

Zambia: Selected Issues



ZAMBIA

SELECTED ISSUES

June 2015

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ZAMBIA

SELECTED ISSUES

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Approved By
African Department

Prepared by Tsidi Tsikata, Qiang Cui, Byung Jang, Tobias Rasmussen,
Manuel Rosales, and Robert Tchaidze

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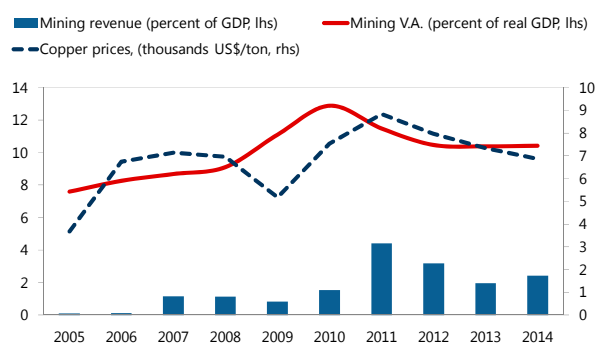
ANALYSIS OF CHANGE IN ZAMBIA'S MINING FISCAL REGIME¹

A. Background

1. **Foreign investment has revived Zambia's mining sector.** Copper mines were privatized in the late 1990s and early 2000s after three decades under government control. Since then, foreign companies have invested around US\$10 billion in the sector, revitalizing Zambia's production to historical high levels. Copper production has tripled from about 250,000 tons in 2000 to over 750,000 tons in 2013.

2. **The mining sector's direct contribution to government revenues (royalties, corporate income tax) has been low.** During 2000–07, on average, the sector contributed less than 0.1 percent of GDP to government revenue while accounting for about 6.2 percent of GDP (Figure 1). This low contribution reflected a combination of low international copper prices, depressed production, low profitability (due in part to large capital investments made to restore production resulting in significant tax credits), and the concession agreements granted to mining companies. Revenues have increased with increasing copper production, higher sector value-added, rising prices, and changes to the fiscal regime (Figure 2).

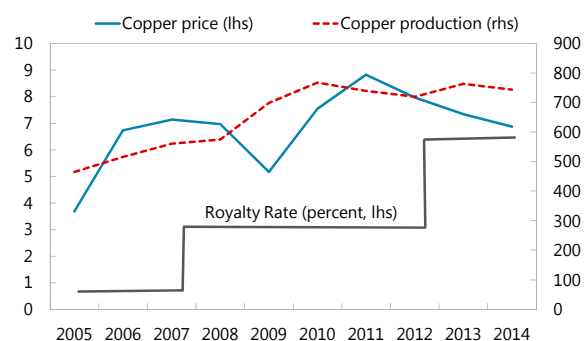
Figure 1. Zambia: Copper Revenue, Prices and Mining Value Added, 2005–14



Sources: Zambian authorities and IMF staff calculations.

Figure 2. Zambia: Copper Price, Royalty Rate, and Copper Exports

(Thousands of U.S. dollars and thousands of tons)



Sources: Zambian authorities and IMF staff calculations.

¹ Prepared by Manuel Rosales.

3. **Reflecting persistent concerns about the low contribution of the mining sector to budget revenues, the government has amended the fiscal regime many times over the last seven years (Table 1).** In 2007, it increased both the corporate income tax (CIT) and the royalty rate. In 2008, it introduced a variable income tax schedule and reduced the depreciation rate for capital expenditures for non-exploratory activities. Royalty rates were further increased in 2012. Along with higher production, these tax changes increased the mining sector's direct contribution to revenues from an average of 0.7 percent of GDP in 2005–09 to close to 3 percent of GDP in 2010.² As a result, Government revenues from the mining sector compare favorably with other mineral exporting countries (Figure 3).

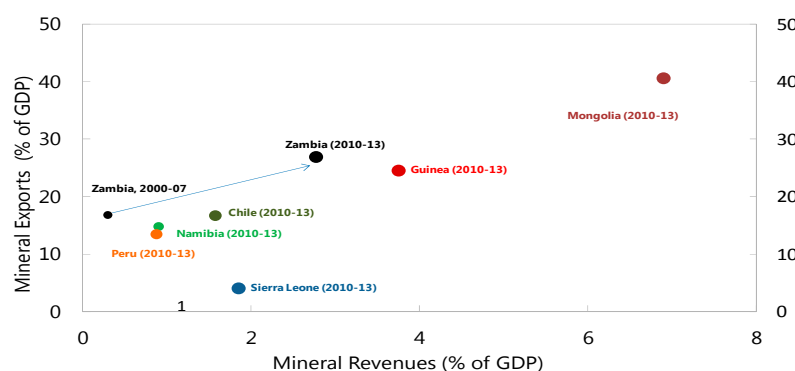
Table 1. Zambia: Reforms to the Mining Fiscal Regime for Base Metals, 2006–15

	2006	2007	2008	2009	2012	2013	2015 ¹
Royalty rate	0.6%	3%	3%	3%	6%	6%	8% / 20%
Corporate Income Tax	25%	30%	30%	30%	30%	30%	0%
Variable Income Tax	No	No	Yes	Yes	Yes	Yes	No
Hedging activity as part of mining	Yes	Yes	No	Yes	No	No	No
Windfall tax	No	No	Yes	No	No	No	No
Capital expenditure allowance	100%	100%	100% for exploration; others 25%	100%	100%	100% for prospecting & exploration; mining operations 25%	100% for prospecting & exploration; mining operations 25%
Loss carry forward (years)	10	10	10	10	10	10	10
Export duty	None	None	15% for unprocessed	15% for unprocessed	10% for unprocessed	10% for unprocessed	10% for unprocessed

Source: Zambia Revenue Authority.

¹ As per the original 2015 budget. 8 percent royalty for underground and 20 percent for open cast mining operations as final tax. 30 percent CIT on income earned from tolling, and 30 percent CIT on income earned from processing of purchased mineral ores, concentrates and any other semi-processed minerals, currently taxed as income from mining operations. Income from industrial mineral will be taxed at the variable tax rate (30 percent to 45 percent). Mineral Royalty at 20 percent on a person in possession of minerals where the supplier to that person has not paid mineral royalty tax.

Figure 3. Zambia: Contribution from Mining Activity in Selected Countries
(Percent of GDP)



Sources: IMF staff calculations.

² Includes only royalties and corporate income tax (i.e., excludes Pay-As-You-Earn paid by workers employed by the sector as well as Value Added Tax and customs duties paid by the sector).

B. Changes to the Mining Fiscal Regime in the 2015 Budget

4. **A sound mining fiscal regime should strike an appropriate balance between government and investor interests.** Countries should be adequately compensated for the depletion of their non-renewable assets and investors should expect a fair return. International best practice suggests that a fiscal regime with a low royalty rate and corporate income tax, supplemented by a windfall or variable income tax (responsive to fluctuating economic/financial conditions), strikes an appropriate balance between government and investor interests.

5. **The 2015 budget introduced major changes to the mining fiscal regime.** It moved away from a system comprising a uniform royalty rate (6 percent), corporate income tax and a variable income tax, to a royalty only system with differentiated rates for underground mines (8 percent) and open cast mines (20 percent). While the corporate income tax was abolished on mining operations, it was retained for income earned from tolling and from processing of purchased ores, concentrates and other semi-processed minerals. The authorities estimated that the change would boost budget revenues from the mining sector by about 1 percent of GDP, based on an assumption that the change would have no adverse impact on production.

6. **A comparison of prevailing royalty rates in 2014 shows that, at 6 percent, Zambia's royalty rate was among the highest fixed rate among copper producing countries (Annex 1).** Governments are attracted by royalties because they generate an immediate stream of revenue once mining production starts. However, royalties discourage investment because they do not respond to changes in costs.

7. **The move to a royalty-based regime with higher rates increases production costs upfront.** Mines that were marginally profitable under the previous regime may become unprofitable. In general, companies are likely to react to lower profitability by curtailing some planned activities and investments.

C. International Comparisons Using the FARI Model³

8. **A cross-country analysis was undertaken to assess the mining fiscal regimes in place in Zambia before and after the changes introduced by the 2015 budget.** The analysis, using the FARI model, employs three key indicators:

- The Average Effective Tax Rate (AETR); it measures the government's share of a project's pre-tax cash flow.
- The Marginal Effective Tax Rate (METR); it measures the difference between the pre- and post-tax rate of return at the margin, where the return on the last dollar invested just covers its cost of capital.

³ The Fiscal Analysis of Resource Industries (FARI) model is a tool developed in the IMF's Fiscal Affairs Department. It is widely used to compare fiscal regimes within a single country or across commodity producing countries.

- The breakeven price; it represents the price required to reach the hurdle rate of return.

9. **The modeling is based on two stylized copper mining projects (Table 2):** (i) a low cost (profitable) project; and (ii) a higher cost (less profitable) project. The projects were constructed using cost structures and production profiles for actual (and similar) mining projects in Zambia, but are not fully identical to any particular existing mines. The higher cost project is characterized by substantially higher investment, resulting in lower pre-tax rate of return.

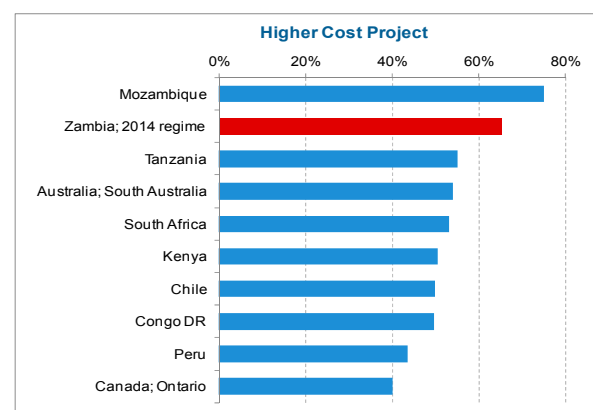
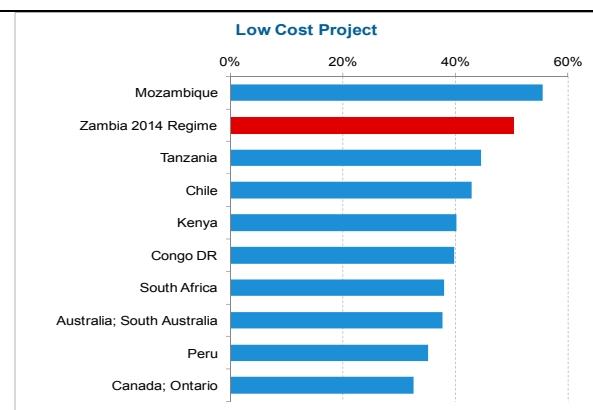
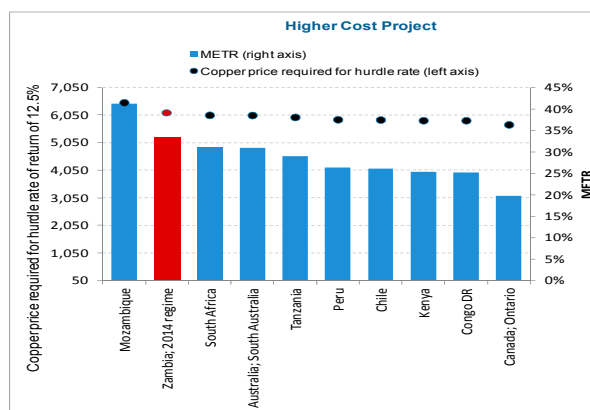
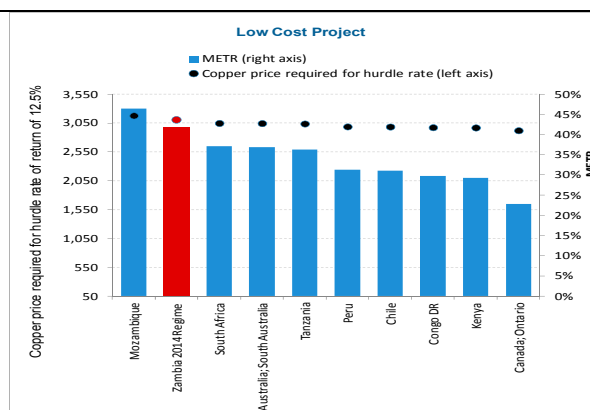
Table 2. Zambia: Stylized Project Examples¹

Category	Units	Low Cost Project	Higher Cost Project
Production copper	000 tons	4,339	6,076
Production gold	000 ounces	1,275	1,224
Production	years	16	18
Exploration costs	\$mm const 2012	-	200
Exploration costs per unit	\$const / unit copper	-	33
Development costs	\$mm const 2012	1,373	5,944
Development costs per unit	\$const / unit copper	316	978
Operating costs	\$mm const 2012	7,065	18,017
Operating costs per unit	\$const / unit copper	1,628	2,965
Decommissioning costs	\$mm const 2012	77	108
Copper price	\$/ton	7,000	7,000
Gold price	\$/ounce	1,400	1,400

Source: IMF staff estimates.

¹ Costs in constant 2012 U.S. dollars.

10. **Assessment of the 2014 regime.** The estimated values of the effective tax rate indicators for the two stylized mines under the fiscal regimes in Zambia and comparator countries in 2014 are presented in Figure 4. The main results for the low cost mine are that: (i) at 50 percent, the AETR for Zambia was the second highest among major copper producing countries; and (ii) at over 40 percent, the METR for Zambia—calculated at a 12.5 percent hurdle rate of return for all countries—was also high relative to peer countries. For the higher cost mine, the model shows Zambia’s fiscal regime as less attractive for investors than those in other copper producing countries. The required breakeven price rises from slightly above US\$3,100/ton for the low cost mine to US\$6,130/ton for the higher cost mine.

Figure 4. Tax Burden from the Mining Fiscal Regime in Selected Copper Producing Countries**Average Effective Tax Rate****Marginal Effective Tax Rate and Break Even Price**

Source: IMF Staff estimates using FARI modeling platform.

D. Estimated Impact of the 2015 Change in the Fiscal Regime

11. **Again using the FARI model, the impact of the new regime for the two stylized mining projects was simulated.** Indicators (AETR, METR, and the breakeven price) were calculated under seven alternative mining fiscal regimes (Table 4): six from Table 1 above (to show the evolution of Zambia's regime since 2006) and an alternative more progressive regime than the 2014 regime (with an adjustment to the variable income tax component).

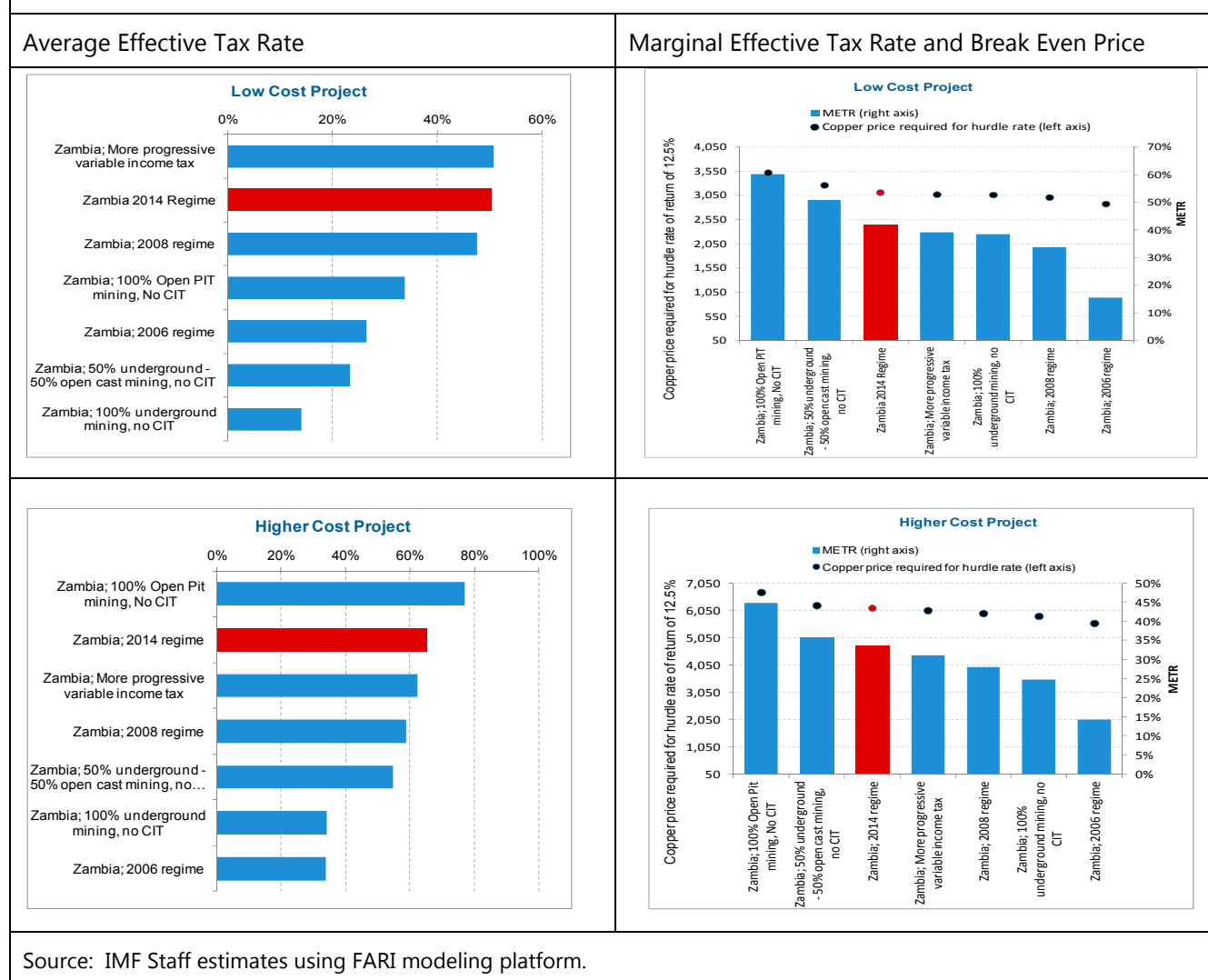
Table 3. Simulated Fiscal Regimes with the FARI Model for Low and High Costs Projects

Fiscal Regimes	
1	2006 Mining Tax Regime
2	2008 Mining Tax Regime
3	2014 Mining Tax Regime
4	2015 Mining Tax Regime for a project with 100% underground mining and no CIT obligation
5	2015 Mining Tax Regime for a project with 100% open pit mining and no CIT obligation
6	2015 Mining Tax Regime for a project with 50% underground mining and 50% open cast mining, and no CIT obligation
7	2014 Mining Tax Regime with a more progressive variable income tax (i.e., lower share in bad years and larger share in good years)

Source: IMF staff.

12. **Relative to the 2014 regime, the AETR decreases under the 2015 regime, except for the higher cost project with 100 percent open pit mining operations.** For such a project, the sharp increase in the royalty rate (from 6 percent to 20 percent) more than offsets the removal of the 30 percent corporate income tax (Figure 5). The results also show that the 2014 regime with a more progressive variable income tax could foster new activity in the sector by allowing companies to develop less profitable projects and thus enhancing the government's revenue prospects over the medium-to-long-term. The breakeven price required in Zambia increases under the 2015 regime, thus reducing the potential for new investment in the sector. Similarly, the METR also increases for both projects under the new regime, meaning higher disincentives for new investments in the sector.

Figure 5. Tax Burden Across Zambia's Mining Fiscal Regimes



13. **The new fiscal regime has not boosted government revenues.** Reflecting the negative impact on the sector's profitability, some mining companies announced plans to reduce operations and postpone new investments. For example, Barrick Gold announced plans to shut down operations at its Lumwana mine, and Konkola Copper Mines (KCM) announced a sharp cut in operations at the Konkola mine. The Zambia Chamber of Mines (ZCM) estimated that annual production lost could reach 150,000 tons and about 12,000 jobs could be lost in 2015. Preliminary information through the first quarter of 2015 shows mineral royalties is 41 percent below the government's target. This underperformance is associated to both the new fiscal regime and lower copper prices.

14. **The new regime introduced complexities to revenue administration.** There is a risk that companies operating both open cast and underground mines would re-organize production to avoid the higher royalty rate, thus hurting government revenue. The ZRA will need to intensively monitor mines'

operations to ensure the government collects the correct level of revenues. This includes defining mechanisms to control mining companies which process both own and purchased/tolled copper. In this context, it will be important for the ZRA to continue strengthening its capacity to monitor activities in the sector including by fully implementing the Mineral Value Chain Monitoring framework.

15. **Amid concerns over its negative economic and social impact, President Lungu asked for changes to the 2015 fiscal regime.** The President tasked a technical committee to review the new regime and propose alternative options including: (i) maintaining status quo with case-by-case relief, (ii) modification of the regime, and (iii) temporarily reinstate the 2014 regime. Staff advised the government to avoid mine-by-mine agreements that would likely entail the government foregoing substantial revenues to keep individual mines in operation.

E. Changes Announced on April 20, 2015

16. **Cabinet announced changes to the 2015 fiscal regime on April 20.** The changes imply going back to the dual system that combines a royalty with a CIT. The main changes include: (i) single royalty rate set 9 percent for both open cast and underground mining operations; (ii) 30 percent CIT on mining operations; (iii) 35 percent CIT on income earned from processing, (iv) variable profit tax on income earned from mining activity at 15 percent when the taxable income exceeds 8 percent of the gross sales; and (v) deduction of tax losses carried forward limited to 50 percent of taxable profits. Additionally, the government indicated that it will stiffen penalties for tax offenders and introduce stringent mechanisms to effectively monitor mining activities and ensure greater transparency among mining companies when reporting revenue and expenditure.

17. **The changes are expected to take effect from July 1, 2015.** Parliamentary approval is required before these changes are implemented. Additionally, the ZRA may need some time to put in place the internal mechanisms for tax filing and payment by mining companies under the revised mining fiscal regime. The Chamber of Mines has welcomed the return to the two-tier system. However, mining companies are assessing how the new royalty rate and reintroduction of the CIT will impact their operations. In this context, it is not clear whether the new regime approved by Cabinet is a permanent fix or whether more changes are to be expected. Against this background, it remains critical to quickly resolve these issues to strengthen stability and predictability going forward.

18. **The amendments approved by Cabinet to the 2015 are changes in the right direction.** The return to a dual system (i.e., royalty rate and corporate income tax-CIT) supplemented by the variable income tax component will allow for flexibility to fluctuating economic/financial conditions helping raise government revenues when copper prices are rising while enhancing the prospects for low profit projects when there is a downturn in prices.

Annex 1. Mining Fiscal Regimes: Zambia and Comparators

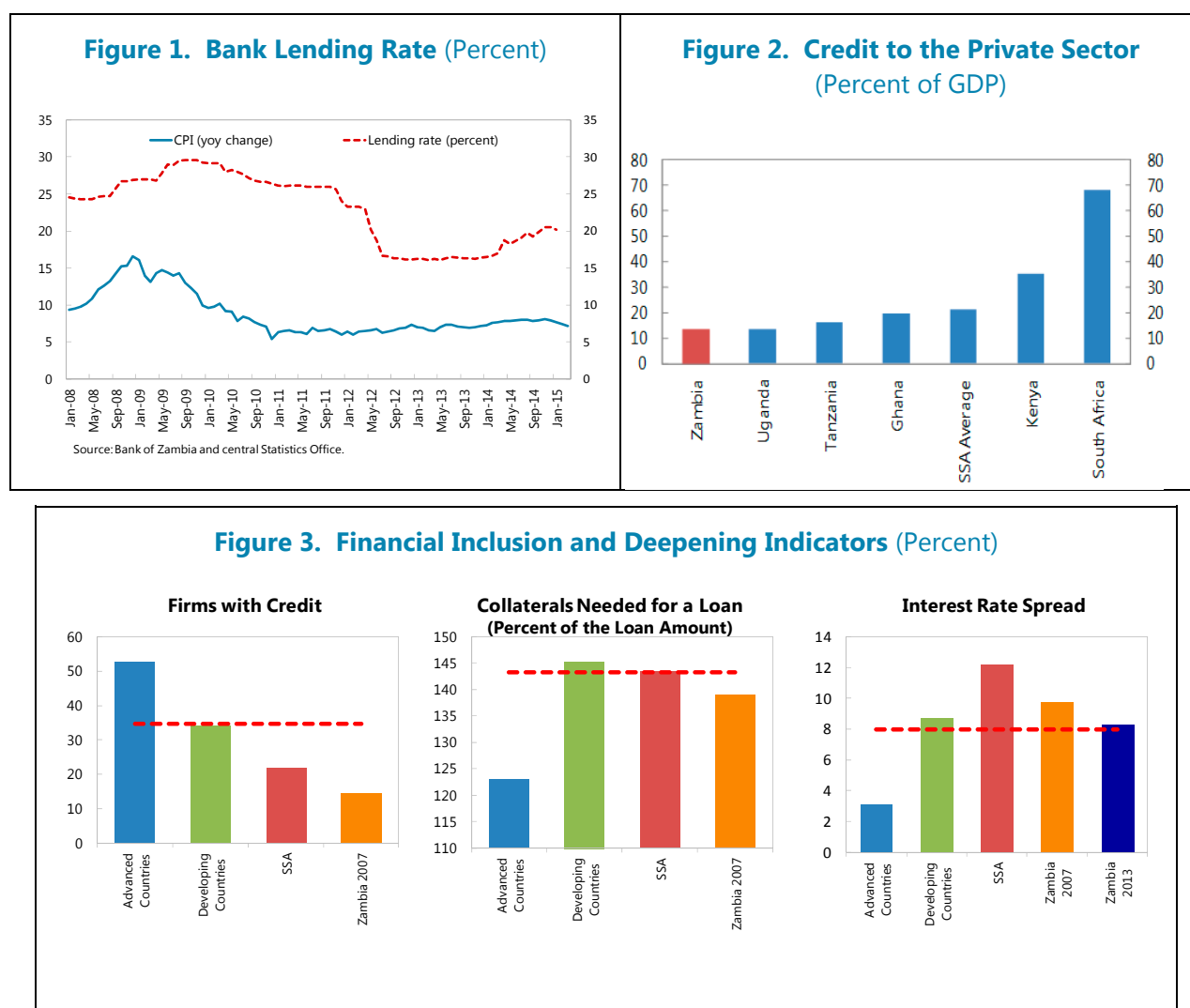
Country	Royalty rate applying to copper	Royalty base	Corporate Income Tax	Depreciation rule	Import duties	Export Tax	Loss carry forward	Additional Profit Tax
Australia - Northern Territory	20%	Net value [gross less opex, capex, and other approved items]	30%	100% exploration; prime cost (straight line) or declining balance methods	Concessions apply	None	Indefinite	None
Australia - Western Australia	5% [copper concentrate]; 2.5% [copper in metallic form]	Gross invoice value of the mineral less any allowable deductions for the mineral such as transport and packaging	30%	100% exploration; prime cost (straight line) or declining balance methods	Concessions apply if values > \$10 million	None	Indefinite	None
Australia - South Australia	4%	Market value less transportation, insurance, packaging, storage.	30%	100% exploration; prime cost (straight line) or declining balance methods	Concessions apply	None	Indefinite	None
Canada - British Columbia	15%	2% on net current proceeds; 13% on net revenue	15% federal + 10% provincial	100% exploration cost; 30% development cost; 25% replacement [federal]	0%-8%	None	Indefinite for capital loss or 20 years for noncapital losses	None
Canada - Ontario	10%	Net profits	15% federal + 10% provincial; 10% federal + 5% provincial tax credit	100% exploration cost; 30% development cost [federal]	0%-8%	None	Indefinite for capital loss or 20 years for noncapital losses	None
Chile	0%-14% based on production level and operating margin	CIT base with some adjustments	20%; 42% if the company opted for the tax invariability regime	100% exploration; 100% intangible development; 11.11% tangible development and replacement	6%	None	Indefinite	None
China	CNY 0.5-20/kg [precious non-ferrous ores] CNY 0.4-30/ton [non-ferrous metal ores]	Volume	25%	100% on exploration; 10% SL on development; 25% SL on replacement [assumed]	Exempt	Exempt	5 years	None
Congo, Dem. Rep.	2%	Gross revenue less transport and selling cost	30%	60% first year, declining balance depreciation in subsequent years.	Exempt	Exempt	5 years	None
Indonesia	4%	Net sales	25%	100% exploration; 6.25% tangibles; 25% replacement [assumed]	Exempt	Exempt	5 years	None
Mexico	N/A	N/A	30%	Fixed asset can be deducted immediately, including up to 87% for machinery and equipment	Exempt [assumed] due to free trade	Exempt	10 years	7.5% additional tax on CIT base
Peru	1%-12%	Operating profit	30%; 8% employee profit sharing	100% exploration; 100% or SL 20% development	Exempt	Exempt	4 years or indefinite if offset against on 50% of income	2%-8.4% special mining tax; 4%-13.12% special mining duty (stability regime only)
United States - Arizona	2.5%	50% of the difference between the gross value of production and the production costs	41.5% in 2014 to be reduced by 0.5 percentage points a year until 2017	70% in first year on exploration and development cost, balance on SL over 5 years; other methods possible	0%-4.5% for machinery	None	20 years	None
United States - Nevada	Based on ratio of net proceeds to gross yield; max 5%	Net Proceeds	35%	70% in first year on exploration and development cost, balance on SL over 5 years; other methods possible	0%-4.5% for machinery	None	20 years	None
Zambia, 2014 regime	6%	Norm Value (volume x LME prices)	30% plus variable income tax	100% on prospecting CAPEX; 25% on other CAPEX	Exempt for capital imports	10% for unprocessed	10 years	Variable Income Tax
Zambia, 2015 original regime	8% for underground; 20% for open-cast	Norm Value (volume x LME prices)	0%; 30% from tolling and processing	25% on prospecting and other CAPEX	Exempt for capital imports	10% for unprocessed	10 years	None
Zambia, 2015 revised regime	9%	Norm Value (volume x LME prices)	30% from mining operations plus variable income tax; 35% CIT from processing operations	100% on prospecting CAPEX; 25% on other CAPEX	Exempt for capital imports	10% for unprocessed	Limited to 50% of taxable profits	Variable Income Tax

Source: FAD Fiscal Analysis of Resource Industries (FARI) database.

ENHANCING FINANCIAL INCLUSION IN ZAMBIA¹

A. Introduction

1. **The authorities are concerned about high lending rates and limited access to credit, particularly by small- and medium-scale enterprises (SMEs).** Despite various measures taken, the authorities believe that lending interest rates in Zambia remain very high, which has limited access to credit by SMEs in particular. Credit to the private sector remains low at 14 percent of GDP in 2014, below the sub-Saharan regional average.



¹ Prepared by Byung Jang. This paper summarizes the results from a draft working paper of the same title.

2. **The authorities have continued their efforts to enhance financial services delivery** by addressing obstacles to financial inclusion and deepening in Zambia, which can be broadly grouped into three categories: access, depth, and efficiency.

- Access.** The number of bank branches has been increasing, particularly in rural areas, and the BoZ has prepared draft regulations on agency banking to increase financial access. These measures would probably reduce the cost of participation in the financial system, particularly in rural areas.
- Depth.** Collateral requirements, which determine depth, can be high when the rule of law and institutions are weak. To address these problems, the authorities have strengthened the Credit Reference Bureau. To further enhance credit culture and cover all forms of credit transactions, the BoZ has prepared a Credit Reporting Bill that will unify the collateral registration system which is currently fragmented across various registries. Moreover, currently security over movable assets of non-incorporated entities cannot be generally registered. To address this problem, the BoZ is developing a Personal Property and Security Interests Bill. Furthermore, an Insolvency Bill has been prepared to consolidate the related laws and strengthen the insolvency/bankruptcy procedure, and the authorities plan to improve land titling.
- Intermediation efficiency.** Efficiency is generally associated with the state of competition and is reflected in interest spreads and banks' overhead costs. Concerns about high lending rates and limited access to credit by SMEs prompted the introduction of ceilings on lending rates for banks, nonbanks, and microfinance institutions in early 2013.² The ceilings on commercial bank lending rates have become increasingly binding as treasury bill rates have increased substantially

Figure 4. Zambia: Number of Bank Branches and Agencies

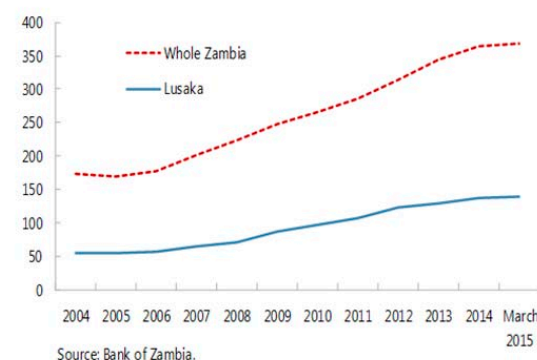
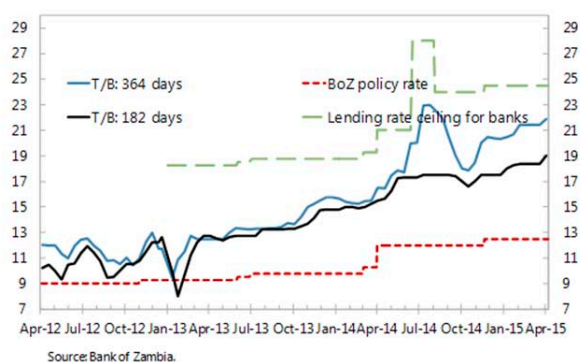


Figure 5. Treasury Bill Rates and Lending Rate Ceiling (Percent)



² The ceilings were initially set at 18.25 percent for banks, 30 percent for nonbanks, and 42 percent for microfinance institutions, with the levels tied to the BOZ policy rate, which was 9.25 percent at that time.

B. Model and Application to Zambia

3. **To study the impact on growth and inclusion of various measures to enhance financial inclusion and deepening, the paper uses a micro-founded general equilibrium model developed by Dabla-Norris et al. (2015).³** In Dabla-Norris et al's model (2015), various measures affect growth, inclusion and inequality through three channels. First, more developed financial markets channel more funds to entrepreneurs, thereby increasing their output. Second, more efficient contracts limit waste from frictions leading to higher growth. Third, more efficient allocation of funds in the financial system brings about an increase in total factor productivity (TFP). The model is calibrated with Zambian data.

4. **The model is calibrated using two Zambian data sets from the World Bank:** the Enterprise Surveys provide firm-level cross-section data and the World Development Indicators provide data on economy-wide gross saving, nonperforming loans, and the interest rate spread. The calibrated model matches Zambia's economic situation pretty well (Text Table).

Zambia 2007	Data	Model
Savings (% of GDP)	14.9	14.9
Collateral (% of loan)	139	139
Firms with credit (%)	14.3	14.3
Non-perf. Loan (%)	8.1	8.3
Top 5% empl. Share	49.8	52.7
Top 10% empl. Share	63.3	64.5
Top 20% empl. Share	78.8	74.7
Top 40% empl. Share	91.7	84.7
Interest rate spread (%)	9.7	9.7

5. **To identify key constraints to financial inclusion in Zambia, three policy experiments are conducted using the calibrated model:** (i) reducing financial participation costs; (ii) relaxing borrowing constraints in the form of collateral requirements; and (iii) increasing intermediation efficiency. Comparison of results for policy experiments shows that different financial inclusion strategies have different effects on growth, firms' access to credit, and inequality. Relaxing collateral constraints appears to offer the greatest benefits in terms of growth and TFP (Figure 6). This suggests that high collateral requirements on firms' borrowing are an important binding constraint to financial inclusion and deepening in the Zambian context. The share of firms with credit also increases strongly but is lower compared with the case of reducing the participation cost. The effect on inequality is largest when the participation cost decreases.

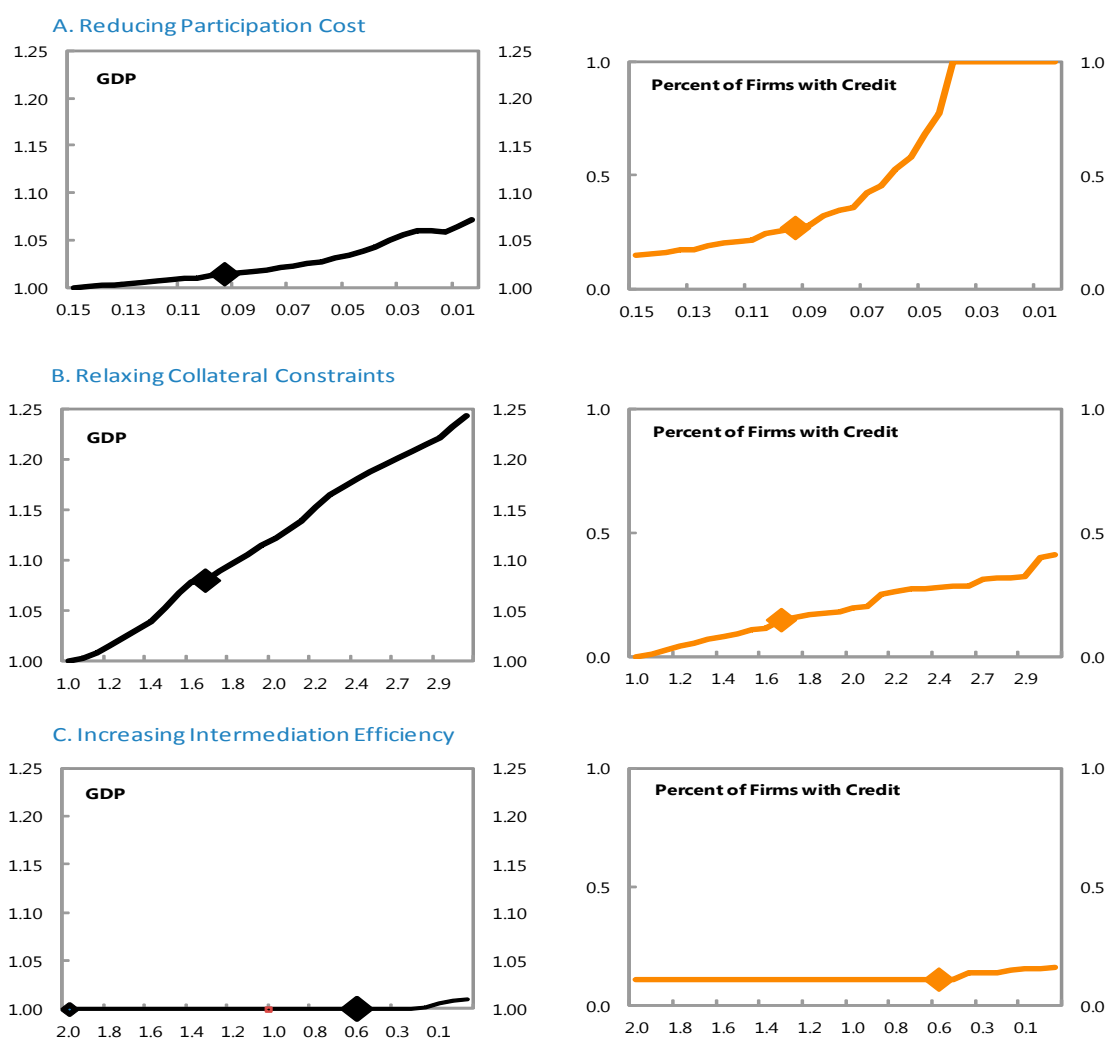
C. Conclusions

6. **Some financial inclusion measures may not have the result that policymakers are hoping for.** For example, a decrease in collateral constraints increases interest spreads as firms leverage more. Increasing intermediation efficiency does not appear to bear a strong effect on any variable in the Zambian context; GDP is not responsive as lower intermediation costs only benefit highly leveraged firms due to low financial access and tight borrowing constraints.

³ Dabla-Norris, E., Y. Ji, R. Townsend, and F. Unsal (2015), "Identifying Constraints to Financial Inclusion and Their Impact on GDP and Inequality: A Structural Framework for Policy," IMF Working Paper (WP/15/22).

7. This study's findings indicate that the authorities' ongoing reform efforts—particularly measures to enhance financial access and address collateral constraints—are likely to have substantial positive impact on growth and inclusion of firms. However, some efforts such as the lending rate ceilings to enhance intermediation efficiency are not likely to produce any substantial positive impact on both growth and inclusion of firms in the current Zambian context.

Figure 6. The Impact of Various Measures on Growth and Firms' Access to Credit



TOWARD MORE INCLUSIVE GROWTH IN ZAMBIA¹

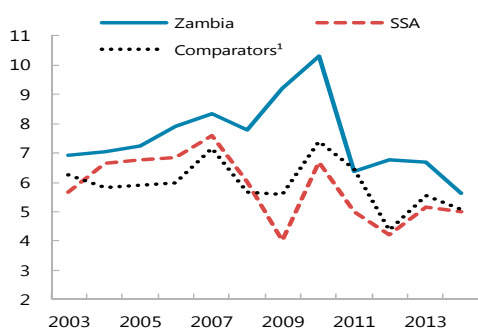
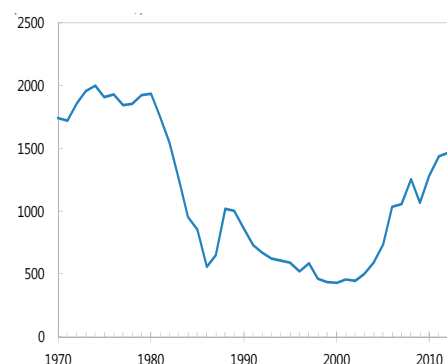
A. Introduction

1. **In the last decade, Zambia has sustained high growth in line with fast-growing peer countries in sub-Saharan Africa.** Supported by market-liberalizing reforms in the 1990s and strong copper prices since 2004, real GDP growth has averaged about 7 percent since 2003 (Figure 1), above the average of about 5½ percent for sub-Saharan Africa (SSA). Over the same period, improved policies for macroeconomic stability helped bring inflation down from about 20 percent to single digit. Strong growth resulted in sustained increases in GDP per capita, which more than tripled from about US\$500 in 2000 to about US\$1,800 in 2013, albeit still below the peak level of US\$2,000 reached in the 1970s (Figure 2).

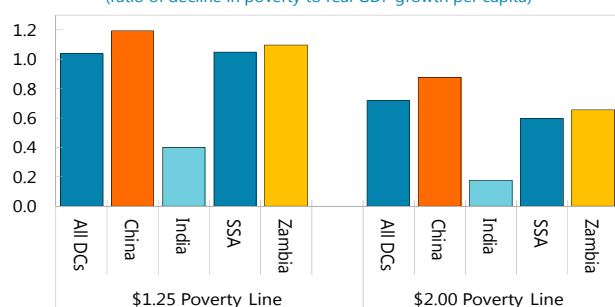
2. **However, Zambia's strong growth has not been sufficiently inclusive to benefit all Zambians.** The overall growth effect in reducing poverty in Zambia is on par with those experienced in other developing countries (Figure 3). For each percentage point increase of growth in 1998–2010, Zambia's extreme poverty rate declined by about 1.1 percentage points, and the overall poverty rate declined by about 0.7 percentage points, in line with the SSA average. But the rural-urban divide is significant. While the urban poverty rate has fallen to about 30 percent in 2010, the poverty rate in the rural areas—where 2/3 of the population lives—remains above 70 percent, much higher than the SSA average poverty rate of 48 percent (Figure 4). Growth incidences for 2006–10 also exhibit a sharp rural-urban divide on the consumption impact (Figures 5 and 6). In urban areas, consumption growth has been positive for all households and higher among poorer ones. In contrast, the impact has been regressive in rural areas, where the consumption of poorer households even declined. Similar urban-rural disparity exists in social indicators. From 2007 to 2010, the prevalence of underweighted children in urban areas dropped from 12.8 percent to 10.8 percent, while the indicator in rural areas declined from 15.3 percent to 14.2 (UNDP 2013). As a result, inequality has worsened, with the Gini coefficient increasing from 0.47 to 0.52 over the last decade (World Bank, 2013).

3. **What explains the lack of inclusive growth in Zambia?** The following sections address this question by analyzing Zambia's growth and productivity patterns as well as growth constraints in infrastructure and the business environment.

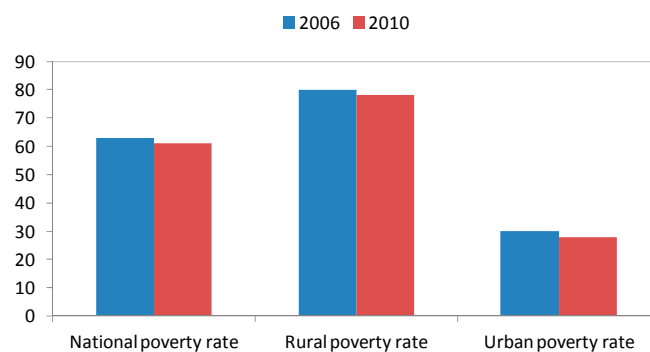
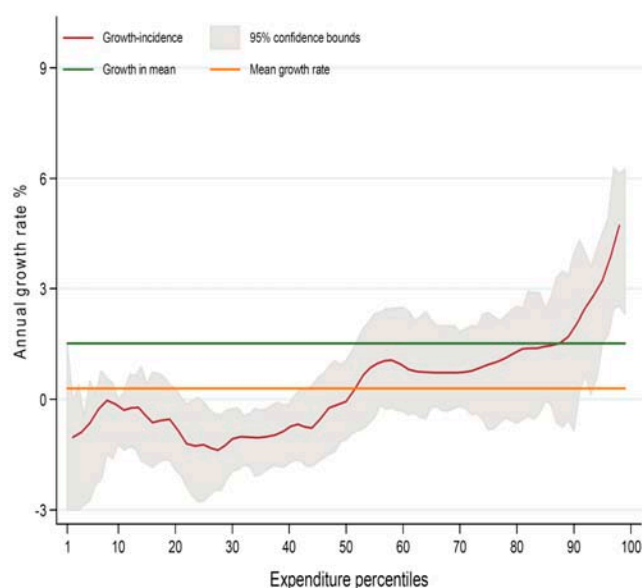
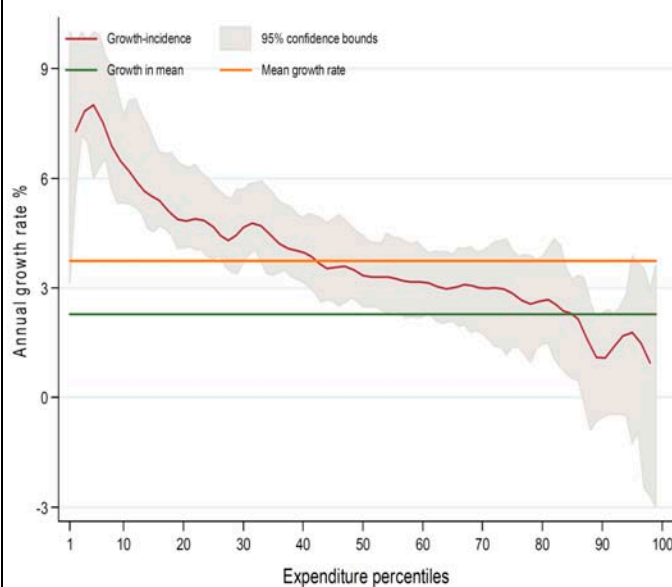
¹ Prepared by Qiang Cui.

Figure 1. Real GDP Growth**Figure 2. GDP Per Capita**
(Constant 2012 US\$)**Figure 3. Growth-Poverty Elasticities in Developing Countries, 1999–2008**

(ratio of decline in poverty to real GDP growth per capita)



Sources: R. Ram, 2013, Applied Economic Letters, and staff calculations.
Note: Data for Zambia refer to extreme and overall poverty respectively for 1998–2010.

Figure 4. Overall Poverty Rate**Figure 5. Rural Growth Incidence****Figure 6. Urban Growth Incidence**

Sources: Central Statistical Office (CSO) of Zambia, ICMM, and World Bank and IMF staff estimates.

1. Median of Ghana, Kenya, Mauritius, Mozambique, Nigeria, Senegal, Tanzania, and Uganda.

B. Sources of Growth

4. **The economic structure has changed but still shows strong dependence on mining.**

During 2000–13, the economic structure showed increasing diversity. The share of the primary sector declined from about 30 percent to 20 percent of GDP. Within this sector, this decline was driven by agriculture, while the share of the mining and quarrying sub-sector rose from about 4 percent to about 10 percent of GDP. The share of the secondary sector has remained stable at about 20 percent of GDP. The tertiary sector recorded a significant increase (Figure 7), and its share in GDP rose from about 50 percent in 2000 to close to 60 percent in 2013. In addition, overall growth continues to exhibit high correlation with copper output (Figure 8), indicating strong linkages between mining and other sectors. Thus, furthering economic diversification remains a challenge.

5. **A growth decomposition analysis shows strong contributions from capital accumulation and labor, while productivity gains are also rising.**

During 2000–10, capital and labor accounted for 27 percent and 24 percent of GDP growth (Figure 9), in line with low-income countries (LICs) overall. However, the human capital contribution of 7 percent is lower than the LIC average of 11 percent. Overall productivity growth, in contrast, has been strong and accounted for 42 percent of overall growth. But the high productivity growth is related to a low base from more protracted declines compared to other LICs prior to 2000.

6. **Recent productivity data by sector show low growth, particularly in sectors important for jobs and structural transformation** (Figure 10).² Agriculture is estimated to employ about 60 to 70 percent of the labor force, and while its productivity growth was largely positive during 2009–12 it has declined recently. The mining sector showed some positive productivity growth, but this reversed in 2011–12, which could be explained by operational problems experienced in some mines. In the secondary sector, productivity growth has shown an upward trend in recent years, although the rate is still negative. Moreover, the job-rich tertiary sector showed a small but continued decline in productivity. In addition, data for informal and formal sectors show a consistent trend, indicating the prevalence of the productivity challenge across the economy.

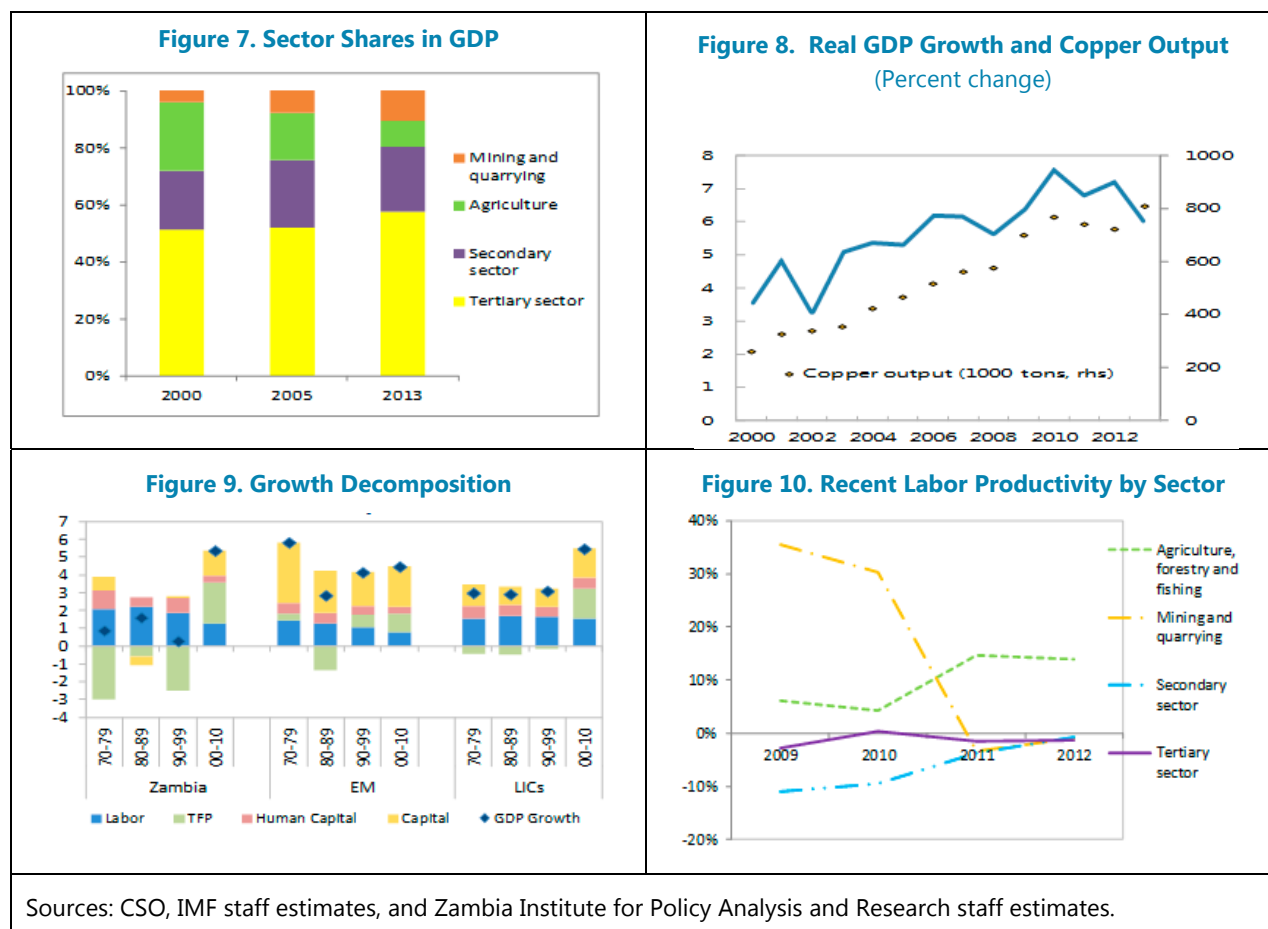
C. Constraints to More Inclusive Growth

7. **Zambia faces several key constraints to structural transformation and inclusive growth.**

Zambia's growth potential remains strong given its rich resources, young and growing labor force, and strategic central position to engage and link neighboring countries in trade. Recent studies (MCA and Zambian authorities, 2012; World Bank, 2013) find that Zambia faces growth bottlenecks from poor infrastructure services, low quality of human capital, and weak business environment. In addition, the fast-growing sectors (mining and construction) have not created sufficient jobs, while the more labor-intensive agriculture and services sectors require strong

² The sector productivity data refer to output per full-time employee equivalent as compiled by the Zambia Institute for Policy Analysis and Research in 2014.

productivity boosts to bring prosperity to more Zambians. These constraints are analyzed further in the following sections.



8. **One major constraint to more rapid and inclusive growth is the weak business environment.** Some recent reforms has helped improve Zambia's Doing Business (DB) ranking, but it has declined from 107th to 111th in DB2015 (Figures 11 and 12). While most indicators are on par with the lower-middle income countries, some indicators are unfavorable relative to the well-performing peers in Africa (e.g., Botswana, Rwanda, and South Africa). For example, Zambia is strong in the ease of "starting a business," but weak in "trading across borders" and "registering property," and lags behind the best performers in "getting electricity". Zambia's rankings are relatively strong in "getting credit" and "paying taxes," but these are based on de jure laws and regulations and need to be assessed together with relevant implementation and results. For example, the impasse over VAT refunds to exporters has been damaging to the business environment; and the significant changes in the mining tax regime without sufficient public consultation has created high levels of uncertainty. These challenges underscore the importance for more dialogue between business and government to find win-win solutions and minimize policy uncertainty.

9. **Among the business environment indicators, one specific bottleneck for inclusive growth is the financial sector.** Studies based on survey and result indicators (e.g., World Bank, 2014; IMF, 2013; and Chapter 2 on financial inclusion) show that low access to finance—which is critical for Small and Medium Enterprises (SMEs) to create jobs and diversify the economy—is a key constraint. About 70 percent of Zambians have no access to either formal or informal financial services, while the respective ratios in the best-performing peers range from about 20 to 50 percent.³ In the 2013 Enterprise Surveys, the share of firms that find that access to finance is the major obstacle has increased to 27 percent, almost a doubling of the share in 2007. Moreover, affected by the high yield offered by government securities, the cost of financing is also a major concern for business, and this also reduces business's access to credits. Concerned about poor access to credit by SMEs, the government imposed lending rate caps in 2013, but only to find the unintended result of further credit rationing. For example, recent data indicate that the actual SME access to credits has reduced (World Bank 2014c). More incentive-compatible policies are needed to address the constraint.
10. **Another constraint to inclusive growth is human capital.** In education, cross-country spending and result indicators show that while Zambia increased spending significantly from 2001 to 2010, the results have lagged behind peer countries, particularly in terms of the average completed years of schooling. In health, the spending level is lower than peer countries and so are the results (Figures 13 and 14). The urban-rural disparities in poverty and social indicators, as identified earlier, also call for better matching of spending with needs. Accordingly, both higher spending and higher efficiency of spending are needed to improve the quality of human capital. In addition, recent studies (e.g., World Bank 2013, ICMM 2014) find poor availability of some specific skills required by businesses. Improved quality of education and targeted vocational training to better translate schooling to skills would thus be needed to help Zambians obtain more job opportunities.
11. **To encourage job creation, it will also be important to balance workers' rights with costs of labor to business.** Zambia's average minimum wage of the private sector is about 110 percent of per capita GDP, and that of the public sector is about 350 percent. The minimum wage in neighboring countries (Angola, Botswana, Mozambique, South Africa, and Tanzania) ranges from 20 to 220 percent. Keeping competitiveness in the private sector requires balanced consideration to support job creation, particularly to address high underemployment among the urban youth and to accommodate a fast-growing labor force. In particular, the perceived attempts—as shown in some official's public comments—to push private firms to apply the public sector minimum wage could be detrimental to job creation. Promoting labor-intensive employment through better quality of education and a more favorable business environment would be more effective in raising employment levels and broad-based wealth creation. Such an approach would also help promote economic diversification and structural transformation over time.

³ World Bank, 2014, FinStat database.

12. **Finally, infrastructure bottlenecks remain a constraint.** Zambia has made significant progress in building infrastructure. Nevertheless, DB indicators and firm surveys reveal that poor electricity supply and transport adversely affect production and cross-border trade. The electrification rate is about 23 percent nationally but only 3 percent in rural areas (World Bank, 2013). Critical for trade, road and rail infrastructure has been limiting Zambia's substantial trading potential with neighboring countries. Zambia's domestic transport cost was found higher than some regional peers (e.g., South Africa, Malawi, and Ethiopia), reducing Zambia's competitiveness. While the paved road network has increased in size, it is concentrated in a few provinces with limited benefit to all Zambians (MCA 2012). To generate the fiscal space to meet infrastructure investment needs while maintaining macroeconomic stability, government spending needs better prioritization and higher efficiency.

Figure 11. Overall Doing Business Ranking

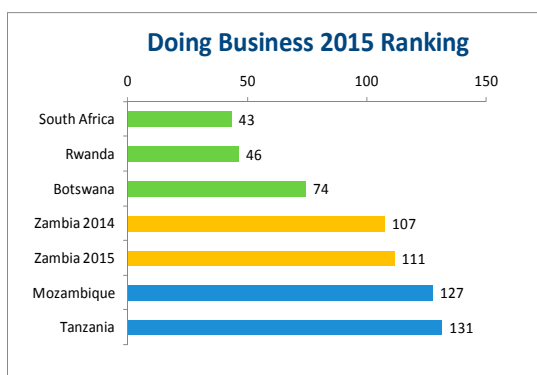


Figure 12. DB Component Indicators

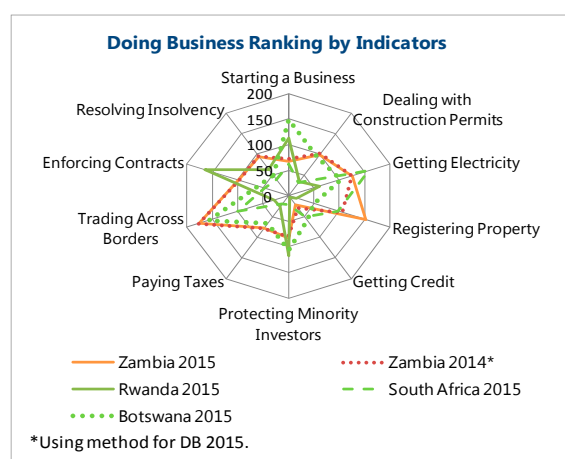


Figure 13. Education Spending and Result

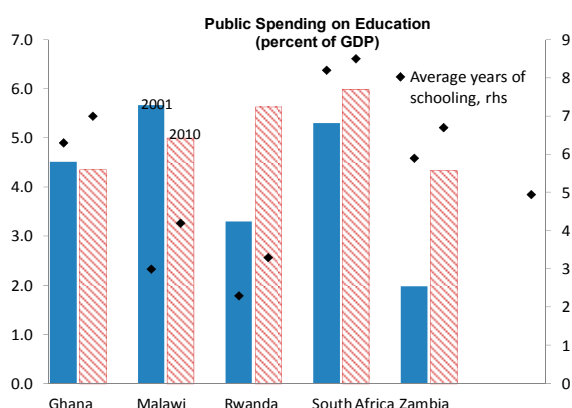
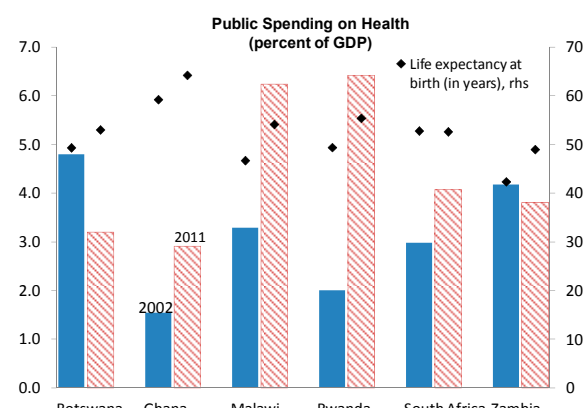


Figure 14. Health Spending and Result



Sources: World Bank Doing Business and World Development Indicators databases; and IMF staff calculations.

D. Conclusions

13. **Zambia’s government strategy is well targeted to address the constraints to inclusive growth, but implementation requires continuous improvement and adaptation.** The revised Sixth National Development Plan (2013–16) commits to developing infrastructure and human capacities, promoting employment, and developing rural areas to facilitate diversification and inclusive growth. These objectives are well aligned with the country’s needs, but implementation could be more focused and adaptive. In agriculture, more efficient support (e.g., extension services and promotion of agri-business and cash crops) could replace the ineffective and regressive subsidies. Facilitating private sector participation would also help enhance productivity. In addition, reallocating government spending towards the social cash transfer program could greatly improve targeting and efficiency, with this program showing strong promise for more effective poverty reduction. In the financial sector, while the lending cap did not achieve the intended result and requires change, other government efforts in supporting credit information and collateral registry, facilitating agency banking, and improving bankruptcy resolution show good progress. Furthermore, improving infrastructure calls for efficient collaboration between the public and private sectors, with commensurate capacity building and monitoring and evaluation to guide effective implementation.

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PRICING OF PETROLEUM PRODUCTS IN ZAMBIA¹

A. Introduction

1. **Zambia imports all of its petroleum products.** The bulk of fuel imports have traditionally been piped from the port of Dar-es-Salaam to the Indeni refinery in Ndola using the 1,710 km Tazama pipeline. These imports are in the form of spiked petroleum feedstock,² which is refined at Indeni to obtain the final market mix. Due to capacity constraints of the pipeline and refinery, refined products are also imported directly by road, with such imports now accounting for about half of the total.³ All procurement is handled by government and both the Tazama pipeline and the Indeni refinery are fully government-owned.

2. **Using the cost plus pricing (CPP) model employed by the Energy Regulation Board (ERB), this paper evaluates the extent to which retail fuel prices in Zambia have reflected the full cost.** The analysis is based on data covering the volume and price of 35 cargos of petroleum feedstock delivered between January 2010 and March 2015.

B. Pricing Mechanism

3. **The CPP model has been in effect since January 2008 and operates on the principle that the final local currency price of petroleum products should cover all costs in the supply chain plus a fair profit margin.** The model involves two stages in the price buildup—wholesale and retail—each covering different costs incurred in the supply chain (Tables 1 and 2). As the margins at the different stages of the price buildup are largely fixed, changes in the overall cost are mainly determined by two variables: the international oil price and the exchange rate of the Zambian kwacha.

4. **The CPP model is applied to each shipment of petroleum feedstock going to the Indeni refinery with a view to determining the cost-reflective final sale price.** Direct imports of finished products have not been reflected in the model, a potentially important source of error in establishing the overall cost-reflective price given the growing role of such imports. The ERB employs a trigger band of 2.5 percent for price reviews. This means that, in principle, the retail fuel price should be adjusted whenever the computed change is beyond the trigger band.

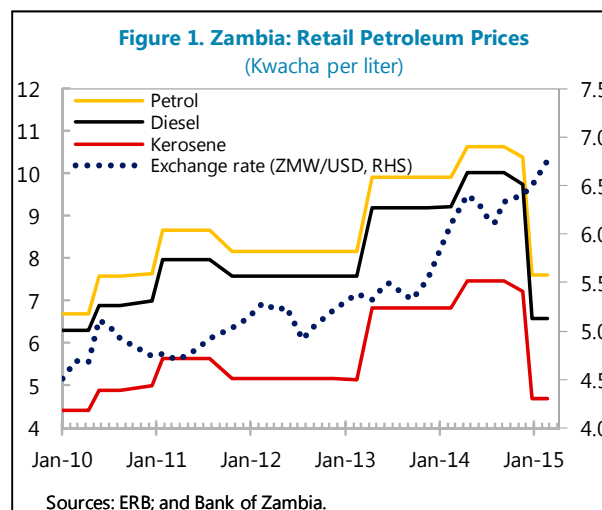
¹ Prepared by Grivas Chiyaba and Tobias Rasmussen.

² A blend of crude oil, condensate, naphtha, and gasoil (diesel).

³ The Tazama pipeline and Indeni refinery date back to the late 1960s and early 1970s and are near the end of their lifespans.

5. **Actual retail price changes have been relatively infrequent in recent years**

(Figure 1). Petroleum feedstock is imported roughly every six to eight weeks and the associated cost-reflective price has in most cases changed by more than 2.5 percent—a consequence of the volatility in feedstock prices and the kwacha exchange rate. Pump prices, however, were only changed on four occasions during 2010–11 and only two times from the start of 2012 to mid-2014. With international oil prices falling sharply in the second half of 2014, retail prices were adjusted down in late November and early December, 2014, and again in mid-January 2015.



6. **The failure to systematically adjust retail prices according to cost has resulted in implicit fuel subsidies being the norm.** Between early 2010 and mid-2014, retail prices in kwacha rose by close to 60 percent for both petrol and diesel. Measured in U.S. dollars, however, the price increases were lower at just under 20 percent, only about half of the almost 40 percent increase in the price of crude oil during the same period (Figures 2 and 3). In the second half of 2014, the drop in international oil prices led to the cost reflective price being below the retail price for some shipments. In January 2015, however, retail price reductions of over 20 percent were larger than warranted, resulting in the reemergence of subsidies.

Figure 2. Zambia: Retail Petroleum Prices
(U.S. dollar per liter)

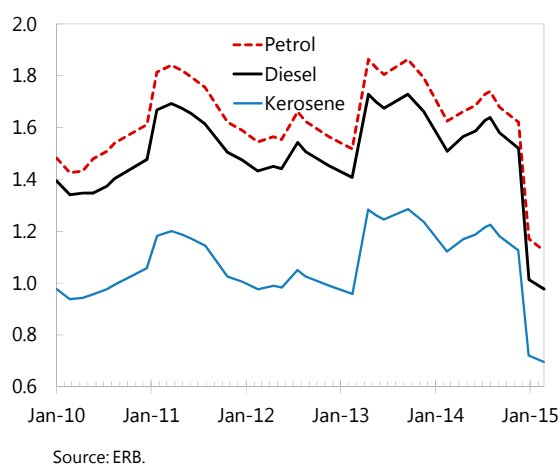
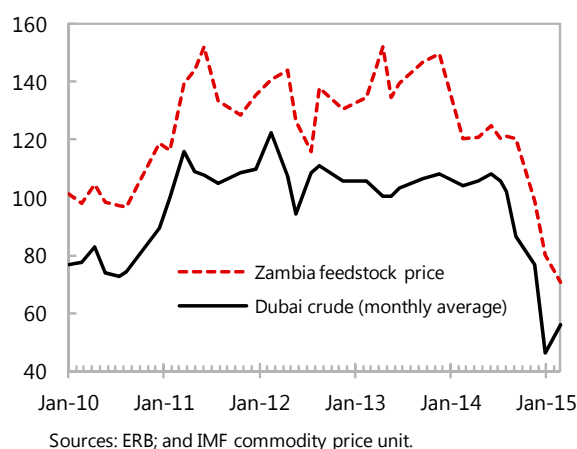


Figure 3. International Petroleum Prices
(U.S. dollar per barrel)



C. Costs

7. **The 35 cargoes of petroleum feedstock delivered to Dar-es-Salaam had a total CIF cost of US\$2,912 million (Table 3).** The cost of this feedstock broadly mirrored but was consistently higher than the international market prices for crude oil (Figure 3). Zambia's purchase price was on average \$26/barrel or 29 percent higher than the average price of Dubai crude in the month that the shipment was delivered. This price premium over Dubai crude reflected extra costs associated with transport to Dar-es-Salaam and the partially refined nature of the feedstock. The premium has varied from as little as \$7 to as much as \$52 per barrel, however, implying that other factors have been important too.

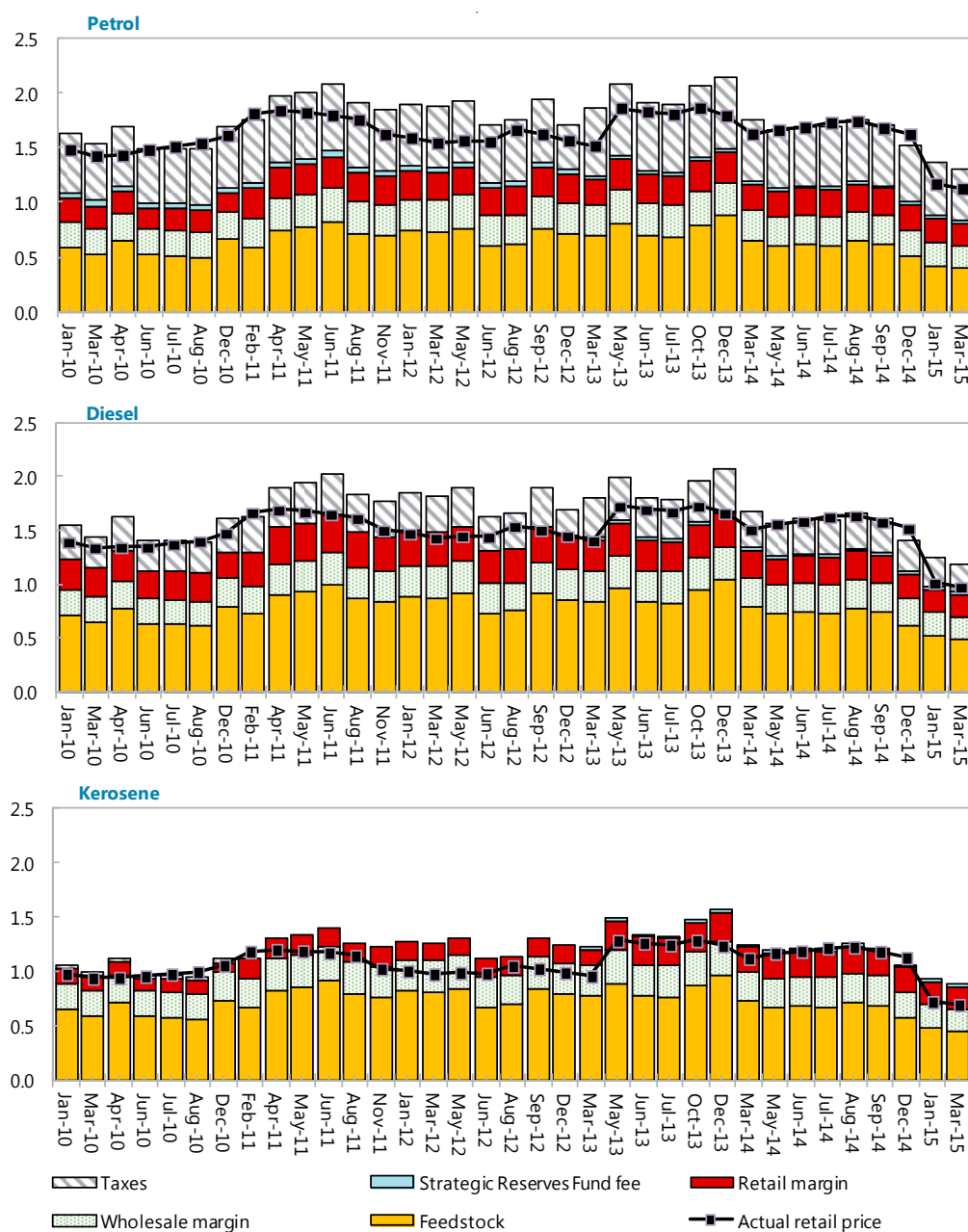
8. **The CPP model shows how the different components contribute to the cost buildup.** Feedstock has typically accounted for less than half of the cost of petrol and diesel but close to two-thirds of the cost of kerosene (Figure 4). Taxes have been the second largest cost component for petrol, smaller for diesel, and zero for kerosene. The data also indicate that the implicit subsidy, defined as the difference between the cost-reflective and the actual price, has for petrol consistently been smaller than the amount of taxes collected, whereas the subsidy for diesel has at times slightly exceeded the amount of taxes collected.

9. **Overall, using the parameters of the CPP model, we estimate the cost-reflective sales price of the final products coming out of the 35 cargoes of feedstock at US\$5,266 million.**^{4,5} Based on actual prices, we estimate the realized sales value at US\$4,755 million. The shortfall from full cost recovery is thus estimated at US\$511 million (on average about 0.4 percent of GDP). Figure 5 shows this revenue-shortfall by cargo, revealing how the subsidies reached over \$30 million for some shipments in 2012–13. The overall dollar value of subsidies for the two shipments in early 2015 were smaller at about \$20 million but, given lower international oil prices, this represented almost 40 percent of the cost of the feedstock, similar to peak levels in 2012–13.

⁴ This estimate tracks petrol, diesel, and kerosene (which account for about 80 percent Indeni's total production by volume) to the final retail stage. The remaining products (liquid petroleum gas (LPG), heavy fuel oil (HFO), Jet A1, and bitumen) are only tracked to the wholesale stage.

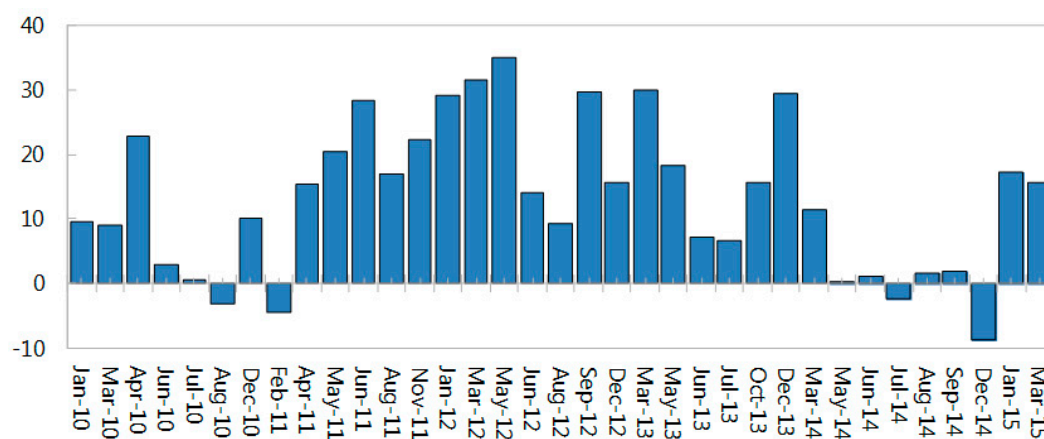
⁵ This is an estimate and not a precise figure, as there are some gaps in the available data. First, we do not have the actual volume of the final products produced at Indeni, but rely on theoretical conversion factors. A second unknown element is the applicable exchange rate, as payments for feedstock take place after the time of delivery. Here we assume that the actual exchange rate used is the one that applies at the time the next shipment is delivered. Third, we base our estimates on the transport margin applicable from Ndola to Lusaka as an approximation of the country-wide average. Forth, Zambia only adopted the system of country-wide uniform pump prices in September 2010 and for the period up to then we simply applied the Lusaka price. These data gaps could reduce or increase the estimated cost-reflective value of production but sensitivity analysis indicates that the estimated total shortfall would not change by more than at most \$50 million. Finally, for LPG, HFO, Jet A1, and bitumen, we do not have information to determine if there are subsidies incurred beyond the wholesale stage.

Figure 4. Zambia: Breakdown of Cost-Reflective Retail Prices
(U.S. dollar per liter)



Sources: ERB; and authors' estimates.

Figure 5. Estimated Retail Revenue Shortfall by Cargo
(Millions of U.S. dollars)



Sources: ERB; and authors' estimates.

10. **Given the fixed margins in the supply chain, any shortfall between the cost-reflective and actual sales value eventually has to be covered by the Zambian Government.** From the start of 2010 to March 2015 the Ministry of Finance released a total of about \$620 million for fuel subsidies, \$109 million more than the \$511 million estimated revenue shortfall. In addition, in early 2015 it was reported that as of end-February, there were subsidy payments due of close to \$260 million, adding to the gap between actual and estimated subsidies. This gap could stem from our estimates not covering subsidies related to direct import of refined fuel products or unrecovered costs beyond the wholesale level for LPG, HFO, Jet A1, and bitumen. Interest charges associated with payment arrears would also have contributed.

D. Zambia and South Africa Comparative Fuel Prices

11. **Despite the history of subsidies, fuel prices in Zambia are higher than elsewhere in the region.** Zambian retail prices of both petrol and diesel have from the start of 2010 to March 2015 averaged about \$0.33 per liter more than the inland price in South Africa, even though Zambian subsidies averaged about \$0.16 per liter and prices in South Africa are not subsidized. The price premium only dropped below \$0.10 per liter in May 2012 and March 2013 when Zambian subsidies peaked at close to \$0.40 per liter (Figure 6).

12. **That fuel prices are higher in Zambia than in South Africa reflects a combination of higher taxes and a more expensive supply chain.** Retail fuel prices in South Africa are set in a manner similar to that implied by Zambia's CPP model, which allows for direct comparison of fuel costs in the two countries (Figure 7). This comparison shows that the Zambian cost premium for petrol of \$0.45 per liter in March 2015 can be attributed to \$0.20 per liter more expensive wholesale fuel and \$0.27 per liter higher taxes. The cost premium for diesel of \$0.37 per liter reflects a difference in wholesale prices of \$0.22, a difference in the retail margin of \$0.18, and a tax difference

of \$0.11.⁶ While high fuel taxes are a policy choice, the high wholesale price in Zambia is indicative of an inefficient supply chain.

Figure 6. Zambia Price Premium Over RSA
(U.S. dollar per liter)

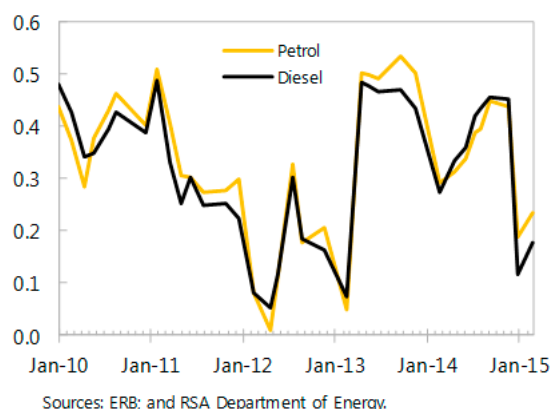
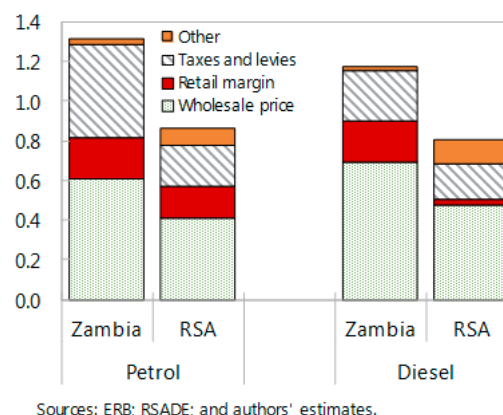


Figure 7. Breakdown of Cost-Reflective Price
(U.S. dollar per liter, March 2015)



E. Concluding Observations

13. **Retail fuel prices below the cost-reflective level have resulted in large bills to government in recent years.** The key to avoiding such costs is to regularly adjust fuel prices in line with the existing CPP model. Fuel price increases are never popular, but keeping retail prices unchanged in the face of higher crude prices or depreciation of the kwacha does not make the costs go away and only increases the size of the adjustment that eventually takes place. Regular and automatic adjustments would mean smaller and less painful price changes and would also help depoliticize the question of fuel pricing.

14. **Outside the CPP model, retail fuel costs are best reduced by addressing the reasons for the high costs in the supply chain.** Aging infrastructure and the associated outdated and inappropriate mode of fuel processing and transport, as well as inefficient procurement and general lack of competition, are contributing significantly to high fuel prices in Zambia. If addressing these obstacles would cut the premium of Zambia over South African wholesale prices in half, as should be possible given the similar distance from fuel export points, then this would allow for a roughly 10 percentage point reduction in retail prices.⁷

⁶ The "Other" category in Figure 6 reflects the Road Accident Fund charge in RSA and the Strategic Reserves Fund fee in Zambia.

⁷ Alan Whitworth argued in 2011 that removing the monopoly enjoyed by the Tazama pipeline and Indeni refinery and allowing competition from finished products transported by road and rail would reduce import costs by as much as 10–15 percent and have the added benefit of increasing the reliability of fuel supplies.

(<http://www.zipar.org.zm/documents/How%20to%20Reduce%20Zambia%E2%80%99s%20Fuel%20Costs.pdf>)

Table 1. Wholesale Price Build-up
(as of June 2014)

Cost Element	Unit Cost	Basis
Cost-Insurance-Freight (cif)		Contract/Supplier Invoice
Ocean Losses	0.30%	Best Practice
Wharfage	1.25%	Tanzanian Harbour Authority
Finance Charges	4.00%	Financier
Collateral Manager (US\$/mt)	0.39	Stock Monitoring Agreement
Insurance	0.15%	Insurer
Tazama Storage Fee (US\$/mt)	2.00	TAZAMA
Tazama Pumping Fee (US\$/mt)	54.00	TAZAMA
Tazama Pipeline Losses	1.45%	
Agency Fee (US\$/mt)	5.00	Agency Agreement
Refinery Fee (US\$/mt)	60.38	Refinery
Refinery Losses	9%	Determined by ERB
Terminal Losses	0.5%, 0.5%, 0.3%	Best Practice

Table 2. Price Build up for the Retail Price
(as of June 2014)

S/N	Details	Unit Costs	Calculations
1	Wholesale Price to OMC	Calculated from the wholesale price buildup	a
2	Terminal Fee	K0.025/litre	b
3	Excise Duty (incl.) road levy	K1.97/litre for petrol and K0.62 for diesel	c
4	Ex NFT Gate		$D=(a+b+c)$
5	Transport Margin (to Lusaka)	K0.17/litre	e
6	Transport Claim/charge	Varies by retail sites throughout the country	f
7	OMC Margin	K0.42/litre	g
8	15 days stock cost-line	Currently at K0.00/litre	h
9	Total (Excl VAT)		$J=(d+e+f+g+h)$
10	Dealer Margin	K0.28/litre	k
11	Price to Dealer		$L=(j+k)$
12	ERB Fees	0.70%	m
13	Strategic Reserves Fund	K0.15/litre for petrol, diesel and kerosene	n
14	Price before VAT		$Q=(l+m+n)$
15	VAT	16%	r
16	Uniform Pump Price	K/litre	$S=(q+r)$

Table 3. Zambia: Cost-Plus Model by Cargo

	2010	2011	2012	2013	2014	Jan-15	Mar-15
Cargo Tonnage (MT)	631,917	577,098	642,683	521,090	641,045	92,900	96,202
Total Monetary Cost (US\$ million)	479	580	634	552	560	55	50
International Petroleum Prices (US\$/bbl)							
Zambia Feedstock Cargo	102	135	133	143	118	80	71
Dubai Crude (monthly average)	78	108	108	104	98	46	56
Exchange Rate (ZMW/US\$, monthly average)	4.80	4.86	5.14	5.41	6.15	6.50	6.75
Volume to Terminal (M3)							
Petrol	188,530	184,071	204,990	153,448	185,500	26,883	27,838
Kerosene	63,548	28,137	31,334	27,198	33,918	4,915	5,090
Diesel	359,164	316,643	352,629	273,539	333,335	48,307	50,024
Other Products ¹	62,525	85,966	95,736	104,391	135,288	19,606	20,303
Total	673,766	614,817	684,689	558,576	688,040	99,711	103,255
Wholesale Price - Cost-Reflective (US\$/liter)							
Petrol	0.84	1.07	1.05	1.15	0.96	0.71	0.67
Kerosene	0.84	1.06	1.04	1.21	1.01	0.75	0.70
Diesel	0.99	1.26	1.23	1.31	1.09	0.80	0.76
Other Products Average	0.49	0.77	0.76	0.88	0.74	0.54	0.51
Wholesale Price - Actual (US\$/liter)							
Petrol	0.76	0.90	0.84	0.97	0.94	0.54	0.52
Kerosene	0.76	0.89	0.83	1.02	1.00	0.57	0.55
Diesel	0.90	1.06	0.99	1.11	1.07	0.61	0.59
Other Products Average	0.44	0.64	0.61	0.75	0.73	0.41	0.40
Retail Price - Cost-Reflective (US\$/liter)							
Petrol	1.58	1.93	1.84	1.99	1.69	1.38	1.31
Kerosene	1.02	1.27	1.23	1.40	1.20	0.92	0.87
Diesel	1.48	1.84	1.77	1.89	1.58	1.23	1.17
Weighted Average	1.46	1.84	1.77	1.90	1.59	1.26	1.20
Retail Price - Actual (US\$/liter)							
Petrol	1.50	1.77	1.59	1.77	1.68	1.17	1.13
Kerosene	0.98	1.15	1.00	1.21	1.17	0.72	0.69
Diesel	1.38	1.63	1.47	1.65	1.58	1.01	0.98
Weighted Average	1.38	1.66	1.49	1.66	1.58	1.05	1.01
Subsidy (US\$/liter)							
Petrol	0.08	0.16	0.25	0.22	0.01	0.21	0.18
Kerosene	0.04	0.12	0.23	0.19	0.00	0.20	0.18
Diesel	0.10	0.21	0.30	0.25	-0.02	0.22	0.19
Other Products ²	0.05	0.15	0.15	0.13	0.01	0.13	0.11
Weighted Average	0.08	0.19	0.28	0.24	0.00	0.21	0.19
Revenue Shortfall: Petrol, Diesel, Kerosene (US\$ million)	52	99	164	107	6	17	16
Cost-reflective Retail Value	894	976	1,040	862	881	101	99
Actual Retail Value	842	877	876	755	876	84	84
Revenue Shortfall: Other Products (US\$ million) ²	3	13	14	14	1	3	2
Cost-reflective Wholesale Value	31	96	72	92	100	11	10
Actual Wholesale Value	28	83	58	78	98	8	8
Total Revenue Shortfall ²							
US\$ million	55	112	179	121	7	20	18
Percent of GDP	0.3	0.5	0.7	0.5	0.0	0.6	0.6
Subsidy Paid by Treasury (US\$ million)	21	55	147	298	50	0	115

Sources: ERB and authors' estimates.

¹ Liquid Petroleum Gas (LPG), Heavy Fuel Oil (HFO), Jet A1, and Bitumen.² LPG, HFO, Jet A1, and Bitumen to wholesale level only.