 years with 33.6 per cent. However, after 49 years of age, participation rate declines to 48 per cent in the oldest age group, 75 years or older (CSO, 2015).

In terms of educational attainment, the 2014 LFS shows that 43 per cent and 40 per cent of the Zambian labour force had completed grades 8-12 and grade 1-7, respectively, as their highest level of education completed while the lowest proportion of 0.6 per cent had completed education at degree level as their highest level of education. Persons who had never attended school accounted for 11 per cent of the labour force. Evidently, there is an increase in labour force participation as educational levels increase, signalling the importance of education in the labour market (CSO, 2015).

Of the 8,149,797 persons in the working-age population (15 – 64), 5,859,225 were employed, representing an employment to population ratio of 71.9 per cent. 57.9 per cent of these employed persons were found to reside in the rural areas with the remaining 42.1 per cent being in urban areas, a reflection on high employment generation capacity of rural agricultural activity.

Disaggregation by sector shows that agriculture, forestry and fishing sector accounted for the highest proportion of employed persons with 48.9 per cent. This is followed by those employed in "activities of households" ,with 17.4 per cent. The LFS also shows that for both rural and urban areas, the agriculture, forestry and fishing sector accounted for the highest proportions of employment of 60.2 per cent and 33.3 per cent, respectively.

[3] The labour force participation rate is defined as the ratio of people active in the labour force (working or seeking employment) to the total working age population.

Table 2: Percentage distribution of employed persons by industry, 2014

Industry	Total persons Number	Employed Per cent
Agriculture, Forestry and Fishing	2 864 158	48.9
Mining and Quarrying	82 725	1.4
Manufacturing	223 681	3.8
Electricity, gas, steam and air conditioning	16 175	0.3
Water supply, sewerage and waste Management	11 283	0.2
Construction	182 806	3.1
Wholesale and retail trade; repair of motor vehicles and motorcycles	692 078	11.8
Transport & Storage	152 052	2.6
Accommodation & Food Services	72 078	1.2
Information & Communication	20 322	0.3
Financial & Insurance Activities	17 342	0.3
Real Estate Activities	5 154	0.1
Professional, Scientific & technical services	13 856	0.2
Administrative & Support Services	52 631	0.9
Public Administration & Defence	72 767	1.2
Education	158 617	2.7
Human health & social work services	63 255	1.1
Activities of households as employer	1 020 054	17.4
Others	138 191	2.4
Total	**5 859 225**	**100**

Source: Labour Force Survey, 2014

A further diagnostic of the labour market shows that at the national level, there were more employed females (52.4 per cent) than there were males (47.6 per cent). However, as table 3 below shows that the proportion of males were higher in all institutional sectors apart from private household sector and private business/farm sector.

Table 3: Percentage distribution of employed persons by institutional sector, 2014

Institutional Sector	Total employed persons	Male (%)	Female (%)
Central Government	243 277	62	38
Local Government	30 367	80	20
Parastatal/State Owned	58 581	77	23
Embassy/International Organization	3 790	83	17
Private Household	367 031	47	53
Producers' Co-operative	9 040	82	18
NGO, Faith based Organization	31 419	53	47
Private Business/Farm	5 115 721	46	54
Total	5 859 225	48	52

Source: Labour Force Survey, 2014

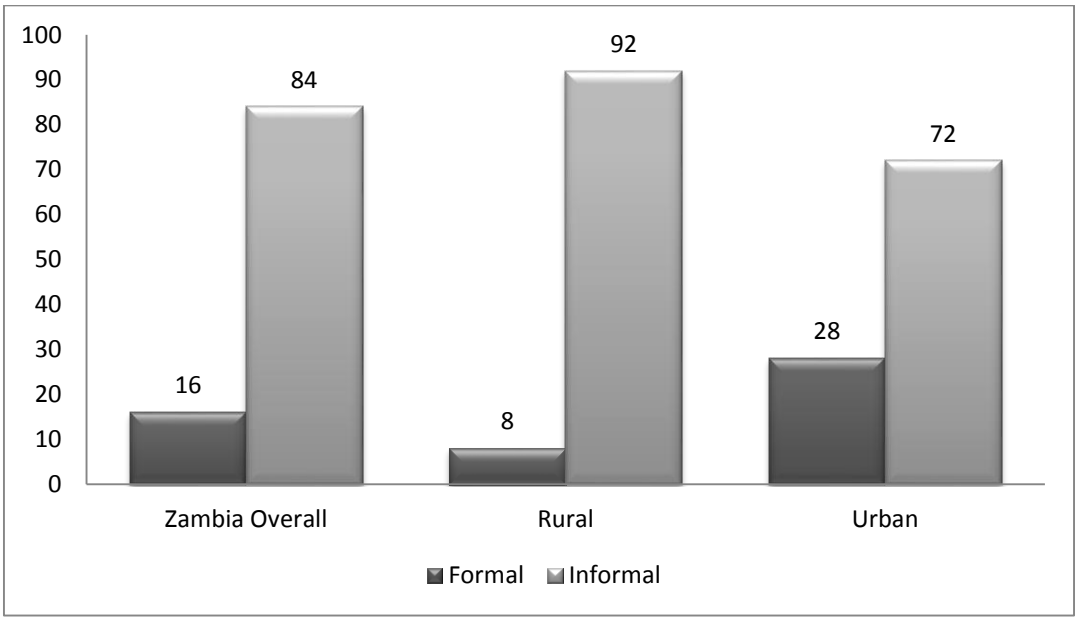
The Zambian informal economy[4] is an important source of employment accounting for 84 per cent of total employment and as expected 92 per cent of employment in the rural areas is in the informal agricultural sector, compared to 72 percent in the urban areas (Table 4). The high levels of rural employment reflect higher participation in agricultural activities by rural populations when compared to urban dwellers. Table 4 (and Figure 1) below shows the percentage distribution of employed persons by industry.

Table 4: Percentage distribution of employed persons by sex and sector of employment, 2014

Urban	Total	Formal Sector		Informal Sector	
	Number	Number	Per cent	Number	Per cent
Total	5 859 225	944 256	16	4 914 969	84
Male	2 789 012	674 167	24	2 114 845	76
Female	3 070 213	270 089	9	2 800 124	91
Rural/Urban					
Rural	3 394 221	264 754	8	3 129 467	92
Urban	2 465 004	679 502	28	1 785 502	72

Source: Labour Force Survey, 2014

Figure 1: Percentage distribution of employment by type and by region, 2014



Source: Labour Force Survey, 2014

Table 5 shows the distribution of wages in the Zambian labour market. As in other developing countries, wages in the formal economy are significantly (ove1 100%) higher than informal economy wages. There is little difference between urban and rural wages, however. This is true for both formal and informal employment (a median based comparisons shows significant difference, however). This is informative, however, since most formal jobs are government jobs with standardized government salaries while the bulk

[4] The informal sector comprises of enterprises that are not formally registered. Consequently, they do not pay tax nor any statutory fees.

of the informal employment is in agriculture, and thus the wage differential within sector, irrespective of region, is expected to be minimal.

Table 5: Distribution of wages in the Zambian labour market, 2014

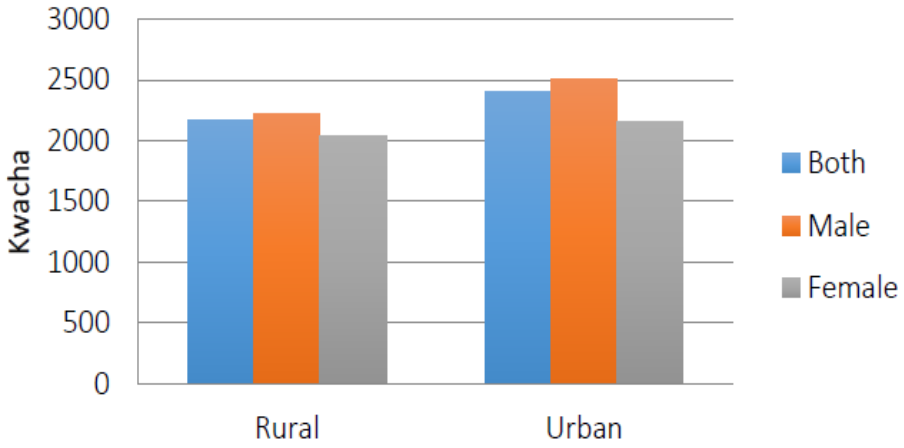
Type of employment	Number of paid employees	Amount, (mean), (K)*		
		Total	Rural	Urban
Formal	629 626	3 512	3 169	3 634
Informal	688 810	1 227	1 246	1 220
Total	1 318 436	2 344	2 173	2 405

Source: Labour Force Survey, 2014

* Note: A median based data shows more difference both rural and urban as well as between formal and informal

With regards to distribution of wages by gender, figure 2 below shows that for both urban and rural areas as well as at the national level, men earn more than women. On average, women earn about 12 less than men..

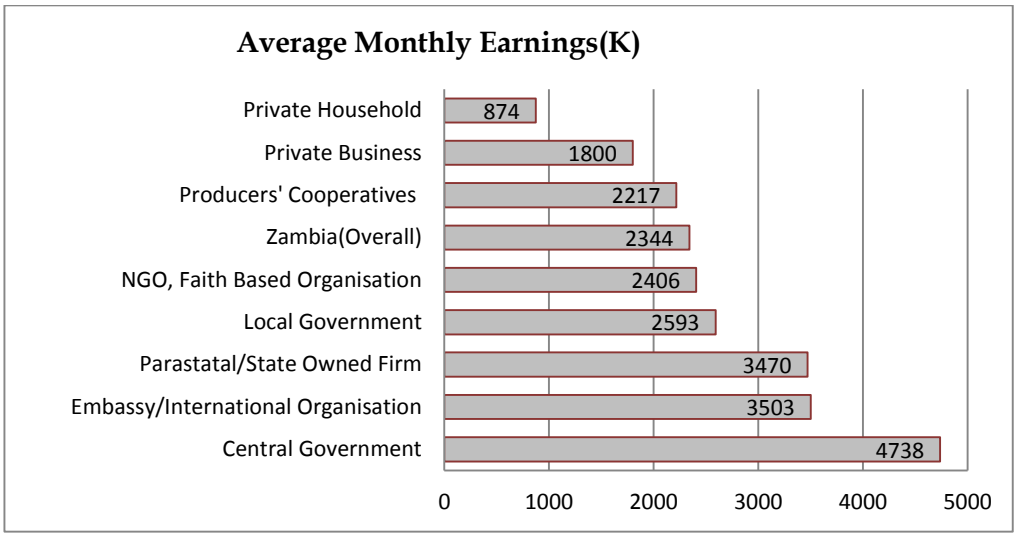
Figure 2: Distribution of wages by region and by sex. 2014



Source: Labour Force Survey, 2014

Across institutional sectors, however, as shown in figure 6 below, there is a significant difference in the level of wages. Central government employment offers, on average, the largest wage with private households being the least paying. Figure3 shows that private sector employment, which is predominantly self-employment and predominantly located in the informal economy in Zambia, offers the lowest level of wages, significantly lower than the national average.

Figure 3: Distribution of wages by institutional sector, 2014



Source: Labour Force Survey, 2014

In sum, what the preceding labour force diagnostic shows is that informal employment forms the bulk of employment opportunities for Zambians in both rural and urban areas. However, evidence shows that a high proportion of those in the informal economy are the self-employed, with relatively low education levels – most workers in this sector have junior secondary education or less (Moono and Rankin, 2013). Consequently, those employed in informal economy face lower wages, on average, than those in the formal employment in part due to low levels of education, low productivity, among others, which attracts low returns[5] (ZIPAR, 2015).

[5] Most self-employed workers are deemed 'survivalists' in nature and argued to reflect failure to secure formal employment rather than entrepreneurial skills and ambition

III. The challenge of labour market analysis using ZAMMOD

3.1 An overview of ZAMMOD

Having identified the major labour market challenges in section 2, this section attempts to briefly describe the major technical tool for managing those challenges - the ZAMMOD. We begin with a brief look at the overall structure of the ZAMMOD and specifically how the labour market block is modelled, outlining some of the major challenges that we identified. We then move on to provide suggestions on how the labour market block could be enhanced. This paper finds that if the suggested enhancements are made, ZAMMOD could be rendered much more potent to analyse and forecast the impact of changes in macroeconomic policy, evolution of the macro economy and external shocks on labour market outcomes.

The theory behind ZAMMOD is similar to applied macro-econometric models that are currently in use in the region such as the "Central Bank of Kenya Macroeconomic Model", CBKMM (Were et al., 2013), and the Kenya Institute for Public Policy Research and Analysis (KIPPRA)–Treasury Macro Model (KTMM) (Huizinga et al., 2001; Geda *et al*, 2001). These are demand-driven Keynesian models within the typical aggregate demand (AD) / aggregate supply (AS) framework. These are combined with consistent national accounts data for the country in question. ZAMMOD is one such model structured along a number of blocks: production, external sector, prices, fiscal, monetary, as well as labour market. Like KTMM, the ZAMMOD has consolidated the monetary and external sector blocks and includes a detailed government (fiscal) block.

The model is primarily designed to meet Ministry of Finance [MoF] needs in the national budgetary and planning process. The model is run on an MS Office EXCEL software platform. Most of the model's parameters are pragmatically computed as averages, moving averages, ratios and growth rates. There are no econometrically estimated equations reported. This method characterizes the other blocks of the model including the labour market block that is of interest to this study. ZAMMOD is currently in use for forecasting, policy analysis and budget preparation by the Ministry of Finance (MoF).

3.2 Challenge of effective labour market modelling in ZAMMOD and its enhancement for improvement

Problems of modelling labour market outcomes in the ZAMMOD can be summarized into two broad areas: (i) those related to the theoretical and econometric formulation of the labour market block, and (ii) those related to the realism of the labour market outcomes from ZAMMOD, data availability and accuracy.

(i) Problems of theoretical and econometric formulation

(ii) Problems of Realism of Labour Market Outcomes from ZAMMOD

Table 6 provides numbers to show the substantial gap between ZAMMOD labour market outcomes and those from Zambia's 2014 national labour force survey (ZNLS). The ratio of the labour market outcomes from the two sources ranges from about 15 per cent for the informal sector to almost 350 per cent for the formal sector. The variation of the ratio of predicted to actual indicates a substantial misalignment (Table 6, column 4). The divergence ratio is significant for all categories of employment in Table 6. This points at the need for improvement.

Table 6: Zambian employment structure: Differences between ZAMMOD and ZLFS (2014)

Employment by categories (in millions)	ZAMMOD 2014	ZLFS 2014	ZAMMOD/ZLFS %*
Employees (Government)	0.221	0.315	70
Employees private sector	0.365	0.124 / 0.849**	294 / 53
Self-employed (including employers)	3.522	1.669.87	211
Unpaid family workers	1.008	2.069	49
Unemployed	0.777	0.470	165
Formal	2 177	0.629 / 0.944***	346 / 231
Informal	0.765	5.229 / 4.914***	15 / 16
Labour Force (in millions)	5.722	6.329	90

* 100% = Perfect agreement; < 100% = ZAMMOD underestimated compared to ZLFS; < 100% = ZAMMOD overestimates compared to ZLFS.

** Employees in private sector are divided between the household sector (0.124) & the private business/farm sector (0.849).

*** Formal sector employment refers to everyone in the formal sector, whether it is formal or informal. The sum adds to the total employed population in both cases.

^The informal sector employees in ZAMMOD are defined as difference between the total labour force and the sum of government and private (total paid employees) sector employees. This is also equal to the sum of self-employees and unpaid family workers by construction in ZAMMOD. This definition of informal sector employees, however, wrongly includes the 'unemployed' as given in rows 217 to 223 of the ZAMMOD, excel sheet named "model".

3.3 Improving the labour market block and suggestions for improvement

Improving the labour market block of the ZAMMOD requires addressing problems related to both employment and income. The primary focus of this study is the employment aspect of the modelling. We focus less on incomes because once the employment aspect is well modelled the step to the income aspect is quite easy. Second, the income aspect of the modelling in ZAMMOD is primarily motivated to link average household earning to the poverty module and related micro data. This is not the primary focus of our study at this stage.

Conventional literature on African and Zambian labour markets attempts to estimate employment outcomes of economic growth using a statistical measure named the "employment elasticity of output". These elasticises are used to link employment with output and related macroeconomic development (see Akikugbe, 2017; Adegboyeet al, 2017; Haouas, 2002, among others). An improvement in the labour market block of ZAMMOD requires computing these elasticises to improve the modelled linkage that the labour market block has with the macro economy. The derivation of these elasticises can be done in two ways. The first approach is to compute the point elasticity directly using equation 1 below. An alternative approach is to use a regression based equation such as the one below (2a).

$$Employment\ Elasticity = \frac{\%\ \boldsymbol{change\ in\ [sectoral]Employment}}{\%\ \boldsymbol{change\ in\ [sectorla]Output}} \qquad [1]$$

$$\ln E_t = \beta_0 + \beta_1 lnY_t + \beta_2 D_{ti} + \mu_i \qquad [2a]$$

$$\frac{\partial E}{E} = \beta_1 \frac{\partial Y}{Y} \quad =>\equiv \frac{\partial E}{\partial Y}\left(\frac{Y}{E}\right) = \beta_1 \qquad [2b]$$

Where the subscript "i" stands for sector; E employment; Y output (sectoral value added); and Di a gender dummy that takes the value of one for female and zero for males.

A third method is to derive sectoral demand for labour following the standard assumption of a monopolistically competitive representative firm's optimization framework. This method uses production and profit functions, or the dual of the latter, a cost function to minimize. The most commonly used functional form presumes a constant elasticity of substitution among factors of production(CES).The famous Cobb-Douglas version, now almost 90 years old, involves the special case when the CES=1. The neoclassical condition for optimality requires profit maximization/cost maximization with respect to the inputs. In the general CES case, the demand for labour (employment, L), could be derived as follows. Suppose the CES (for Y output, and K capital) is given by,

$$\boldsymbol{Y = \left[\beta_L L^{-\lambda} + \beta_K K^{-\lambda}\right]^{-1/\lambda}} \qquad [1]$$

The optimal level of employment can be derived from the condition that the marginal product of labour (MPL) should be equal to real wage (w/P), where "w" and "P" are nominal wage and price, respectively. This is given as,

$$MPL = \frac{\partial Y}{\partial L} = -1/\lambda \left[\beta_L L^{-\lambda} + \beta_K K^{-\lambda}\right]^{-1/\lambda - 1} \cdot \left(-\lambda L^{-\lambda-1}\beta_L\right) \qquad [2]$$

$$= \frac{\beta_L \left[\beta_L L^{-\lambda} + \beta_K K^{-\lambda}\right]^{-1/\lambda - 1}}{L^{(1+\lambda)}} \qquad \text{Note: } -1/\lambda - 1 \equiv \left(-1/\lambda\right)(1+\lambda)$$

$$= \frac{\beta_L \left[\beta_L L^{-\lambda} + \beta_K K^{-\lambda}\right]^{\left(-1/\lambda\right)(1+\lambda)}}{L^{(1+\lambda)}}$$

Thus,

$$\frac{\partial Y}{\partial L} = \beta_L \left(\frac{Y}{L}\right)^{1+\lambda} = \frac{w}{P} \qquad \Leftarrow \text{Using the neoclasical condition noted.} \qquad [3]$$

$$L = \left[\beta_L \left(\frac{P}{w}\right) \cdot Y^{1+\lambda}\right]^{1/1+\lambda} \qquad [4]$$

$$L = \beta_L^{\sigma} \left(\frac{w}{P}\right)^{-\sigma} Y \quad \text{Where } \sigma = \frac{1}{1+\lambda} \qquad [5]$$

This equation [5] becomes linear when it is converted to natural logarithms, yielding the estimable version,

$$\ln L_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln \left(\frac{w}{P}\right)_t + \mu_t \qquad [6]$$

Both equations [2a] and [6] could also be set in partial adjustment framework. This has the advantage of overcoming the limiting assumption of instantaneous adjustment towards

equilibrium (steady state) implied by the formulation above. If we define L* the desired or equilibrium level of employment, and made "λ" an adjustment parameter between 0 and 1 (0< λ<1), the change in L (ΔL) could be set as,

$$\Delta \ln L_t = \lambda(lnL_t^* - lnL_{t-1}) \quad [7]$$

$$lnL_t - lnL_{t-1} = \lambda\left\{\left[L_t^* = \beta_0 + \beta_1 lnY_t + \beta_2 ln\left(\frac{W}{P}\right)_t\right] - lnL_{t-1})\right\} \quad [7b]$$

$$⟦\ln L⟧_t=\lambda[\beta_0+\beta_1 \ln Y_t+\beta_2 ⟦\ln(w/P)⟧_t]+(1-\lambda)⟦\ln L⟧_{t-1} \quad [7c]$$

These equations provide an alternative specification to be explored at the estimation stage. Regarding the functional form and estimation approach to be used for such models, a number of researchers use a log-log production functional form as our model here. Some other researchers opt for a trans-log specification arguing that it offers a flexible framework (Haouaset al, 2002). As for all measures of labour demand, caution is required when applying CES production functions. These measures have implicit theoretical characteristics and can generate "perverse" outcomes (Weeks 2012, Chapter 10).

In this study, for lack of time series data on sectoral real wage rates in ZAMMOD, we will use the first two approaches (equation 1 and 2a) to calculate sectoral employment elasticities for Zambia. We have also used equation [6] by including the national level of real wages for all sectors. This will allow us to examine the sectoral employment and income implications of proposed policy reforms and the evolution of the macro economy in a modified ZAMMOD. In future research sectoral employment and income could be modified by introducing gender as additional variable in the estimable equation. This is helpful to see the gender dimension of proposed polices and the evolution of the macro economy (that includes growth) in terms of labour market outcomes in Zambia.

Using equations 1 and data from three NLFS, we have computed sectoral employment elasticises that could be used to modify ZAMMOD. The results appear in Table 7a. Using equations [2] and [6] as well as their partial adjustment variant as given by equation [7c] we have also estimated sectoral employment elasticises of output using time series data given in ZAMMOD. This latter result is given in Table 7b.

Caution is required when interpreting the elasticities, because at theoretical level output growth could be the result of growth in employment or productivity. This could have a trade-off as this relationship is based on the identity ΔY=ΔL+ΔP. In such identity, for a given change in Y (output), a rise in employment (L) needs to be offset by an equal and opposite movement in productivity for ΔY to remain constant at the give level of change. Based on this possibility, the interpretation of different elasticity values under different growth scenarios need to be interpreted as summarized in Table 7c (Kapsos, 2005; Akinkugbe, 2017).

Be that as it may, the significant variation in the estimated and computed elasticities is worth commenting upon. First, in Table 7a. although our period of analysis is different, we have used similar approach to that of Akikugbe (2017). However, the elasticity values found are very different. Even our results for the two periods (2008-2014 versus 2012-2014) are radically different. Since it is highly unlikely a significant structural change has occurred between 2005-2008 (during Akikugbe's estimation period) and that of ours (say for the period 2008-2014), this might be related the problem of method, the data or both.

Compared to the method of point elasticity computation and the result given in Table 7a, the regression based method and result given in Table 7b is better. This because first it covers relatively longer period and the regression approach by construction measures the average relationship between the regressors and the regressed for the whole period. Second,

the specification of the regression equation is based on sound theoretical basis as expounded above. Finally, the results across different regression based models reported in Table 7b are not that radically different. They seem sensible that tally with the evolution of the employment structure as described in section 2.1 above. Hence, we have used this result to modify/enhance the labour market aspect of the ZAMMOD in this study.

Table 7a: Employment elasticises in Zambia

Sector	Elasticity (Direct estimate based on equation 1)		Elasticity (Estimated using a Regression based model, equation 2a)	
	ZLFS 2014	ZLFS 2014		ZLFS 2005-2008 (Akikugbe, 2017)
Agriculture, forestry and fishing	-2.63	0.13		1.91
Mining and quarrying	-0.14	-3.45		-3.2
Manufacturing	0.98	0.23		17.2
Electricity, gas and water	1.92	0.14		-9.4
Construction	13.20	-0.37		2.85
Wholesale and retail trade	0.70	0.29		25.1*
Transport and communications	1.16	0.68		-0.9
Community, social and personal services	4.43	2.41		58.5
Financial institutions and insurance	-1.28	1.98		-5.1
Real estate and business services**		-4.04		**
Restaurants and hotels	1.94	1.74		*
Zambia (all)	0.50	0.61		1.92

Notes:*Restaurants & hotels are included in Wholesale, retail trade sector in Akikugbe (2017).

**"Business services" are put under "Financial and Insurance" sector in Akikugbe (2017). The author does not mention where he put "Real estate" services.

Table 7b: Employment Elasticises in Zambia: Regression based estimates (1994-2013)

Sector	Model 1 Regression based elasticity		Model 2 Demand for Labour		Akikugbe 2017 estimates
	Equilibrium model	Partial adjustment model	Equilibrium model	Partial adjustment model	ZLFS 2005-2008
Agriculture, forestry and fishing	-1.34	-0.72	-1.34	-0.85	1.91
Mining and quarrying	0.24	0.17	0.25	0.15(1.3)	-3.2
Manufacturing	0.42	0.38	0.25(1.04)	0.23(0.94)	17.2
Electricity, gas and water	2.43	0.71	1.77	0.66	-9.4
Construction	0.39(1.03)	0.44*	0.11(0.22)	0.36(0.90)	2.85
Wholesale and retail trade*	0.66	0.43	0.58	0.41	25.1*
Transport and communications	0.11(57)	0.28	-0.10(0.35)	0.24(1.1)	-0.9
Community, social and personal services	0.56	0.20	0.52	0.24	58.5
Financial institutions and insurance	-0.42(-0.28)	-0.44(-0.28)	-0.46(-0.25)	-0.42(0.23)	-5.1
Real estate and business services***	-0.04(-0.13)	-0.02(-0.07)	-0.48(-0.96)	-0.47(-0.89)	**
Restaurants and hotels**					*
Zambia (all)	0.55	0.19	0.49	0.21	1.92

Note: * All estimates are statistically significant at 1% and better. The only exceptions are those written in italics and to which their t-value is given in parenthesis. The construction sector elasticity for model 1, partial adjustment version, is significant at about 10 per cent

** We don't have employment data for this sector (Restaurants and hotels). However, we didn't miss much as the sector's contribution to GDP is about two per cent.

*** We don't have employment data for this sector. Thus, we have combined this sector's output with the output of the "Financial Institutions and Insurance" sector. We then used the employment in the latter sector to compute the aggregate elasticity - thus assuming this sector's employment figures also include those in the "real estate and business services".

Source: Authors' regression based estimation using ZAMMOD database.

Table 7c: Interpretation of estimated elasticises

Employment elasticity here (corresponds)	For positive GDP growth	For negative GDP growth
e < 0	(-) employment growth	(+) employment growth
	(+) productivity growth	(-) productivity growth
0 < e < 1	(+) employment growth	(-) employment growth
	(+) productivity growth	(-) productivity growth
e > 1	(+) employment growth	(-) employment growth
	(-) productivity growth	(+) productivity growth

Note: For the first row, with positive GDP growth, negative employment elasticity corresponds with negative employment growth and positive productivity growth. Read the rest in the same way.

Source: Kapsos(2005)

In addition to introducing sectoral based labour market outcomes in ZAMMOD, which is missing, there is also scope to improve the existing employment and income modelling by fine-tuning the labour market block of the current ZAMMOD. This could be done without changing the existing employment (and income) categories used in ZAMMOD. This improvement relates to the building up of strong theoretical and empirically logical linkage between variables in the labour market block of the ZAMMOD on the one hand and the

evolution of the macro economy in ZAMMOD on the other. In the current version of the ZAMMOD such linkages are either missing or unsatisfactory. The exception is the modelling of the number of employees in the private sector which is relatively better. These crucial linkages are made and the ZAMMOD is enhanced to depict he following employment categories better: "employees in the government sector"; the "unpaid family labour" category; the "unemployed" category as well as the "Self-employed" category.

Once these improvements are made, the next logical step is to improve the income outcome of the improved employment categories. This in particular relates on how to link such employment categories with income, especially for the following employment categories which are poorly modelled in the current version of the ZAMMOD: "employers", "self-employed" and "subsistence farmers". Improving this requires further empirical research. The purpose of such research should be to link income accruing to these employment categories to the macro economy. This is an agenda for future research which is not the prime focus of this study.

In sum, in the context of this study and in an attempt to make the best use of the model, two major (the third one being the combined result of the two) improvements to the labour market block of ZAMMOD were made (the labour market outcomes using the original and modified ZAMMOD are given in Annex 1 for comparison):

i) The linkage that the existing "employment outcome" part of the labour market block has with the evolution of the macro economy is improved.

ii) A new and richer sectoral based employment outcome module is introduced as part of the labour market block.

The above two improvements have led to an improved labour market related outcome in the ZAMMOD to which a policy analysis is carried and discussed in the next section.

IV. Macroeconomic reforms and labour market outcomes: Application of the enhanced ZAMMOD

This section briefly discusses how the enhanced ZAMMOD is used to analyse the current policy environment and proposed economic reforms. The presentation is based on three important documents and interviews conducted in Lusaka in November 2017 by the research team. The documents are the 2018 budget speech, the government policy statement known as "Zambia Plus", and the 7th National Development Plan (2017-2021). Subsequently the proposed reforms in these documents are translated into quantifiable form for a simulation exercise carried out using the modified/enhanced ZAMMOD. The final section is devoted to the results of the policy simulation exercise.

4.1 Economic reforms, actual and proposed

Zambia has faced a number of economic and social challenges in recent years. These include weak growth, a high level of public debt, deteriorating balance of payments largely related to copper price, weak fiscal positions, youth unemployment, and lack of diversification. All are long-standing problems that require policy action.

To address the challenges the government of Zambia is adopting new set of policies from long, medium and short term perspective. The policies appear in the 7th National Development Plan, the new Economic Stabilization and Growth Programme (ESGP, commonly called Zambia Plus), and the 2018 Budget Speech. In addition, the government is in discussion with the IMF and WB on a possible financing package to support the ESGP.

The emerging policy direction from these policy initiatives could be categorized under the following three main headings:

i) Real Sector Policies: Growth, Diversification and Job creation

ii) Fiscal, Debt and Monetary Policies, and

iii) Structural Policies

i) Real sector policies: Growth, diversification and job creation

In its 7th NDP(MNDP 2017) the government planned GDP growth of 3.9 per cent in 2017, 4.6 per cent in 2018, 5.2 per cent in 2019, then 5.4 per cent and 5.5 per cent in 2020 and 2021, respectively. It has also plans to create productive and gainful job opportunities during these years. The output and employment growth would be achieved through diversification of the economy. The planned target for diversification is to increase the share of the non-mining sector to about 50 per cent of the GDP (MNDP 2017). These ambitious macroeconomic goals would be underpinned by fiscal, debt and monetary policies aimed at creating fiscal sustainability and macroeconomic stability.

ii) Fiscal, debt and monetary policies

The fiscal and monetary focus of government policy is (MoF, 2017) "restoring fiscal fitness" for sustained inclusive growth and development (MoF, 2017). To achieve this, the government would:

a) restrain unproductive expenditure;

b) focus on completing existing infrastructural works and strictly avoid new commitments;

c) because the financing of farmer input support program(FISP) is judged to be inefficient, during 2017, the programme is altered so that farmers“ graduate out of it”, and benefits limited to 1 million farmers;

d) will by the end of 2017 move to electricity tariffs that reflect costs, while maintaining the special tariff to protect poorer households;

e) will adjust petroleum prices in line with changes in market conditions;

f) ensure that the public debt remains within sustainable levels, in part through altering the composition of debt towards concessional loans;

g) eliminate arrears to private suppliers owed to suppliers of goods and services, as well as contractors will also be carried and incur no additional arrears;

h) restrict new public sector recruitments to only frontline workers in the health and education sectors. This will continue in ESGP period. Central government wage ceiling will be nine percent of GDP;

i) mitigate the negative effects of the adjustment measures on vulnerable households by increasing social cash transfers in2017 and sustain them thereafter; the number of beneficiary households would increase from 242,000 to over 500,000 with monthly payments per household rising by 28 per cent;

j) continue to implement the Food Security Pack Programme, increasing this programme from the 40,000 in 2017/18 farming season to 80,000 beneficiaries;

k) raise domestically generated revenues and during the current planning period, domestic revenue would increase to above 18 per cent of GDP;

l) work towards a target inflation of 6-8 per cent as part of the mandate to maintain and nurture the financial sector and through its monetary policy will support fiscal consolidation measures.

These ESGP plan and related policies will be implemented through five critical pillars which are noted by the 7th NDP (MNDP, 2017) as "structural policies" and listed below.

iii) Structural policies

In addition to above policies, the government has also planned to have a set of structural policies that would (MNDP, 2017; MoF, 2017):

a) restore credibility of the budget by minimizing unplanned expenditures and halting the accumulation of arrears;

b) enhance domestic resource mobilization and refocusing of public spending on core public sector mandates;

c) improve economic and fiscal governance by raising the levels of accountability and transparency in the allocation and use of public finances;

d) ensure greater economic stability, growth and job creation through policy consistency to raise confidence for sustained private sector investment; and

e) Scaling-up social protection programmes to shield the most vulnerable in society from negative effects of the Programme.

Finally, the ESGP committed the government to pursue structural reforms while implementing an effective social safety net to lessen the impact of stabilization measures on the most vulnerable (MoF, 2017).

We have attempted below to examine the labour market outcome implications of these policies in the ESGP as well as other measures potentially planned or that might be modified

should IMF financing be achieved. In the next section we quantify these policies in a model simulation exercise, followed by the simulation exercise itself.

4.2 Reforms specified for simulation

Before commencing the simulation of proposed policies using the enhance ZAMMOD, we reiterate the conclusion and recommendation of a previous study by ILO on the use of ZAMMOD for policy analysis. This study considered problems related to government expenditure classification scheme. Noting the problem of aligning expenditure items to policies and outcome, this ILO study recommended that:

> *….adapted to fully reflect to economic classification of government outlays so that one can identify expenditure which are (1) direct transfers to households (category of social benefits), (2) other social expenditure which are not direct transfers to households but either support productive capacity of agricultural households, reduce prices of consumer goods and services or support institutions serving households (some subsidies and some grants).*

This problem, identified in this ILO study, persisted in the current version of the ZAMMOD and limited our full use of the model for the reform policy and its labour market outcome analysis. Notwithstanding such limitations, we have used the public expenditure framework employed in ZAMMOD to specify the proposed reform policies in their commensurate quantitative form for simulation (see Table 8a). Table 8a is based on the 2018 budget which is an expression of the government's policy reform as discussed above in a budgetary form.

Table 8a: Reform specified for simulation: Government policy expressed in terms of the 2018 budget

	Quantitative value in the proposed 2018 budget Stimulation 1 Government Scenario – Zambia Plus scenario		Simulation 2 Extreme/IMF negotiation scenario
	Proposed amount in 2018 (Billions of K)	% of GDP in 2018	% of GDP in 2018
Government Expenditure	71.6	25.9%	23%
General Public Service	25.9	36.1% of Budget	36.1% of Budget
Defence, Public order & safety	5.6	7.9% of Budget	7.9% of Budget
Economic Affairs	17.3	24.1 of Budget	24.1 of Budget
Health	6.78	9.5% of Budget	9.5% of Budget
Education	11.56	16.1% of Budget	16.1% of Budget
Social Protection	2.30	3.2% of Budget	3.2% of Budget
Environmental protection	0.951	1.3% of Budget	1.3% of Budget
Housing and Community Amenities	0.816	1.1% of Budget	1.1% of Budget
Recreation, Culture & Religion	0.451	0.65% of Budget	0.65% of Budget
Total Domestic Revenue, Grants & Financing	71.66	25.9%	25.9%
Total Domestic Revenue	49.09	17.7%	17.7%
Domestic Financing	11.5	4.0%	4.0%
Foreign Grants and Financing	11.42	4.1%	4.1%
Major Planned Macro Aggregates			
GDP Growth, 3.9% in 2017	4.6% (in 2018) and 5.2, 5.4, 5.5% until 2021.		
Inflation, average annual	7% per annum, 2018-2021		
Over all fiscal deficit, including grants	<3% 2018-2021;(in 7th NDP); the 2018 budget plans to limit it this to 6.1%		
Formal employment (% of total employment, 18.3% in 2017)	19.5%(in 2018), and 21.8,23.5, 25% until 2021		
Working Poverty rate, 35.9% in 2017	35% (in 2018) and 34,33, 32% until 2021		
Youth Unemployment, 13.9% in 2017	12.8% (in 2018) and 11.7, 10.6, 10% until 2021		

Source: Compiled from 2018 Budget and NDP (2017-2021) as well as Zambia-Plus.

A major problem in the use of ZAMMOD to examine the proposed policies as expressed in Table 8a is that ZAMMOD presents government expenditure by expenses categories, instead of the government functional classification as given in Table 8a. Moreover, ZAMMOD's expenditure categories are highly consolidated showing just current and aggregate capital expenditures. The current expenditure reporting system is relatively better as it is disaggregated into spending on "wages and salaries", "goods and services" and "interest payment". Thus, we need to employ some workable assumptions to find the equivalent of the proposed spending items in Table 8a in an expenditure form usable in ZAMMOD.

In line with this, for the purpose of the simulation exercise, we have assumed the proportion between capital and current expenditure in the last three years (2015-2017), where capital expenditure is about 21 per cent (current expenditure being 80 per cent), to remain the same during the simulation period (2018-2021). Similarly, we have assumed the composition of current expenditure in the last three years to remain the same during the

simulation period. In future, this fiscal block of the ZAMMOD needs to be modified to show public expenditure both by expense and government functional classifications. This will greatly improve its use for evaluation of detailed policy scenarios and related labour market (and other economic and social) outcomes.

Leaving aside such improvement for future research, using our assumptions about the breakdown of public expenditure across expense categories used in ZAMMOD, we have converted the government's proposed policy that is expressed in the 2018 budget and given in Table 8a, in a format that is usable in ZAMMOD given as Table 8b below. The implication of this government policy package, our first simulation, for the labour market outcome is given in Tables 9a and 9b and discussed in the next section. We have also carried a second simulation, where we have assumed a more stringent austerity (stabilization) package that may come if the negotiation with IMF for additional financing is successful. In this scenarios, we have assumed expenditure as the share of GDP to decline by 3 percentage points from the level stipulated in 2018 budget while government revenue targets remaining as stipulate in the 2018 budget. The implication of this latter scenario for the labour market outcome is given in Tables 10a and 10b and discussed in the next section.

Table 8b: Expenditure and Expenditure Categories used for simulation, 2018 (in millions of Kwacha)

Expenditure Categories (used for simulation)	Simulation 1 (Change from the base run)	Before Simulation (the base run)	Simulation 1 amount (Total)
Current expenditure (calculated)	9 120	47 153	56 273
Wages and salaries	6 035	24 626	30 661
Goods and Services	747	4 285	5 032
Interest payments	0	9 459	9 459
Domestic	0	3 674	3 674
External	0	2 937	2 937
Other current expenditure (=transfers to hh expenditures)	2 337	8 783	11 120
Capital expenditures	1 697	13 342	15 039
Domestic arrears payments (net lending)	0	321	321
Total expenditures and net lending	11 138	60 495	71 633

4.3 Simulation outcomes assessed

To address the major objective of this study as well as to demonstrate the use of the enhanced labour market block that is integrated with the ZAMMOD, we have first carried a macroeconomic forecast for all endogenous variables of ZAMMOD for the period 2017-2021 with no policy change (the 7th NDP period). This is aimed at tracking the evolution of the labour market outcomes following our improvement to the ZAMMOD. We use this as the ‘baseline scenario’ ("business as usual") in comparison to which the policy simulation exercise outlined in the previous sections is carried out. The baseline scenario results that are generated using both the modified in comparison to the original (unmodified) ZAMMOD, including their value in absolute terms, are given in Appendix I. Tables A1 and A2 in appendix I show the base run scenario using the original and modified ZAMMOD, respectively. The result shows the improvement has gave rise to a change in both employment and related income (labour market) outcomes.

4.3.1 The First Simulation: Government proposed stabilization policy – 'Zambia-Plus'

Although the policy simulation result from the ZAMMOD under both scenarios offers a range of macroeconomic outcomes, our discussion here is focused on the labour market outcomes only. Table 9a shows the employment and income outcome using the employment category that is currently in use in ZAMMOD. The result shows, employment will increase across all categories, except in the informal sector. The highest increase is forecasted to come from the "unpaid family workers" category which is expected to increase by over three per cent per annum during the planning/simulation period (2018-2021). This is followed by employment in the private sector, the self-employed and the government sectors, in order of importance. The number of the unemployed will decline during the planning period. However, the rate of decline is not significant as it ranged from 1.4 percentage point decline in 2018 to about 1.8 percentage points decline in 2021 from the rate that would have been prevailed under the business as usual scenario. This pessimistic outcome for employment became even stronger when our new sectoral based employment outcome is used (Table 9b). Thus, the unemployment rate is generally expected to hardly change significantly - showing the bleak prospects for job creation at national level.

With regard to income outcome, households that are employed in the government sector are found to enjoy the highest increase in earning (an increase of about 24 per cent throughout the planning period). Similarly, households who are employers are expected to have an increase in their monthly earning of about five per cent per annum during the planning period, this figure reaching six per cent in 2021. Households in the rest of the employment categories are expected to experience a decline in their monthly earnings, however. This loss will be the highest for "subsistence farmers" (Table 9a). Thus, it is important to take this distributional implications of the proposed policy and its political economy implications in the course of implementing the Zambia-plus policy and related budget.

Table 9a: Employment and income outcome of the 'Zambia-Plus scenario' using the modified ZAMMOD

	Deviation from the baseline (in %)			
Number of Employees	**2018**	**2019**	**2010**	**2021**
Employees Government Sector	0.4	0.7	0.9	1.3
Employees Private Sector	2.4	2.9	3.3	3.7
Self-employed (plus employers)	1.4	1.7	1.9	2.2
Unpaid family workers	3.1	3.5	3.5	3.7
Unemployed	-11.9	-13.7	-14.6	-16.2
Unemployment rate (actual)	11.6	11.5	11.6	11.4
Mean Monthly house hold income for households headed by				
Government employee	24.5	24.4	24.3	24.2
Private sector employee	-0.1	-0.1	-0.2	-0.2
Employers	5.0	5.2	5.7	6.2
Subsistence farmers	-0.1	-0.2	-0.2	-0.2
Other(informal sector)	-0.1	-0.1	-0.2	-0.2

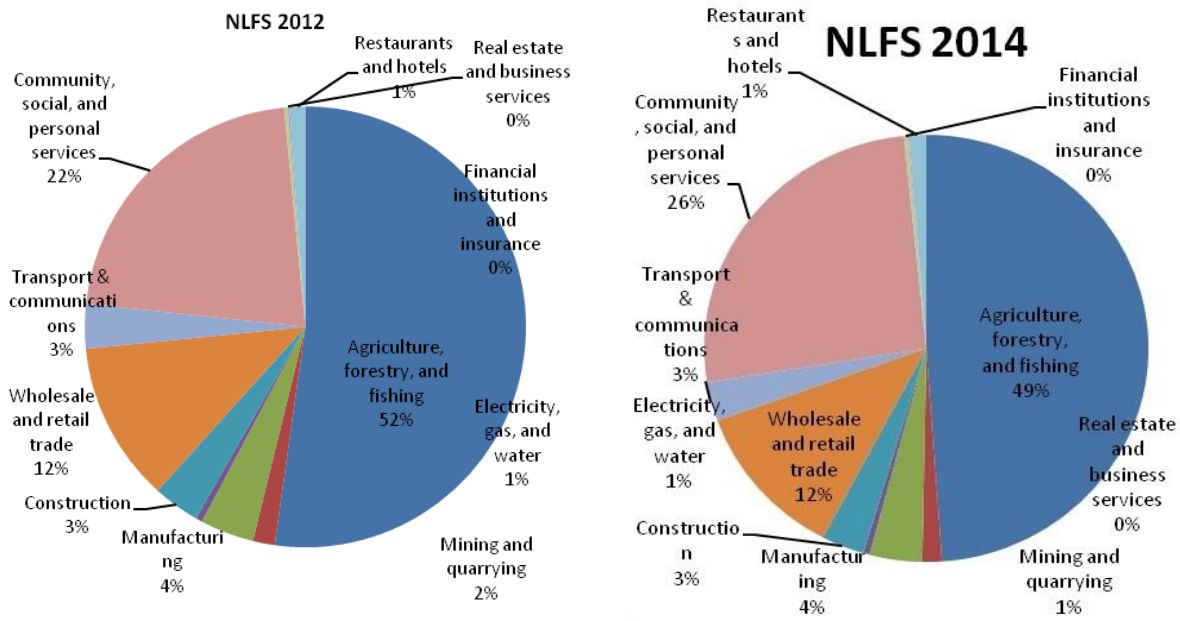
Source: Based on ILO-Modified ZAMMOD

Having the above result, we have resorted to examine the sectoral employment implications of the proposed policies using our new labour market module. Before discussing this result, it is worth looking at the sectoral employment condition from the 2012

and 2014 national labour force survey data which is summarised in Figure 4.1. shows, although its share has slightly declined in 2014, agriculture contributes about 50 percent to national employment. This is followed by community, social and personal services and the whole sale, and retail trade sectors. The "financial" and "real estate" sectors are found to contribute the least for employment in Zambia.

On the background of this actual profile of the labour market in Zambia, Table 9b shows the sectoral employment implications of the Zambia-plus policy, as expressed in the 2018 budget when implemented in 2018. We have first run the model without the policy first called it the "base-run". Then we have run the model with expenditure level implied by the "Zambia-plus" policy. The deviation of the latter with first (the base run) as percentage of the "base-run" values is given in Table 9b. This is change is attributed to the policy effect. Table 9b shows, following this policy, employment generally will increase across all sectors, the total increment ranging from 1.7 per cent in 2018 to 2 to 2.5 per cent between 2019 and 2021. The only exception to this being the "financial" and "real estate" sectors where employment in 2018 is expected to decline by 2.3 per cent and 1.8 per cent, respectively. This decline will persist until the year 2021 where it reaches -3 and -2.5 per cent, respectively. In this scenario, unemployment will be about 16.1 per cent in 2018 and will rise by almost one percentage point annually till the year 2021 following this policy scenario (Table 9b). This scenario also shows the government's economic growth target for 2018 and 2019 could be met when this policy is implemented. GDP growth, however, will decline and become below target in 2020 and 2021.

Figure 4.1: Sectoral contribution to employment (2012-2014)



Note: "Community, Social and Personal Services" corresponds to "Activities of households as employers and all others unspecified categories in the NLFS.

Source: ZLFS 2014, Total employed persons 5,860, 000 (47% male) and: ZLFS 2012, Total employed persons 5,500, 000 (49% male).

Table 9b: Sectoral employment outcome of the "Zambia-plus Scenario using the modified ZAMMOD (deviation from the base run, in %)

	2018	2019	2010	2021
Total employed (Formal Sector)	1.7	2.0	2.2	2.5
Agriculture, forestry, and fishing	0.1	0.1	0.2	0.2
Mining and quarrying	0.0	0.0	0.0	0.1
Manufacturing	1.2	1.5	1.7	1.9
Electricity, gas, and water	1.2	1.5	1.7	1.9
Construction	1.0	1.5	1.9	2.4
Wholesale and retail trade	2.2	2.5	2.7	3.0
Transport and communications	1.2	1.5	1.6	1.8
Community, social, and personal services	2.4	2.7	3.0	3.3
Financial institutions and insurance	-2.3	-2.6	-2.8	-3.0
Real estate and business services	-1.8	-2.1	-2.3	-2.5
Restaurants and hotels	3.0	3.4	3.6	3.9
Total Employed Population	0.9	1.1	1.3	1.4
Informal Sector Employment	0.8	1.0	1.1	1.2
Total Unemployed Persons	-4.6	-5.0	-5.2	-5.4
Unemployment (Deviation from the base run, in %)	-4.6	-5.0	-5.2	-5.4
Unemployment rate (actual)*	16.1	17.4	18.7	19.8
Real GDP Growth (actual)	5.9	4.3	3.6	4.6

Note: * Is different from the figure given in Table 4.2a. Table 4.2a is based on the original ZAMMOD with limited improvement. On the other hand the figures here come from our new module and is more realistic.

Source: Based on ILO-Modified ZAMMOD

4.3.2 The Second Simulation: Harder stabilization policy - beyond Zambia-Plus

The employment and income outcomes for the second scenario- a scenarios related to harder stabilization policy that may come if the government plans to go beyond Zambia-plus, say following an agreement with IMF program, are given in Tables 10a and 10b. Following this policy scenario, there will generally be stagnation in employment in the government sector. Other sectors will see insignificant growth of employment, however. The overall unemployment rate (based on the modified ZAMMOD framework, see Table 10a) will also be stagnant. On the other hand, the number of employees in the rest of the sectors will increase, although the magnitude is very small (in the range of 0.6 to 1.8 per cent per annum during the planning periods, Table 10a.). In general, the unemployment rate will hardly change with this scenario and would worsen nearly by 50 per cent compared to the "Zambia-plus" policy scenario. Following this policy, unemployment during the planning period will decline in value that ranges from 0.7 percentage points (in 2018) to about 0.88 percentage points, when it is the best, in 2021

Average monthly earning will increase for household who are 'government employees' as well as for those who are "employers" themselves. However, this rise income is half the level that would have been attained with the policy package referred as Zambia-plus before (the first scenario). Households in the private and informal sectors as well as those who are subsistence farmers will see a decline in their monthly average income following this stringent austerity (stabilization) policy package. Thus, similar to the first scenario, it is

important to take this distributional implications of the possible austerity policy package and its political economy implications if it is to be negotiated and implemented.

Table 10a: Employment and income outcome of "Possible IMF-negotiated scenario" using modified ZAMMOD (Simulation 2, deviation from the base run in %)

Number of Employees	2018	2019	2010	2021
Employees Government	0.0	0.1	0.3	0.4
Employees Private Sector	1.0	1.2	1.4	1.5
Self-employed (plus employers)	0.6	0.7	0.8	0.9
Unpaid family worker	1.6	1.7	1.7	1.8
Unemployed	-5.4	-6.1	-6.4	-7.0
Unemployment Rate (Deviation from the base run)	-5.4	-6.1	-6.4	-7.0
Unemployment rate (Actual)	12.4	12.5	12.7	12.6
Mean monthly house hold income for households headed by				
Government employee	12.1	12.0	12.0	12.0
Private sector employee	-0.03	-0.08	-0.10	-0.12
Employers	2.3	2.3	2.5	2.7
Subsistence farmers	-0.06	-0.10	-0.12	-0.12
Other(informal sector)	-0.03	-0.08	-0.10	-0.12

Source: Based on ILO-Modified ZAMMOD

Using our new sectoral labour market outcome module, total formal employment will increase only marginally, by less than one per cent following this policy package. The only sectors where the increase will be above one percent (1.5 per cent) is the "restaurants and hotels" sectors (Table 10b). These are not substantial sectors in Zambia, however, as their contribution to national employment is less than one per cent (Figure 4.1). In the "financial" and "real estate" sectors employment will actually decline. Thus, in general, this policy package is bad for employment as the general level of employment will be high (16.5 per cent) in 2018. This will continue to increase by about one percentage points per annum during the rest of the planning period. It is also bad for growth as GDP growth will decelerate below the planned target of about four per cent in 2018 and 2019 and further to 3.4 per cent and four per cent in 2020 and 2021, respectively. These growth scenario is also significantly below the first policy scenario of the 'Zambia-plus' policy package.

Table 10b: Sectoral employment outcome of "Possible IMF-negotiated scenario"using modified ZAMMOD (simulation scenario 2)

Sectoral employment outcome	Deviation from the base run (in %)			
	2018	**2019**	**2010**	**2021**
Total employed (Formal Sector)	0.7	0.9	0.9	1.0
Agriculture, forestry, and fishing	0.0	0.0	0.0	0.1
Mining and quarrying	0.0	0.0	0.0	0.0
Manufacturing	0.5	0.6	0.7	0.8
Electricity, gas, and water	0.5	0.6	0.7	0.8
Construction	0.3	0.5	0.6	0.8
Wholesale and retail trade	1.0	1.1	1.2	1.3
Transport and communications	0.5	0.6	0.7	0.8
Community, social, and personal services	1.1	1.2	1.3	1.4
Financial institutions and insurance	-1.0	-1.2	-1.2	-1.4
Real estate and business services	-0.8	-1.0	-1.0	-1.1
Restaurants and hotels	1.5	1.6	1.6	1.7
Total Employed Population	0.4	0.5	0.5	0.6
Informal Sector Employment	0.3	0.4	0.4	0.5
Total Unemployed Persons	-2.0	-2.1	-2.1	-2.2
Unemployment (Deviation from base run, in %)	-2.0	-2.1	-2.1	-2.2
Unemployment rate (Actual)	**16.5**	**17.9**	**19.3**	**20.5**
Real GDP Growth (actual)	**4.1**	**3.9**	**3.4**	**4.4**

Source: Based on ILO-modified ZAMMOD

V. Conclusion

This study began by describing macroeconomic and labour market developments in Zambia and the policy challenges associated with those developments. Recognizing the government's effort to address the multifaceted challenges of the Zambian economy through a large scale policy reform, the study focused on understanding the labour market outcome of these proposed reform policies. It was also concerned with the enhancement and improvement of the labour market aspect of the ZAMMOD econometric model used by the Ministry of Finance to calculate the evolution of major economic variables.

We have proposed specific improvements for the labour market block of ZAMMOD. These improvements derive from practices common in the modelling process in other African countries as well as from a thorough examination of both the theoretical specification and empirical application of the labour market block of the model. In line with this, two major improvements are made to labour market block of the ZAMMOD. First, we have improved the employment and income outcomes parts of the labour market block by modifying the specification of the relevant equations to reflect the evolution of the macro economy and their bearing in the labour market outcomes. This was largely missing in the current version of the ZAMMOD. Second, we have introduced a new labour market module that can offer policy makers with the sectoral employment outcome of proposed policies and related macroeconomic evolution of the economy. We have used estimated employment elasticities of output derived from a set of sectoral demand for labour functions to do that.

Having made our suggestions for improvement and introducing them into the model in a manner consistent with the current interactive “block” structure of ZAMMOD, we assessed the impact of recent proposed government policies on the labour market. The policy simulations include fiscal and monetary changes summarized in the 2018 budget. While we deal with the major policy issues proposed by the Zambian government, this is not a comprehensive study on the Zambian economy or the labour market. Rather, following the Terms of Reference, the output of this study aims primarily to enhance the ZAMMOD and suggest for its further improvement, which is a major tool used to evaluate the consequences of macroeconomic policies. We have also examined the possible labour market impact of significant macro policy reforms as part of this study. Two policy scenarios are run with the improved ZAMMOD for this purpose.

The first scenario relates to the policy package named "Zambia-plus" as summarised in the proposed 2018 budget and Tables 9a and 9b. The second simulation relates to a possibility of much harder austerity measures that may go beyond the "Zambia-plus" by reducing public expenditure three percentage points below the level stipulated in the Zambia-plus/2018 budget. The latter could be taken as a possible outcome of a negotiation for a policy package with the IMF.

The result shows, employment will increase across all categories, except in the informal sector. The number of the unemployed will decline during the planning period. However, the rate of decline is not significant as it ranged from 1.4 percentage point decline in 2018 to about 1.8 percentage points decline in 2021 from the rate that would have been prevailed under the business as usual scenario. This pessimistic outcome for employment became even stronger when our new sectoral based employment outcome is used (Table 9b). Thus, the unemployment rate is not expected to change significantly – showing the bleak prospects for job creation at national level. When computed from sectoral perspective, the unemployment rate is found to be about 16.1 per cent in 2018 and will rise by almost one percentage point annually till the year 2021.

With regard to income outcome, households that are employed in the government sector are found to enjoy the highest increase in earning. This is followed by households

who are employers. The rest of the employment categories are expected to experience a decline in their monthly earnings following the policy of "Zambia-plus". This loss is found to be the highest for "subsistence farmers". Thus, it is important to take this distributional implications of the proposed policy and its political economy implications in the course of implementing the Zambia-plus policy and related budget.

The employment and income outcomes for the second scenario – a scenario related to harder stabilization policy that may come if the government plans to go beyond "Zambia-plus", perhaps following successful negotiation with IMF, shows the possibility of further stagnation in employment in the government sector. On the other hand, the number of employees in the rest of the sectors will increase, although the magnitude is very small (in the range of 0.6 to 1.8 per cent per annum during the planning periods, Table 10a.). In general, the unemployment rate will hardly change with this scenario and would worsen nearly by 50 per cent compared to the "Zambia-Plus" policy scenario. Following this policy, unemployment during the planning period will decline marginally that ranges in value from 0.7 percentage points (in 2018) to about 0.88 percentage points, when it is the best, in 2021.

In terms of earning, average monthly earning will increase for household who are 'government employees' as well as for those who are "employers" themselves. However, this rise in income is half the level that would have been attained with "Zambia-plus' policy package (or the first scenario). With this second policy package all households in the private and informal sectors as well as those who are subsistence farmers will see a decline in their monthly average income. Thus, similar to the first scenario, it is important to take this distributional implications of the possible austerity policy package and its political economy implications if it is to be negotiated and implemented. In general, this harder austerity policy package is found to be bad both for employment and economic growth.

Generally, although the current improved version of the ZAMMOD is helpful to examine the implications of proposed and stipulated policies above, it still needs further research and further improvement. We have made a number of recommendation to improve the labour market block of ZAMMOD that includes designing the fiscal block of the model by functional categories. We have also suggested enhancing the database for the labour market block to accommodate some of the major detail labour market features available in the national labour force survey. When such improvements are made, ZAMMOD will be a better tool that will allow the government to simulate the effect of different policies and the evolution of the macro economy for labour market outcome. In the medium term, the enhancement and improvements that we have made in the context of this study are sufficiently significant and offer a better labour market outcomes and can be usefully used by the government. Using this modified ZAMMOD we have found that the employment creation potential of the Zambia-plus policy is limited and this will be worst if a negotiated austerity measure with IMF is carried and implemented. We also found that both policy scenarios have significant distributional and hence political implications which policy makers need to aware of.

Finally, this modified ZAMMOD (called ILO-ZAMMOD 2017) which is also used to carry out the policy analysis reported in this study is attached with this study which could be used to get a better labour market outcome for different policy analysis exercise. We hope such improvements on ZAMMOD will further be made by the Ministry of Finance on all variables of the model so that ZAMMOD will be a better tool for policy analysis.

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List of Institutions Contacted for Interview

Ministry of Finance, Government of Zambia.

Ministry of Labour, Government of Zambia

Ministry of Planning, Government of Zambia

Cabinet Office, Government of Zambia

International Monetary Fund, Zambia Country Office

Association of Zambia Employers

Association of Zambian Trade Unions

APPENDIX 1

Annex 1a: Labour Market outcome of ZAMMOD before improvement (Original)

Number of employees		2015	2016	2017	2018	2019	2020	2021
Employees Government	mln.nr	0.228	0.234	0.241	0.248	0.255	0.262	0.270
Employees Private Sector	mln.nr	0.363	0.358	0.355	0.352	0.352	0.350	0.350
Self-employed (plus employers)	mln.nr	3.633	3.748	3.866	3.987	4.110	4.233	4.357
Unpaid family worker	mln.nr	1.039	1.072	1.106	1.141	1.176	1.211	1.247
Unemployed	mln.nr	0.802	0.827	0.853	0.880	0.907	0.934	0.962
Total Labour Force	mln.nr	6.065	6.241	6.422	6.608	6.800	6.990	7.186
of which non-formal sector	mln.nr	5.474	5.648	5.825	6.008	6.193	6.378	6.565
Total Population	mln.nr	15.178	15.618	16.071	16.537	17.017	17.493	17.983
Number of households to main economic activity of head of hh								
Govt employee	mln.nr	0.251	0.258	0.266	0.273	0.281	0.289	0.297
Private sector employee	mln.nr	0.442	0.437	0.433	0.429	0.429	0.426	0.427
Employer	mln.nr	0.009	0.009	0.009	0.009	0.009	0.009	0.009
Subsistence farmers	mln.nr	1.434	1.494	1.553	1.614	1.670	1.730	1.785
Other(informal sector)	mln.nr	0.808	0.831	0.857	0.882	0.912	0.939	0.970
Total	mln.nr	2.944	3.030	3.118	3.208	3.301	3.394	3.489
of which non-formal sector)	mln.nr	2.242	2.326	2.410	2.496	2.582	2.669	2.755
Mean monthly household income to main economic activity of head of households								
Govt employee	KR	4 026.19	4 873.23	5 128.24	5 751.71	6 239.23	6 629.66	6 953.50
Private sector employee	KR	2 639.85	3 078.18	3 620.96	4 092.55	4 504.74	4 877.50	5 224.97
Employer	KR	4 900.93	5 798.03	6 698.00	7 509.18	8 838.12	9 555.87	10 394.90
Subsistence farmers	KR	689.85	885.03	992.70	1 076.90	1 144.33	1 200.27	1 247.80
Other(informal sector)	KR	1 834.57	2 139.19	2 516.39	2 844.13	3 130.58	3 389.63	3 631.11

Annex 1b: Labour Market outcome of ZAMMOD after improvement (ILO modified)

Number of employees		2015	2016	2017	2018	2019	2020	2021
Employees Government	mln.nr	0.255	0.254	0.265	0.271	0.277	0.283	0.290
Employees Private Sector	mln.nr	0.363	0.358	0.355	0.352	0.351	0.349	0.350
Self-employed (plus employers)	mln.nr	3.663	3.732	3.820	3.905	4.009	4.105	4.222
Unpaid family worker	mln.nr	1.127	1.146	1.168	1.212	1.259	1.305	1.350
Unemployed	mln.nr	0.657	0.750	0.813	0.868	0.903	0.947	0.974
Total Labour Force	mln.nr	6.065	6.241	6.422	6.608	6.800	6.990	7.186
of which non-formal sector	mln.nr	5.447	5.629	5.801	5.985	6.171	6.357	6.546
Total Population	mln.nr	15.18	15.62	16.07	16.54	17.02	17.49	17.98
Number of households to main economic activity of head of hh								
Govt employee	mln.nr	0.251	0.250	0.261	0.267	0.273	0.279	0.286
Private sector employee	mln.nr	0.442	0.436	0.433	0.429	0.428	0.425	0.426
Employer	mln.nr	0.009	0.009	0.009	0.009	0.009	0.009	0.009
Subsistence farmers	mln.nr	1.434	1.501	1.556	1.619	1.677	1.738	1.795
Other(informal sector)	mln.nr	0.808	0.834	0.858	0.884	0.914	0.941	0.973
Total	mln.nr	2.944	3.030	3.118	3.208	3.301	3.394	3.489
of which non-formal sector)	mln.nr	2.242	2.334	2.414	2.503	2.591	2.680	2.768
Mean monthly household income to main economic activity of head of households								
Govt employee	KR	4026.19	4887.52	5135.16	5759.34	6247.52	6638.59	6963.05
Private sector employee	KR	2639.85	3078.18	3620.91	4092.45	4504.66	4877.51	5225.13
Employer	KR	4900.93	5775.00	6682.90	7484.48	8801.20	9507.93	10334.48
Subsistence farmers	KR	689.85	885.03	992.68	1076.87	1144.32	1200.29	1247.86
Other(informal sector)	KR	1834.57	2139.19	2516.36	2844.06	3130.53	3389.64	3631.22

Table A3: Labour Market Outcome in the 1st 'Zambia-Plus' simulation using the ILO modified ZAMMOD (in absolute numbers)

Number of employees		2018	2019	2020	2021
Employees Government	mln.nr	0.272	0.279	0.286	0.294
Employees Private Sector	mln.nr	0.360	0.361	0.360	0.362
Self-employed (plus employers)	mln.nr	3.961	4.077	4.183	4.313
Unpaid family worker	mln.nr	1.250	1.303	1.351	1.400
Unemployed	mln.nr	0.765	0.779	0.809	0.817
Total Labour Force	mln.nr	6.6	6.8	6.99	7.2
of which non-formal sector	mln.nr	5.97	6.15	6.3	6.5
Unemployment Rate		11.6	11.	11.6	11.4
Total Population	mln.nr	16.5	17.0	17.	17.98
Population Growth	%	2.9	2.9	2.8	2.8
Number of households to main economic activity of head of household					
Govt employee	mln.nr	0.268	0.275	0.282	0.289
Private sector employee	mln.nr	0.439	0.440	0.439	0.442
Employer	mln.nr	0.009	0.009	0.009	0.009
Subsistence farmers	mln.nr	1.6	1.7	1.7	1.8
Other(informal sector)	mln.nr	0.894	0.926	0.955	0.990
Total	mln.nr	3.3	3.3	3.4	3.
of which non-formal sector)	mln.nr	2.	2.6	2.7	2.8
Mean monthly household income to main economic activity of head of household					
Govt employee	KR	7 170.0	7 769.5	8 250.5	8 651.3
Private sector employee	KR	4 090.3	4 498.5	4 868.6	5 214.6
Employer	KR	7 860.1	9 262.0	10 047.7	10 970.5
Subsistence farmers	KR	1 075.7	1 142.4	1 197.9	1 245.2
Other(informal sector)	KR	2 842.6	3 126.3	3 383.	3 623.9

Table A4: Labour market outcome in the 2nd 'IMP-negotiated' simulation using the ILO modified ZAMMOD (in absolute numbers

Number of employees		2018	2019	2020	2021
Employees Government	mln.nr	0.271	0.278	0.284	0.291
Employees Private Sector	mln.nr	0.356	0.355	0.354	0.355
Self-employed (plus employers)	mln.nr	3.9	4.0	4.1	4.260
Unpaid family worker	mln.nr	1.2	1.3	1.3	1.374
Unemployed	mln.nr	0.821	0.848	0.887	0.906
Total Labour Force	mln.nr	6.6	6.8	7.0	7.186
of which non-formal sector	mln.nr	6.0	6.2	6.4	6.540
Unemployment Rate		12.4	12.5	12.7	12.6
Total Population	mln.nr	16.5	17.0	17.5	18.0
Population Growth	%	2.9	2.9	2.8	2.8
Number of households to main economic activity of head of household					
Govt employee	mln.nr	0.267	0.274	0.280	0.287
Private sector employee	mln.nr	0.433	0.433	0.431	0.432
Employer	mln.nr	0.009	0.009	0.009	0.009
Subsistence farmers	mln.nr	1.6	1.7	1.7	1.8
Other(informal sector)	mln.nr	0.888	0.919	0.948	0.980
Total	mln.nr	3.2	3.3	3.4	3.5
of which non-formal sector)	mln.nr	2.5	2.6	2.7	2.8
Mean monthly household income to main economic activity of head of household					
Govt employee	KR	6 457.1	7 000.0	7 435.5	7 797.7
Private sector employee	KR	4 091.2	4 501.1	4 872.4	5 219.1
Employer	KR	7 652.8	9 005.0	9 742.1	10 608.2
Subsistence farmers	KR	1 076.2	1 143.2	1 198.9	1 246.3
Other(informal sector)	KR	2 843.2	3 128.1	3 386.1	3 627.0

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