Is Zambia contracting Dutch Disease?

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Acknowledgements

Abstract

The recent large increase in the price of copper has had a substantial impact on copper dependent economies, such as Zambia. This paper applies a traditional framework on the effects of an increase in natural resource revenues to analyse the extent to which the current copper boom is generating Dutch Disease effects in Zambia. While the increase in copper prices and exports has raised growth in Zambia, we argue that an increase in copper exports may also have less benign effects. For instance, the increase in copper prices has been a major driver of the real appreciation of the exchange rate over the last few years. Preliminary evidence indicates that this may have led to a movement of resources away from certain non-traditional tradable sectors towards non-tradable sectors. The potential negative impact on non-traditional exporting sectors may offset (in part) the positive short-run effects on growth and an improved trade balance. To counter such challenges, the non-traditional tradable sector needs to become more competitive, or face possible relocation, thereby further increasing the dependency on copper as the dominant export. Although inflation is decreasing somewhat, the pace of this decline appears to be more sluggish than the pace of the exchange rate appreciation would have enabled, suggesting incomplete pass through of an exchange rate appreciation onto cheaper domestic prices. Zambia could be looking at other more successful experiences (e.g. Chile) for ways to capitalise on the copper boom through the management of windfall revenues.

Contents

1. Introduction

The volatility in commodity prices can still pose serious challenges for commodity dependent economies. In a period of rising commodity prices, understanding the effects of both beneficial and adverse sudden changes in prices is vital to enable a country to use such booms to harness its economic development process. Natural resources booms still prove to be a mixed blessing for developing countries as policy-makers respond to the challenges posed by the booms in very different ways.

The recent large increase in copper prices (driven mainly by China and India's boost in demand for copper) offers a valid example of such challenges, as it has had a substantial impact on copper dependent economies, such as Zambia. The copper boom in Zambia has coincided with at least three other factors potentially causing an appreciation of the exchange rate: a write-off of the external debt, an increase in non traditional exports (NTEs) and a higher inflow of foreign aid. These factors have jointly contributed to a steep appreciation of the real exchange rate since 2004 and to a variation of relative prices in the economy, which may have a substantial impact on the country's economic development path. This has spurred a heated debate on the possible policy options to minimise the potential negative effects on the economy. This paper contributes to this debate by analysing the impact on the Zambian economy of the recent large inflow of foreign exchange in the context of the literature on the Dutch Disease, i.e. the adverse impact of a sudden discovery of natural resources on the national economy via the appreciation of the real exchange rate and the decline in export competitiveness.

In particular, the study analyses the short-term effects of the copper boom and the resulting exchange rate appreciation in Zambia. Moreover, it suggests possible ways though which long-term effects operate and it discusses what possible policies may help to maximise the benefits from the large inflow of foreign exchange and minimise its potential negative impact.

Our findings suggest that the increase in copper exports has been a major factor in the real exchange rate appreciation. Until 2005 this appreciation has not caused a reduction in most NTEs (i.e. non traditional goods' exports), as would be predicted if Zambia suffered from the Dutch Disease. There are two reasons why this may be the case: first, the squeeze in profit margins for most NTEs has not been sufficient to make exports unsustainable; second, the major effects of the appreciation on competitiveness have manifested themselves mainly in 2006, for which data are not yet available.

It is important to note from the beginning that the paucity of data is an important limitation to the analysis throughout the paper. As the copper boom is still ongoing, long data series are not available; and are often not available in the time frequency required for formal quantitative analyses. Notwithstanding these limitations we believe that detailed analyses of the impact of the boom at the country level, such as the one presented here, are needed in order to go beyond the conventional wisdom on the subject and concretely help policy-makers maximise the benefits from these shocks. Moreover, embedding the short-run analysis into the long-run one, enables us to suggest policy questions for further research.

The structure of the paper is as follows: the next section describes the theoretical potential impact of a resource boom; section 3 tries to apply the theoretical framework to the analysis of Zambia's data; section 4 concludes indicating some possible policy options and questions to be addressed.

2. The possible effects of the increase in natural resource revenues

It is by now well acknowledged that the sudden inflow of large foreign exchange into an economy may turn into a mixed blessing for its economic development prospects. This is true both when the inflow is determined by the sudden development of a natural resources sector, following for example the discovery of large reserves (Corden and Neary 1982, Gelb 1998) and when it is due to other factors, such as aid inflows (Adam and Bevan 2006, IMF 2005, Killick and Foster 2006). Such an external shock is expected to produce substantial short- and long-run impact on the economy. We review here the main channels of this impact using the traditional framework of Dutch Disease analysing the effects of the discovery of a large amount of a new natural resource adapted to a developing country as Zambia.[1]

2.1. Short-run effects

There are two general short-run effects of a natural resource boom on the economy: resource movement and resource spending effects. In order to illustrate those we divide the economy into three sectors: a tradable natural resource sector (T), a tradable non-traditional sector (e.g. agriculture, A) and a non-tradable sector (i.e. services S).

The *resource movement* effect is determined by the increase in the relative return to the booming T sector, which draws resources from the other two sectors.[2] The most realistic assumption in the short-run is that labour is the only factor of production mobile between sectors. The excess demand for labour by sector T should cease when real wages are equalised across sectors at a higher level. The movement of resources would reduce the supply capacity of sectors A and S: while the excess demand in the former could be met through imports, the increased demand for services would be absorbed via a rise of the price of non tradables relative to tradables, i.e. an appreciation of the real exchange rate.[3] The magnitude of this effect clearly depends on the extent to which the resources used by the booming sector T are compatible with the other sectors in the economy. Typically the mineral sector forms an enclave within a developing country's economy, with few links to the other sectors (Benjamin et al. 1989). The copper sector in Zambia confirms this pattern, thus we would expect the resource movement effect not to be particularly severe in Zambia.

In order to describe the *spending effect*, it is convenient to assume that T does not demand labour from the other sectors and to concentrate on the way the increased income from the discovery of the natural resource is actually spent. Provided that both sectors A and S produce normal goods, then the demand for these sectors should increase following the boom in T. Given the relative prices of the economy, there would be excess demand for S, which would have to be met via an appreciation of the real exchange rate.[4] This in turn would raise the return to S relative to A determining an expansion of S through resources drawn from A.

Both effects have a clear outcome in terms of relative prices: the price of non tradables relative to tradables should rise, determining a *real exchange rate* (RER) *appreciation*. The RER can be defined as:

$$q = e \frac{P_{NT}}{P_T^*}$$

where e is the inverse of the nominal exchange rate (i.e. how many units of foreign currency are needed for one Kwacha) and P_T^* and P_{NT} are the prices of tradable (expressed in foreign currency) and non-tradable goods (in domestic currency) respectively. A rise in q represents a real appreciation of the

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[1] We mainly follow the classic 'Australian model' of international trade developed first by Corden and Neary (1982), and try to adapt it to the Zambian context.

[2] The increase in the relative return could be driven either by a boom in the international price of T or by the discovery of large quantity of T (in the latter case the return increases from 0 to positive).

[3] This would not be the case if there was spare supply capacity of services which may be employed to meet the increased demand.

[4] Again, with fully employed resources, the higher demand for A could be met through imports without changing the nominal price.

currency and is determined by a rise of P_{NT}, of e or both relative to P_T^*.[5] In the analysis below we use a popular extension of the RER: the Real Effective Exchange Rate (REER), which is the trade-weighted RER with the nominal exchange rate and tradable foreign prices defined as:

$$e = \sum_{i=1}^{n} e_i \omega_i \text{ and } P_T^* = \sum_{i=1}^{n} P_{Ti} \omega_i$$

where e_i and α_i are the nominal exchange rate between Zambia and country i and the share of country i in Zambia's trade respectively, P_{Ti} is the tradable price in country i, and all i= 1,...n are Zambian trading partners.

The real appreciation of the currency has important potential effects on the *current account* of the country through its influence on the pattern of international trade. Typically if the increase in exports of T (due to higher prices and/or higher volumes) is larger than the decrease in export of A (due to the lower international competitiveness of the sector), the current account should improve. There is no ex ante prediction about the evolution of the current account, although a decomposition of sector A may help to gauge the extent to which its exports may be undermined (the higher the share of imported inputs used, the less negatively affected the sector would be).

The interaction between the resource movement and spending effects determines the likely impact of the natural resource boom on *sectoral output* and *real wages* as well. Sector T should unambiguously expand because of the resource movement effect, while sector A should shrink due to both effects. The effects on S are ambiguous and would depend on which of the two effects prevail. Because of the reduced resource movement effect expected from the copper industry, S is likely to expand in the case of Zambia. If this may well be the general prediction, it would also be useful to distinguish the effects on the various sub-sectors of A according to their use of domestic factors of production and their substitutability with foreign goods.[6] The impact on real wages is theoretically ambiguous: the resource movement effect tends to increase the real wage, as production of both S and A shrinks; the spending effect causes the wage measured in terms of A to increase, while the wage in terms of S decreases. The net impact will therefore depend on the relative magnitude of the two effects, as well as on the relative weight of S and A in the consumption basket: the higher the share of S, the more likely the real wage is likely to fall. As the resource movement effect is likely to be limited in the case of copper in Zambia, the actual effect on real wages is expected to be mainly determined by the share of S and A in consumption.

The same lines of argument apply also when an aid inflow is the source of the foreign exchange. If the additional aid is spent (and not saved), this may generate a resource movement effect to the extent that it is spent through an 'aid' sector. The spending effect would materialise through increased demand for goods and services provided additional aid is spent and/or it is absorbed.

On the *fiscal side*, the commodity boom should generate windfall revenues for the government due to higher revenues from increased production and employment in the booming traditional sector. The size of windfall revenues also depends on the indirect effects of the natural resource boom related to the eventual growth of the economy. As the natural resource sector is usually either owned by the state or heavily taxed (if owned by the private sector), the direct effect on fiscal revenues is likely to be quite substantial. As the government is often able to manage a significant part of the additional inflows from a natural resource boom, the impact of windfall revenues is crucial to minimise the risk of Dutch Disease. This is true both in the short-run (e.g. via saving a part of the additional resources so as to cool-off some excess demand and relieve pressure on the exchange rate) as well as in the long-run (e.g. via productivity enhancing investments which increase the industry competitiveness).[7] However, as the

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[5] The rise in e can be produced by the increase in demand for domestic currency following the natural resource boom; the increase in relative prices of non tradables may come about due to the excess demand for S described above.

[6] See Benjamin et al. (1989) for an argument on the imperfect substitutability of some manufacturing goods with foreign goods in developing countries.

[7] This argument is even reinforced in the case of aid inflows, as most of it is actually managed directly by the public sector.

applied tax rate in the Zambia copper sector is relatively low, windfall revenues following the copper boom may be limited.

2.2. Long-run effects

Can the effects of a natural resource boom be persistent over time even once the boom has finished (e.g. the natural resource has exhausted or the price has fallen again)? The answer seems to be positive according to Sachs and Warner (1999), who analyse several natural resource booms in Latin America, finding that in most cases booms had negative long lasting effects on growth. As manufacturing is considered to be the only sector with a high level of learning-by-doing, one popular explanation for such negative influence relates to the bias against the anti-non traditional traded sector (usually manufacturing) that natural resource booms bring about.[8] This argument is in line with cross-country evidence, which identifies the Dutch Disease effects of shifting labour away from high learning-by-doing sectors as the main factor responsible for the negative relation between natural resource abundance and growth (Sachs and Warner, 1997).

However, the assumption that natural resource production comes systematically at the expenses of manufacturing and learning-by-doing (and thus long-term economic growth) is challenged by Stijns (2000), who shows that abundance of certain types of natural resources may in fact be positively correlated with channels favourable to a country's growth. This is true for example for oil and gas reserves whose presence is associated with better education, more market-oriented economic policy and more favourable investment-saving characteristics. The long-run effects of a natural resource boom would therefore need to be considered in the light of the learning process generated by the natural resource sector and the flexibility of the economy to take opportunities. In the case of Zambia, a few questions may need to be asked to assess the potential long-term impact of a copper boom: is learning-by-doing a characteristic only of the manufacturing sector in Zambia? Is the copper sector able to create positive externalities? Is the copper boom restraining the production of dynamic externalities from the other sectors (e.g. less imports of sectors with increasing returns)?

One crucial way in which a resource boom may influence the long-run growth pattern is through the management of windfall revenues. Whether these extra resources are used to increase productivity or to boost demand for consumption can have very different effects indeed. For example, these resources may be used to help specific shrinking sectors of the economy, identified as important for long-run growth, to buffer future terms of trade shocks related to commodity prices' volatility. Deaton (1999) argues that even temporary commodity price booms may provide a potential source of funds for investment important to sustained growth, and one of the main problems in Africa has actually been the low quality of investments. This argument is in line with theoretical models suggesting that supply-side public investment may offset in the long-run the loss from decreasing amount of non-natural resource exports and the learning by doing associated to it.[9]

There are two main issues to be addressed when evaluating the policy options for managing these revenues effectively. On the one hand the size of the revenues depends on the ownership of the resources and/or the possibility of appropriating part of the rent from the sector. On the other hand the way in which the resources are managed is mainly dependent upon the quality of the government. Obviously corrupt and incompetent governments may use windfall revenues for personal interests (e.g. 'buying-out' votes for their re-election), thereby deteriorating the long-run pattern of development.

Finally empirical studies seem to suggest that the real appreciation of the exchange rate may have an adverse impact on medium and long growth. Gupta et al. (2005) found that virtually all cases of sustained growth in sub-Saharan Africa have avoided overvaluation of the exchange rate. Hausmann et al. (2004) showed that medium term economic growth can be accelerated by a depreciation of the real exchange rate. This may provide an extra note of caution when assessing the way in which resource

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[8] Because of the high learning-by-doing component, the manufacturing sector is best placed to increase labour productivity in the long-run, which eventually drives growth. In formal models the learning-by-doing component is usually captured by assuming that manufacturing enjoys increasing returns to scale.

[9] See for example Adam and Bevan (2006), whose model considers aid financed public expenditure. The same argument may apply to windfall revenues from commodity boom.

booms (or any other type of shocks generating large inflows of foreign exchange) may affect the exchange rate.

3. The Zambian experience[10]

Zambia had one of the most disappointing rates of growth in southern Africa until 2001 (Table 1), despite a programme of extensive economic reforms aimed at liberalising a heavily regulated economy in mid-1990s.[11] Much of this sluggish growth can be attributed to several factors including lack of good infrastructure (both physical and human), the country's geographical conditions (landlocked economy surrounded by low income countries), its heavy dependence on highly volatile primary products, a very unfavourable disease environment with a high incidence of HIV/AIDS and poor governance.[12]

A recovery began in 1995–2000 and continued in 2001–02, led mainly by the NTE sectors (all of which are non-metals). This was shortly before the increase in copper prices in 2003, when the acceleration of such recovery occurred, turning Zambia into one of the fastest growing economies in Southern Africa. Given Zambian export sector's heavy dependence on copper, booming international copper prices seem to have spurred the country's current significant growth, with real GDP growth averaging around 5% between 2003 and 2005 (World Bank 2006).

Table 1 GDP growth in Southern Africa (average annual growth)

	GDP % growth 1990–95	GDP % growth 1995–2000	GDP % growth 2001–04
Lesotho	3.57	2.53	2.74
Malawi	2.63	3.52	1.15
Mozambique	2.92	7.72	8.01
Namibia	4.49	3.14	2.69
South Africa	0.73	2.46	2.69
Tanzania	1.55	3.69	5.94
Zambia	**-1.14**	**2.47**	**3.84**
Zimbabwe	1.03	1.69	-5.22*

* Data available for 2000–02 only. Calculations based on 2000 constant US$ data.
Source: World Bank (2006)

3.1 The short-run effects of the copper boom

The rise in international copper demand has spurred a significant increase in the value of Zambian copper production and exports, as documented in Chart 1. The monthly value of production and export has increased ten- and nine-fold respectively between January 2003 and July 2006, with the bulk of the rise occurring since the second half of 2005. Given the high dependence of Zambian exports on copper, such a large copper boom may have the same potential effects on the economy as the discovery of large reserves of natural resource.

Real Exchange Rate

One question is to what extent the boom is responsible for both the recent nominal and real exchange rates appreciation experienced by the Kwacha vs. the main currencies (e.g. the Kwacha appreciated vs. the dollar by over 30% between January 2005 and May 2006). Chart 2 shows the extent of the recent appreciation, by plotting the REER between 2003 and 2006. In order to answer this question we would need to isolate the impact of the copper boom from the other determinants of capital inflows. In fact

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[10] Most of the data on which this analysis is based are drawn from Calì et al. (2006).

[11] The programme included the liberalisation of the exchange rate, of international trade and of the banking sector, the privatisation of state-owned enterprises and the decontrol of agricultural prices.

[12] According to Transparency International, Zambia's rating of the level of perceived corruption has been ranging between 2.6 and 3.4 between 2000 and 2005 (where 0 refers to completely corrupt and 10 completely free of corruption).

during the same period a number of other factors have determined an increased demand for Kwacha, which may have been responsible for the recent appreciation. Such factors include:

- the recent attainment of HIPC (Highly Indebted Poor Countries) Completion point, which has spurred the cancellation of a significant part of Zambian foreign debt.[13] On the one hand this has reduced the debt servicing burden for the country (denominated in dollars);[14] on the other hand the HIPC completion point usually sends a general signal of prudent macroeconomic policies and of domestic fiscal discipline, thereby stimulating both domestic and (particularly) foreign investments.[15]
- the expansion in NTE, whose value in dollars has more than doubled between 2000 and 2005, and has increased by 36% between 2003 and 2005.
- the current contraction in Zambian monetary policy, which reduces the available amount of domestic currency.

Chart 1. Monthly value of Zambian copper production and exports. (USD m)
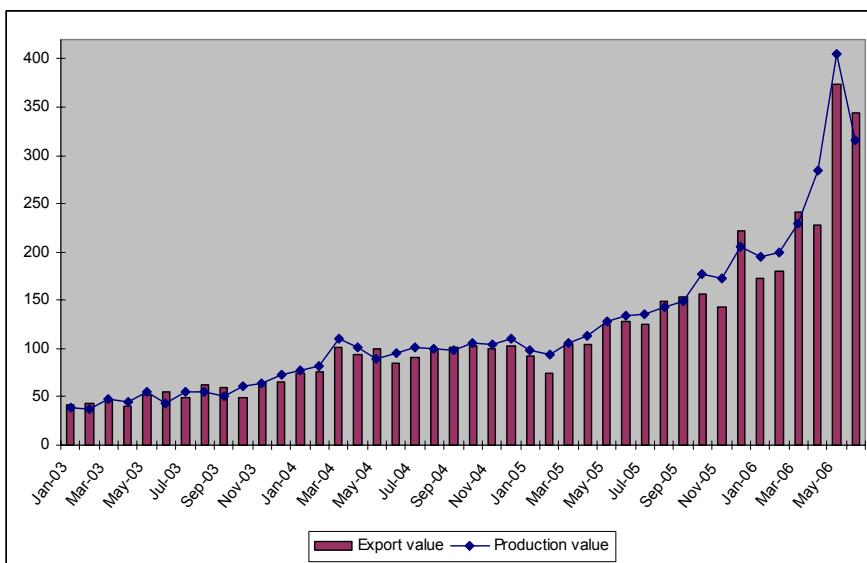
Source: Bank of Zambia, various issues

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[13] The external debt has dropped in few years from US$ 7.1 billion to US$ 500 million (Mhango, 2006).

[14] The official interest payment dropped from US$ 137 million (or 1.3% of GDP) in 2002 to US$ 110 million (or 0.4% of GDP) in 2005 (IMF, 2006d).

[15] For example it is believed that Citibank has invested over US$100 million in various government instruments (treasury bills, bonds, etc) denominated in kwacha (Osafo-Kwaako, 2005) and foreign investors currently hold 57% of government bonds (Mhango, 2006). Foreign investments increased by 56% in the first five months of 2006 (Mhango, 2006); most of FDI are anyway related to the mining industry. Mining was responsible for USD 240 mn in 2001, a quarter of the total FDI stock of USD 1.1 bn.

Chart 2:. REER evolution for Zambia
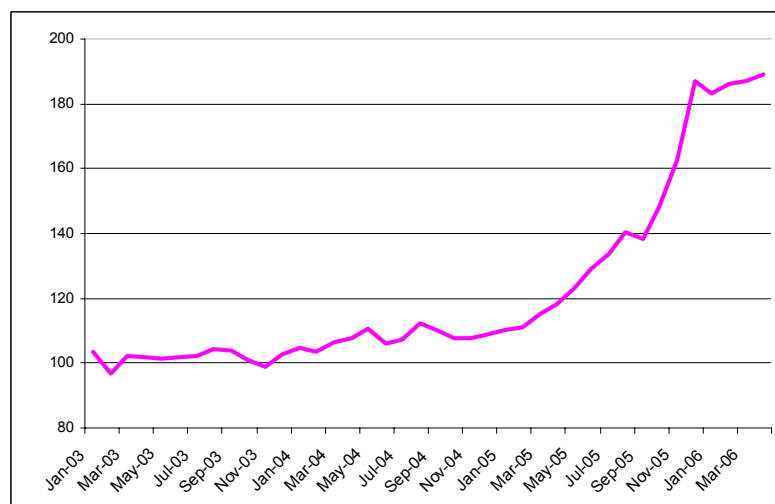
Source: IMF (2006a)

Despite Zambia's high dependence on foreign assistance and the intention of donors to scale up development assistance to the country, there is no evidence of a major role that aid inflows have played in the appreciation of the Kwacha. Table 2 details the flow of gross official assistance to Zambia, which in fact shows a decline between 2004 and 2005. We decide to use gross official assistance from Balance of Payments data instead of the OECD official development assistance ones (also reported in the table), as the former is a closer proxy for aid channelled into the country. ODA figures include items such as debt relief, which do not represent flows of foreign exchange into the country.

Table 2: Gross official assistance to Zambia (USDm)

	2000	2001	2002	2003	2004[a]	2005[b]
Gross official assistance	457	527	685	416	668	577
ODA	795	349	641	581	1082	NA

a. Preliminary; b. Projected
Source: IMF (2006d) and OECD (2006)

Unfortunately we do not have enough data to assess the exact role of the various potential determinants of the appreciation. For a meaningful analysis we would need at least quarterly data for several years, which we do not have for any of the three factors. However, we use the data available on copper exports and copper prices to make inferences on the relative role of the copper boom. The copper boom effects on the currency should come about through both the price and the quantity of copper exports of the country. These variables are obtained on a monthly frequency from the Bank of Zambia, while the monthly copper price is taken from the International Financial Statistics (IMF 2006a). We are able obtain the export value of copper for Zambia between January 2003 and August 2006. We use the average Zambian monthly REER as calculated by IMF (2006a).16 Simple regression analysis (as in Table 3) shows that copper export values can explain 87.5% of the variation in REER between January 2003 and April 2006 (column 1) and 90% (column 3) of the variation between 2004 and 2006. The correlation between the two variables is also extremely high in both cases. As expected, the explanatory power of copper price is lower, although still very high and close to the levels of the export value (column 2 and 4). Although the coefficients in these regressions are probably biased as they are likely to capture the effects of other omitted variables, the power of these results is still striking. As copper price appears to be a good proxy for export values, we also try to test its long-run relationship

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[16] Data are available only up to April 2006.

with REER (between 1985 and 2006). The effect of copper price on REER is still very significant, but the explanatory power is reduced, as it is expected over a much longer period of time (column 5). This seems to point to the large influence that several other factors, such as those described above, may have exerted on Zambian REER during the last 20 years. Taken at their face value, these results suggest that the recent real exchange appreciation of the Kwacha seems to be driven mainly by the copper boom. Relative prices have adjusted in response to the increased copper exports through an appreciation of Zambian nominal bilateral exchange rates.

Table 3: Correlation between REER and the copper boom

Period	2003–06		2004–06		1985–2006
	X value	Copper Price	X value	Copper Price	Copper Price
Correlation	0.9436	0.904	0.949	0.942	0.466
R Square	0.887	0.818	0.900	0.887	0.217
Coefficient	0.514	0.023	0.613	0.031	0.015
t-statistics	16.343	13.058	15.285	14.264	8.401
Observations	40	40	28	28	256

Source: Bank of Zambia (various issues) for export values and IMF (2006a) for REER and copper price

This result receives some support by an analysis of the composition of Zambian exports over the past ten years (Chart 3). Despite the rise in NTE, the metal sector has substantially increased its share in exports over the last four years (accounting for three quarter of total exports in 2005 versus 60% in 2002). On the margin the boost in metal exports is likely therefore to have a much higher impact on the economy (and thus on the exchange rate) than the increase of NTE.

Chart 3 Composition of Zambian exports, (US$ million and %)
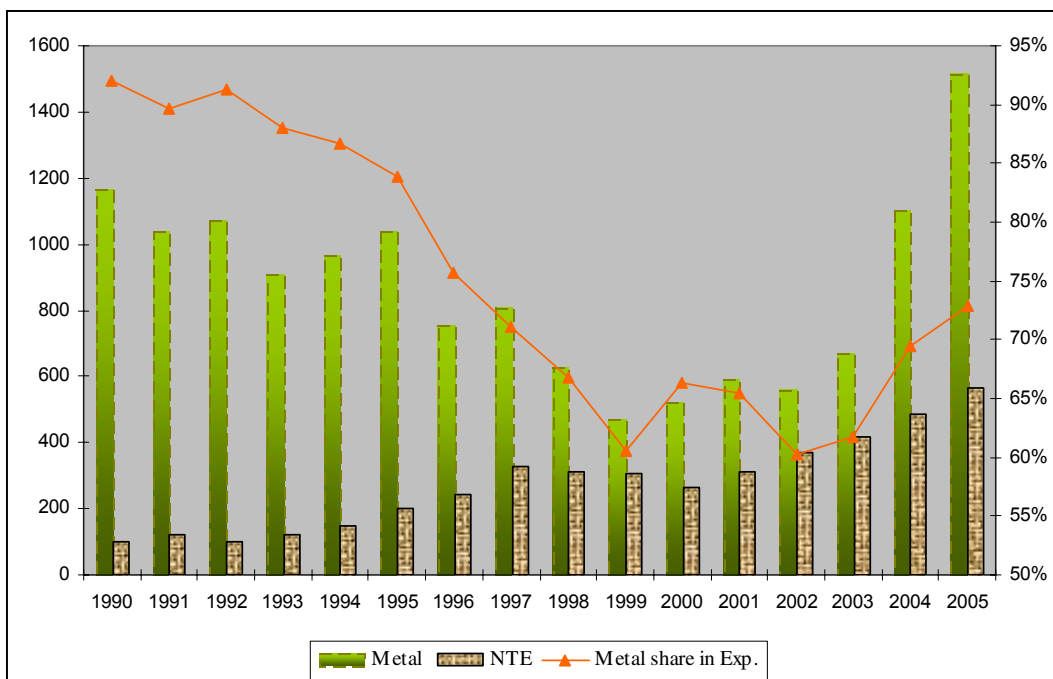
Note: Unit for metal share in exports is on the right scale
Source: Export Board of Zambia

Sectoral output

The crucial role played by the copper boom in driving the REER appreciation suggests that resource movement and spending effects are operating in the Zambian economy. There is no explicit way of testing the relative magnitude of the resource movement vs. the spending effect in the case of Zambia. However, the relative changes in sectoral size may provide some insight on the magnitude of the resource movement. We conjectured that given the scarce links of the copper sector in the economy, the resource movement effect may be somewhat limited. We would then expect that the non-tradable sector (services) may expand at the expense of the non-traditional tradables.

In order to test these hypotheses, we use two types of data: domestic value added data and NTE data. The former may help disentangle macro-sectoral movements in the domestic production structure, the latter data may allow us to focus on the non-traditional tradable sector. However, a significant proportion of Dutch Disease type effects may manifest itself later than 2005, since the part of the REER appreciation has taken place since the end of 2005 (see Chart 2 above).

Table 4 shows the sectoral composition of real GDP. The data indicates that both mining and non-tradable sectors have expanded between 2003 and 2005 relative to the other tradable sectors (mainly agriculture and manufacturing). These findings seem in line with the theoretical prediction that the copper boom is determining a movement of resources towards non-tradables (in particular construction) and mining. However, we cannot exclude that these are in fact long-term trends, which are largely independent of the copper boom. In fact the non-tradable sector has been growing since 2000, the mining sector had grown between 2000 and 2002 already, while agriculture's decline dates back several years. Manufacturing seems to be the sector which has mostly suffered during the REER appreciation, and its weight in GDP has gone back to the level of 2002.

Table 4: Composition of GDP (at 1994 constant Kwacha)

	2000	2001	2002	2003	2004	2005[a]
Non-booming tradable	**30.6**	**29.5**	**28.8**	**28.8**	**28.5**	**28.0**
Agriculture, Forestry and Fishing	17.2	16.0	15.2	15.2	15.0	14.7
Agriculture	8.5	7.6	6.9	7.1	7.2	7.0
Manufacturing	10.5	10.4	10.7	10.9	10.9	10.7
Electricity, gas and water	2.9	3.1	2.9	2.7	2.6	2.6
Booming tradable	**6.4**	**7.0**	**7.9**	**7.7**	**8.4**	**8.2**
Mining and quarrying	6.4	7.0	7.9	7.7	8.4	8.2
Non-tradable	**56.8**	**57.2**	**58.2**	**58.7**	**59.2**	**60.4**
Construction	4.9	5.3	6.0	6.9	7.9	9.0
Wholesale and retail trade	18.3	18.4	18.7	18.8	18.8	18.9
Restaurants, bars and hotels	1.9	2.3	2.3	2.4	2.4	2.5
Transport, storage and comm.	6.3	6.2	6.1	6.1	6.1	6.3
Financial Institutions and insurance	8.2	7.8	7.9	7.7	7.6	7.5
Real Estate and Business services	9.5	9.4	9.5	9.4	9.3	9.2
Community, social and personal services	7.7	7.8	7.7	7.4	7.1	7.0
Less:	-4.9	-4.8	-4.7	-4.6	-4.5	-4.4
TOTAL	89.1	88.9	90.0	90.7	91.5	92.2
Taxes	10.9	11.1	10.0	9.3	8.5	7.8
TOTAL GDP at Market prices	100.0	100.0	100.0	100.0	100.0	100.0

a. Preliminary data
Source: Government of Zambia (2006)

The expansion of the mining sector is evident looking at the increase in the monthly volume of copper production in Chart 4. The growth in volume is steady except for a drop in early 2005, which may explain the small loss of relative share in GDP of mining between 2003 and 2004. Preliminary evidence for 2006 seems to suggest a further expansion of the sector during this year as well.

The real appreciation of the domestic currency has usually a direct impact on the relative international competitiveness of the tradable sectors. As these sectors sell their goods in foreign

currency while a significant part of their inputs are denominated in local currency, their margins are likely to be squeezed because they are likely to be price-takers, and eventually some firms may be driven out of the market. This is particularly true for those sectors which use a high share of domestic inputs in the production, such as labour-intensive industries, which include the NTEs in Zambia. Firms in the agricultural sector or agro-processing sectors which comprise almost half of NTEs, are likely to be strongly affected by rising relative domestic labour costs and inputs relative to foreign costs. As the majority of the NTE sectors are likely to be labour-intensive, there may be severe consequences of an appreciating exchange rate on poverty reduction in Zambia.

Chart 4: Monthly volume of Zambian copper production (metric tonnes)
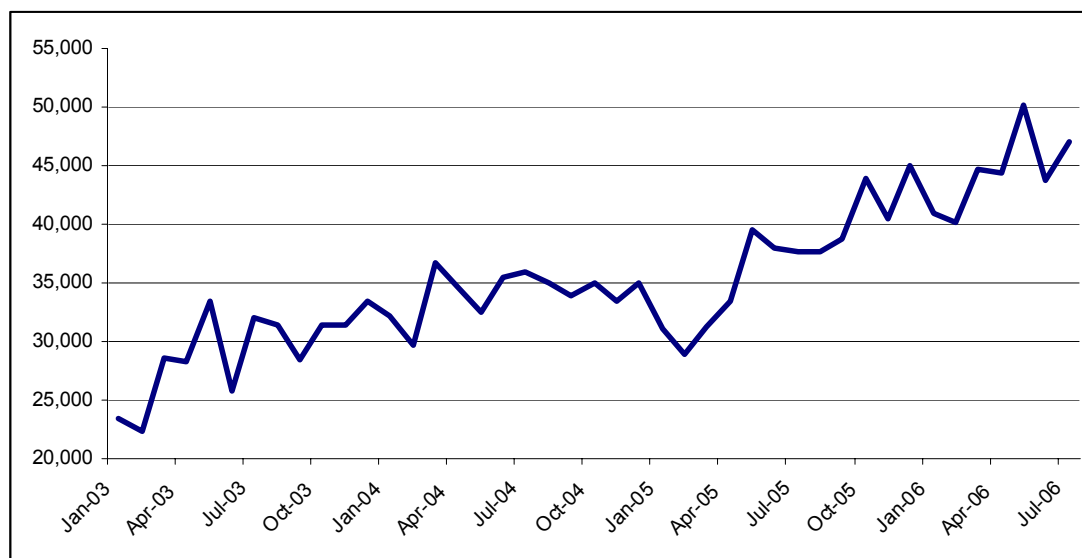
Source: Bank of Zambia (various issues)

However, the data on NTEs in Table 5 suggest that the negative effects of the RER appreciation have not yet been significantly felt as of 2005. With the exception of horticulture (which fell in 2005), most agricultural exports have either grown or remained stable. Cotton (which together with tobacco forms the bulk of primary agriculture exports), sugar (the main processed agricultural export) and floriculture exports kept growing in 2005.[17] Tobacco exports remained stable at the same level of 2004, after significant growth in the previous years. Agricultural exports as a whole have increased by US$ 40 million, or 15% between 2004 and 2005, a lower rise than in the previous period. Given the available data, it is not possible to ascertain the extent to which this slower pace of growth may be due to the RER appreciation.

In general all NTEs have grown throughout 2005 following the trend of the preceding years, with the main exception being manufacturing (whose exports have decreased) and with textile remaining stagnant. Driven by a buoyant copper processing industry, engineering products exports appear to be expanding at a rapid pace.[18] The industry represents the most important example of forward linkage of the copper extractive industry. It consists of three specific groups comprising semi-finished and finished non-ferrous metals, finished metals and other engineering products.[19] However, a further increase in copper prices may represent a potential obstacle to the sector's development, as copper is

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[17] The growth in sugar exports is also driven by the extension of Zambia's sugar quota to the EU through the Everything But Arms initiative, which will continue increase the quota until 2009, when all quota restrictions will be eliminated. Zambia is set to benefit from this liberalisation in terms of increased sugar exports and production, as in the model by Keck and Piermartini (2005).

[18] Other than local copper, there is some evidence of large quantities of copper imported from DRC to be processed in Zambia.

[19] Specific products include bare copper wire, copper rods, building wires, power cables, telecommunication cables, non-ferrous metals, metal rail sleepers, bolts and nuts, rock drilling and other mining equipment, ingots, billets and carbon brushes.

the main input of production.[20] Taken at their face value, these data indicate that the expected effect of the RER appreciation may have manifested itself only for a few NTEs (horticulture, manufacturing and to a certain extent tobacco). It is outside the scope of the paper to assess whether the poor performance of these few NTEs has been caused by product-specific factors (e.g. the growing competition in textiles brought about by the end of the Multi-Fibre Agreement in 2005) or by a differential impact of the RER appreciation, which will eventually affect 'the rest' as well. Such assessment would become easier once more data become available (e.g. data for 2006, when the appreciation may have imposed a higher cost to businesses).

Table 5: Composition of non-traditional exports (current US $ million)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Animal Products	1.4	1.7	3.4	4.1	4.4	3.4	3.1	5.2	3.6	2	2.1
Floricultural	13.5	18.3	21.3	32.9	42.7	33.9	34.1	30.3	22.4	26.8	32.1
Horticultural	4	8.9	15.9	20.6	23.9	27.4	36.4	44.9	46	35.9	20.5
Primary Agriculture	24.1	37.9	90.9	62.2	75.5	37.1	51.4	76.5	97.9	163.7	197.0
Cotton	5.2	7.8	44	17.1	9.2	9.5	15.6	30.2	32.3	54.8	81
Tobacco	4.8	9.1	15	8	8.5	12	9.5	27	36.1	55.1	57.9
Processed Agriculture	25.2	33.8	30.9	49.4	33	35.6	43	43.7	43.9	49.8	66.9
Sugar	25	33.8	30.8	33.6	23.1	22.8	37	35.1	35.2	36	65.3
Total Agriculture	**68.2**	**100.6**	**162.4**	**169.2**	**179.5**	**137.4**	**168**	**200.6**	**213.8**	**278.2**	**318.6**
Wood Products	1.4	1.8	3.4	3.2	3	3.9	3.8	3.2	3	0	3.5
Building Material	3.2	7.9	12	8.6	10.2	8.7	7.1	8.2	11.1	8.3	8.4
Chemicals	2.4	3.1	7.8	6.9	5.9	7	6	14.4	9.7	9.8	20.6
Engineering Products	39.4	36.5	42.4	31.7	23.2	20.6	21.3	22.2	29.1	64.7	96.4
Garments	0.1	0.1	0.3	0.4	0.4	0.4	0.2	0.2	0.2	0.1	0.4
Handicrafts	0.1	0.2	0.1	0.2	0.2	0.3	0.2	0.4	0.2	0	0.2
Leather	1.9	2.1	2.2	3.1	2	4.3	3.9	4.1	3.4	3.5	4.0
Non-Metallic	0.7	0.7	0.5	0.5	1	1.1	0.9	1.4	2.6	1.6	1.1
Textiles	39.1	40.5	50.6	42.4	37	36	34.1	25.6	26	24.7	26.9
Other Manufacturing	0.5	1.5	3	3.1	6.5	4.4	9.2	9.8	15.4	29.1	22.2
Petroleum Oils	11.4	5.7	1.8	6.8	6.4	0.4	1.6	1.4	18.4	28	14.4
Gemstones	7.5	10.9	14.5	11.6	13.8	15.4	30.3	37.1	23.7	16.3	31.6
Total non-agriculture	**107.6**	**111**	**138.5**	**118.5**	**109.6**	**102.5**	**118.6**	**128**	**142.8**	**186.1**	**229.7**
SUB-TOTAL	**178.2**	**211.6**	**304.7**	**287.7**	**286.2**	**239.8**	**276.5**	**326.7**	**356.3**	**468.6**	**548.4**
Re-Exports	-	4.1	3.9	3.7	2.7	4	4.2	5.7	3.6	2.1	3.7
Scrap Metal	-	10.7	6	4.2	6.1	5.1	4.1	3.1	3.7	5.9	6.8
Mining	-	-	3.7	12.2	3.3	7.3	17.6	25.5	44.6	3.6	3.1
TOTAL VISIBLE NTE	178.2	226.4	314.7	307.8	298.4	256.2	302.5	361	408.2	480.2	561.9
Electricity	21.1	16.2	14.8	5.6	6.1	7.4	9.3	7.3	7	4.8	3.8
TOTAL NTE	**199.3**	**242.6**	**329.5**	**313.4**	**304.5**	**263.6**	**311.8**	**368.3**	**415.2**	**484.9**	**565.7**

Source: Export Board of Zambia

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[20] One of the problems that representatives of the sector have pointed out is that the copper is paid at the London Metal Exchange quoted price, which is inclusive of the transport cost component. This is despite ZAMEFA being located within the Copperbelt Province where copper is extracted (Calì et al. 2006).

Notwithstanding the apparent limited impact of the copper boom on NTEs so far, a number of concerns remain about the sustainability of NTEs in the event the appreciation of the Kwacha continued. Fynn and Haggblade (2006) argue that the negative effects will soon materialise for most agricultural exports. They calculate that under a permanent strengthening of the Kwacha at 3,500 K/$ (in the first eight months of 2006 the average exchange rate has been 3,400 K/$), agricultural export earnings may fall by US$107 million per year, affecting 194,000 farm households. For the farms that would remain, competitive pressures will favour increased mechanisation using cheap imported equipment at the expense of local labour. At a 2,500K/$ exchange rate, the study estimates that export agriculture will largely disappear from Zambia.[21] Because of their cost structure the largest agricultural export employers – cotton, tobacco and horticulture – should experience the steepest reductions in farmer incentives, production and export volumes should the appreciation of the currency be sustained. In particular, the horticulture sector may be more vulnerable to negative shocks, given the strong presence of foreign investors (particularly Zimbabwean farmers fleeing Zimbabwe due to the social and economic crisis in the country), which seem to be relatively more prone to relocate to more competitive areas than domestic investors. Floriculture, because of its low domestic cost component, is likely to face less pressure from a strong Kwacha.[22] In addition, while effects are not always visible on the basis of absolute levels (if all exports increase), the relative position of sectors does seem to indicate that the share of the NTEs in total exports is decreasing.

Moreover, the strong currency may increase the vulnerability of the import competing sector (especially in the food and textile sectors) as imports should become cheaper. The possible displacement of these domestic industries is more likely to come through competition from developing countries, including Zambian neighbours, rather than high income countries which have fairly complementary production structures to Zambia.

The other major exporting sector, tourism, may also be penalised by the strong Kwacha, as most of its inputs are locally sourced. Even though it is currently undergoing a boom in the Livingstone area, in part due to the crisis in neighbouring Zimbabwe, the sector is also likely to face challenges through higher prices for foreign tourists. Unfortunately we have no data on tourism receipts, but operators in the sector have been among the most vocal in the complaints against the strengthening currency (see for example, *Business Post*, of 13 December 2005). As tourism constitutes over 12% of total exports, a careful assessment of its competitiveness prospects in relation to the copper boom is much needed.[23]

Effects on inflation and real wages

In theory, the loss of competitiveness experienced by non-traditional tradable sectors should be partly counterbalanced by the appreciation of the kwacha via cheaper imports in two main ways. First, lower prices of inputs (especially capital equipment and intermediate inputs) should reduce production costs for domestic firms; second, cheaper tradable goods may reduce the price of the domestic consumption basket, thus increasing real wages for a given level of nominal wages. In practice however, the extent to which the appreciation of the currency translates into lower domestic prices crucially depends on how much of the decreases in import prices would be passed on to domestic prices. We do not have enough data at this stage to carry out a proper test of such pass-through mechanisms, but preliminary analysis seems to indicate that there has been only limited pass-through from the stronger kwacha on to domestic prices.

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[21] After a moderate decline, the K/$ exchange rate was at 3,884 in August 2006.

[22] Floriculture is highly capital intensive, as it requires construction of green houses and cold rooms, the development of plant material and intense training of staff (Fynn and Haggblade, 2006). The authors calculate that labour amounts to 22.5% of variable costs in vegetables compared with 4.5% in floriculture at an exchange rate of K4500/$.

[23] The data refers to the year 2000 (World Bank 2006) and it is likely to have increased by then given the recent rise in tourist arrivals into the country, and into the Victoria Falls in particular, following the economic instability in neighbouring Zimbabwe.

Chart 5: REER vs. CPI (2003–2006)
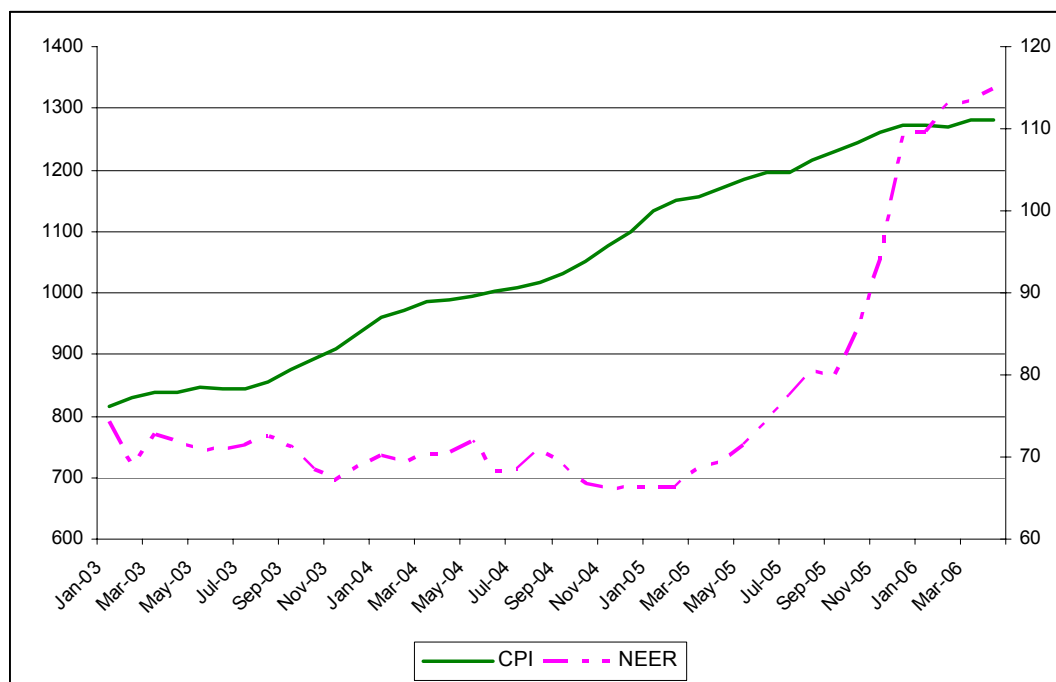
Note: NEER unit is on the right axis
Source: IMF (2006a) and Government of Zambia (various issues).

Chart 5 plots the patterns of the Nominal Effective Exchange Rate (NEER) and of the Consumer Price Index (CPI) since 2003. Considering that as Import/GDP ratio in Zambia has been between 27% and 31% between 2000 and 2004, we would expect that import prices considerably affect domestic prices. Quite surprisingly, there seems to be fairly little correlation between the two lines, at least until December 2005. The steep nominal appreciation of the Kwacha throughout 2005 seems to have influenced the CPI only in a very marginal way, as the latter has kept increasing at the same pace as in the pre-appreciation period. Some effects of the strong currency appear to be operating only in 2006, when the rise of CPI slowed down, with a decreasing, albeit significantly positive, inflation.[24] Part of the explanation for this lack of correlation between REER and CPI arguably relies on the fact that only a fraction of the goods' basket used to calculate the CPI is composed of tradable goods. However, the weak correlation between the NEER and CPI displayed in Chart 5 seems to be enough to postulate the existence of constraints to the smooth operating of transfer pricing mechanisms. This may call for a closer investigation of the structure of the importing industry, on the basis of which the appropriation of rents from the stronger kwacha is allocated between importers (including retailers) and final consumers.

It is useful to examine the possible distributional effects of the reduction in the inflation rate in 2006. Reports indicate that this has come to fruition only for luxury goods, as staple food prices have remained relatively constant. Such finding is partially confirmed by the analysis of the CPI for different income groups. Chart 6 shows that the slow down of the CPI growth in 2006 has been felt only by urban consumers (both low and high-income), while the CPI for rural groups has *de facto* maintained an unchanged pattern of growth. This effect on inflation may penalise tradable rural sectors, such as agriculture, as they may not enjoy any benefit in terms of real wages from the appreciating currency. Moreover, as the bulk of poverty in Zambia is concentrated in rural areas, this may bear important consequences on the pattern of poverty reduction in the country.

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[24] The inflation rate has been at an average 12% in 2006, declining from an average 18.5% in 2004 (Central Statistical Office).

**Chart 6: CPI for different income groups**
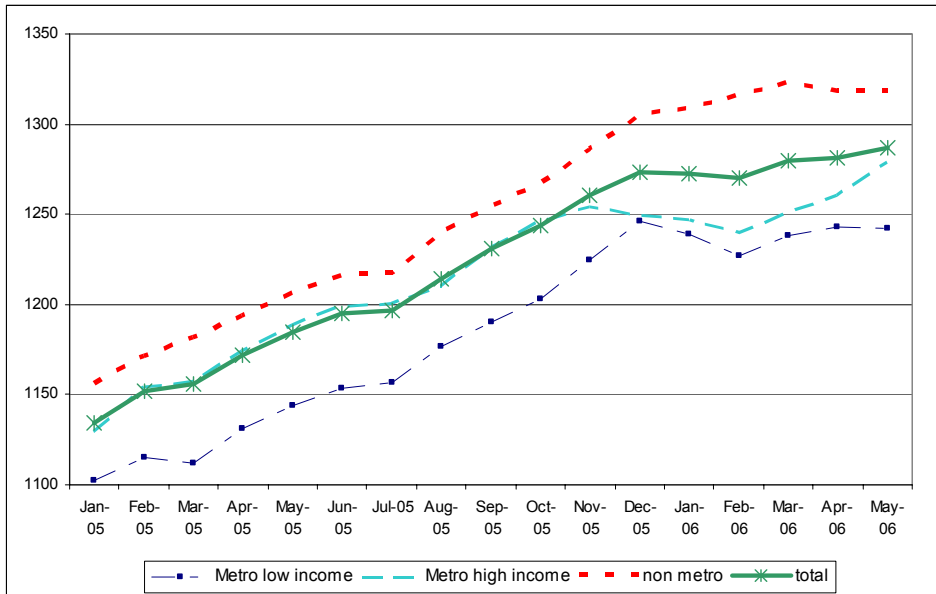
Note: metro=urban
Source: Government of Zambia (various issues).

The limited impact of the appreciating currency on inflation may mean that the pattern of real wages tends to be driven mainly by nominal wages, especially in rural areas. Because of the pressure that the agricultural sector is facing towards mechanisation, rural wages may actually be facing downward pressure. On the other hand there is some evidence that nominal wage in mining is rising. The recent increase in miners' pay by 20% conceded by the industry when the miner's union went on strike seems to suggest that the labour supply curve is not completely elastic and this may provide incentives for some resources movement from other sectors.[25]

Trade balance

The copper boom has driven the value of Zambian exports to grow significantly over the past three years, reversing the long-run disappointing performance of the export sector in the 1990s (Chart 7). The fall in international copper prices over the period 1995–2002 caused a decrease in exports, which was only partially offset by the increase in NTEs. The strengthening Kwacha has determined a steep increase in imports in the last two years. However, exports have grown faster since 2003, which has caused the gap between exports and imports to reduce, with a ratio of 0.85.

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[25] Mining Weekly (2006).

Chart 7: Zambian Imports and exports 1990–2005 (current US $ million)
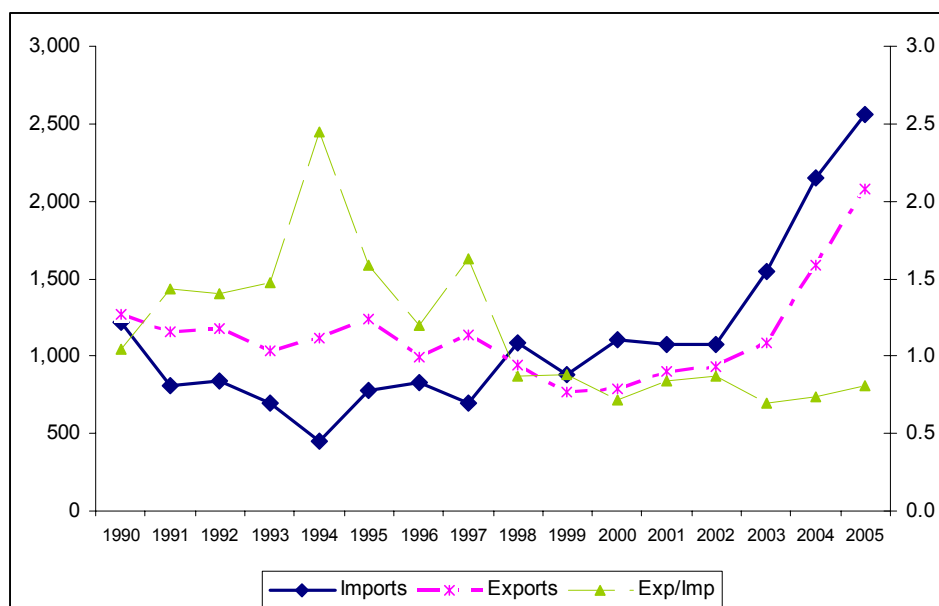
Note: Exp/Imp is on the right scale
Source: Bank of Zambia

Effects on public resources

An analysis of the composition of Zambian fiscal resources reveals that indirect effects (via higher income and VAT tax related to GDP growth) play a more important role than the direct effects in determining the increase in revenues (Table 6). Indeed, the three-fold increase in total public resources between 2000 and 2005 derives mainly from tax revenues related to GDP growth (VAT and income tax) and a rise in external grants. The excise taxes, which include the royalties on copper extraction as well, have grown at a lower pace than tax revenues and represent in 2005 a mere 13.6% of them. The main reason for this is the low rate of mineral royalty, which was reduced to 0.6% from 2% in 2002 to encourage more copper mining in Zambia (as 2002 was a trough in the world price of copper). Moreover, under the Mines and Minerals Act and the local taxation laws, mining companies carrying out copper and cobalt extraction operations have a corporate tax of 25 percent, compared with the 35 percent before. Mining companies are also exempted from paying dividends realised from copper produced and sold. Therefore the government currently appears to be able to appropriate very little direct gains out of the copper boom. As a matter of fact, the share in revenues in 2005 was still lower than before the copper boom (People's Daily, 2006). Moreover, as most of the copper sector is foreign owned, to the extent that profits are repatriated to the parent company of the Zambian branch, a significant portion of the increased inflows of resources may be flowing out of the country. Foreign assets held by banking institutions have not increased over the past two years.[26] This may provide incentives for the government to directly capitalise on the booming copper industry. Indeed, Zambia plans to raise its tax on mineral royalties from 0.6% to somewhere around 3%.[27]

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[26] Source: IMF (2006b).

[27] The government states this rise in the tax is to put Zambia's tax rate closer in line with world averages (People's daily, 2006).

Table 6: Zambia's fiscal resources composition (in billions Kwacha)

	2000	2001	2002	2003	2004	2005[a]
Revenue and grants	2,528	3,262	4,259	5,104	6,173	7,468
Revenue	1,953	2,509	2,909	3,680	4,740	5,643
Tax revenue	1,931	2,449	2,849	3,548	4,546	5,513
Income taxes	634	977	1,244	1,622	2,032	2,455
Excise taxes	278	366	423	482	607	768
VAT	575	821	812	1,034	1,362	1,633
Domestic VAT	230	278	342	393	453	623
Import VAT	345	544	471	642	909	1,010
Customs duty	252	285	367	409	544	656
Non-tax revenue	22	60	60	132	194	130
Grants	575	754	1,350	1,424	1,433	1,825
Grants as % of total resources	22.7%	23.1%	31.7%	27.9%	23.2%	24.4%
Excise taxes as % of revenues	14.2%	14.6%	14.5%	13.1%	12.8%	13.6%

a. Preliminary data
Source: IMF (2006d)

3.2 Possible long-run effects and policy options

What are the long-term prospects for the Zambian economy? We have seen that a temporary natural resources boom may cause permanent effects on the production structure and the growth pattern of the economy.[28] There are usually a couple of necessary (but not sufficient) conditions that the boom ought to satisfy in order to produce permanent changes: the shock should last *long* enough and it should be *intense* enough. If the trend in international demand and prices of copper were short-lived, then agents would not have enough time to make investment decisions on the basis of these trends. By the same token, if the changes in copper prices were limited, the effects on relative prices and on the sectoral allocation of resources may be negligible. There is no recognised benchmark to assess whether the copper boom satisfy these two conditions. However, we can make some preliminary inference on the duration and intensity of the current boom, from which we argue that the boom may well generate persistent effects. Current trends in international demand suggest that copper prices should stay at high levels in the short-run (IMF, 2006c). In the medium term, they are expected to retreat as new capacity comes on stream, although probably not falling back to earlier levels — in part because higher energy prices have increased production costs. Second, the four-fold jump in copper price between 2003 and 2006 indicates that the intensity of the shock has been significant.

Production structure

The copper boom may cause changes in the production structure that may undermine the viability of important tradable sectors. These sectors may shrink to a size below a sustainable threshold and eventually disappear, especially if the ability of firms to re-enter is constrained, e.g. by sunk costs.[29] To the extent that the sectoral composition of the production structure is relevant for the generation of dynamic gains (e.g. productivity spillovers, learning-by-doing, investments in human and physical capital), this may have implications for the long-run pattern of growth of the economy. Of course this would depend on which sectors are the main generators of dynamic gains. In this respect the potential negative impact of the copper boom on the development of certain tradable sectors, such as some of the manufacturing and primary agricultural activities, may be of concern. Moreover, to the extent that these activities and agriculture in particular, are the largest employers in the economy, their decline

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[28] If the copper boom were to continue indefinitely, so that the equilibrium prices stayed at the current level, then the boom would operate as a technological shock in neoclassical growth models. Its (permanent) effect would be to raise the long-term growth trajectory of the economy.

[29] Economies of scale may be internal to the firms and/or to certain sectors (e.g. in transportation of perishable goods, such as floriculture, or in the export marketing and distribution of textile products). If these are a large enough, a decrease in production in those sectors may make their activity not viable.

may be worrisome from a demand side and poverty reduction perspectives. On the other hand, the copper industry seems to be developing some forward linkages especially with the engineering production, which could be important in the generation of dynamic gains for the economy.

There is another issue, which is important to consider in this context and relates to the sustainability of current copper prices. As (at least part of) the boom is likely to fade away in the medium term, the economy needs to be enough diversified to be able to cope with the potential fall in income from copper. To be sure, mining companies seem to have taken into account a possible drop in prices in their investment decision. There is evidence they have used conservative prices in their financial models when forecasting revenue and profits (Mhango, 2006).[30] The substantial investments in copper mines also suggest that the mining industry perceives this increase in activity to be sustainable in the long term. However, the increasing dependence of the export sector on copper highlighted in Chart 3 is worrisome for the long-term sustainability of the economy (in relation to the traditional arguments of instability of primary commodities' demand and relative low positive externalities of copper production on the economy).

Windfall revenues

As discussed there are ways in which the government may counterbalance the potential negative impacts from the boom through supply-side investment and/or a careful management of the exchange rate. However these options do not seem to be open to the Zambian government, as the copper boom has had little effect on fiscal revenues. Further investigation is needed to understand why the public sector is not able to extract more resources out of the copper boom, by for instance raising the tax rate on extraction or on profits.[31] The challenges for the government in using windfall gains is constraining the extent to which Zambia would be able to maximise the long-run benefits from the boom. The ownership of the resources appears to play a role in determining the likely relative success of a natural resource boom, a factor which is confirmed by the comparative analysis with the Chilean case below. Alongside the need for greater public resources, increased fiscal transparency should help to ensure that most is made from any additional budget revenues.

Exchange rate appreciation

Although Zambia's GDP has been growing substantially over the past two years, the rapid appreciation of the currency (which started in 2005) should be examined with care, as there is mounting evidence of the detrimental effects of an overvaluation of the RER on growth prospects (Hausmann et al., 2004). Moreover, to the extent that the dependence on copper prices' substantially increases the variability of the exchange rate, this may adversely affect both exporters (who incur higher exchange rates risks) and importers (who may be less willing to quickly pass through the customers price cuts due to an appreciating exchange rate).

Zambia vs. Chile

Chile may provide a useful example on how some of these challenges could be met. Chile is the largest copper producer and exporter in the world and like Zambia, its economy is still largely dependent on copper, which represents around 60% of its exports.[32] The economy remains strong despite some symptoms of Dutch Disease, which are being minimised through a very careful management of the additional resources flowing into the country. The majority of these resources are being kept offshore in

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[30] One source reported that mining companies were forecasting with a projected sustainable price of US$ 4,000 per metric tonne (the price is now around US$ 8,000 per metric tonne). This should still provide an ample margin over an estimated average cost of production of US$ 2,900. The new mines have even lower costs ranging between US$1 500 and US$2 000, which will protect profit margins when prices fall (Mhango, 2006).

[31] In fact there have been proposals of raising the tax rate on mineral royalties to around 3%; however, this increase has not yet materialised after almost two years since the start of the boom, nor does the proposed rate seem to be able to increase the windfall revenues by a significant level.

[32] Chile's copper production is much larger than Zambia's (5.3 million tonnes vs. 0.45 million tonnes).

foreign currency, easing the upward pressure on the currency. The plan of the government is to give 0.5% of GDP a year to the Central Bank, to offset the weight of the debts from a major bank bail-out in 1982–83. A further 0.5% is to be deposited to an offshore trust fund, on which the government can draw in the future to meet public pension obligations. Any surplus beyond 1% of GDP should be channeled into a new 'economic and social stabilisation fund', which should also be held abroad. In adverse times, the government can draw on this rather than contracting debt. This would strengthen Chile's counter-cyclical fiscal policy, as well as helping to restrain the peso's rise.[33]

Such management follows a historic prudent approach to exchange rate management which has allowed the Chilean REER to be significantly more stable than the Zambian one over time (Chart 8). The Chilean current REER is barely above its average of the past ten years. This is also confirmed by a more formal analysis, which regresses the REER on copper price for the two countries since 1985. The results presented in Table 7 are quite striking: the effects of copper price on the REER is between 7 and 9 times larger for Zambia than for Chile; interestingly, over the long-run Chilean REER does not bear any significant relationship with copper price (a slightly negative one if anything). And even in the recent appreciation, the explanatory power of copper price on Chilean REER evolution is much lower than in the case of Zambia.

Chart 8: Chilean vs. Zambian REER (1985–2006)
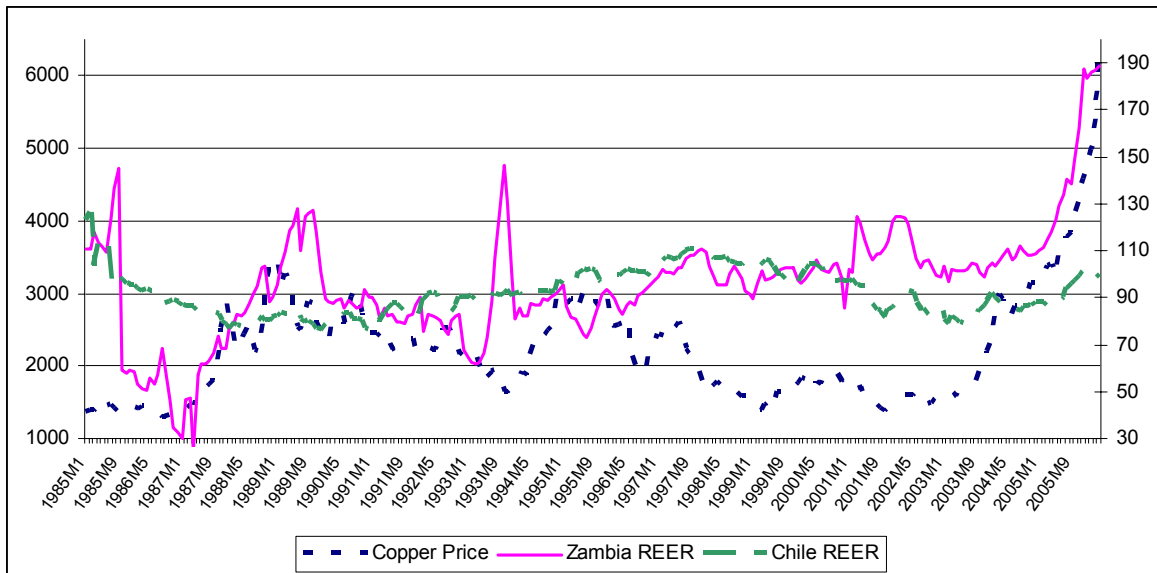
Source: IMF (2006a)

Table 7: REER and the copper boom in Zambia and Chile

	2004–06		1985–2006	
	Chile REER	Zambia REER	Chile REER	Zambia REER
Correlation	0.842	0.942	0.134	0.466
R Square	0.710	0.887	0.018	0.217
Coefficient	0.005	0.031	-0.002	0.015
t-statistics	7.971	14.264	-2.159	8.401
Observations	28	28	256	256

Source: IMF (2006a)

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[33] The Economist (2006).

4. Conclusions and possible policy implications

This paper shows mixed evidence on the effects of the copper boom on the Zambian economy. One message that is quite uncontroversial, however not easy for poor countries to implement, is that the economy needs to be flexible enough to adapt to changing conditions, whether they are increasing or decreasing copper prices. On the basis of our analysis, we would like to draw some implications for policy options to maximise the benefits of the recent copper boom, while minimising the potential costs. However, a complete menu of options would need more detailed data than are available to us, and an examination of a few issues, which remain unresolved. We briefly sketch possible policy issues stemming from the analysis, highlighting the eventual areas or questions that would need to be addressed. We focus here mainly on policy options to maximise the economic growth prospects of the country, therefore we abstract from other considerations, such as short-term adjustment costs.

1) The government needs to extract more resources from the booming sector, without incurring the risk of over-taxation (which would provide disincentives to invest for copper companies). This option needs to be evaluated against the backdrop of its political feasibility (what would be the likely consequence of an increase in the mineral royalty tax or in the corporate tax for mining companies to the extent possible in practice given past binding commitments?)
2) If enough windfall revenues are channelled into the public sector, there would be the option of creating a trust fund to save for periods of adverse terms of trade and to put some pressure off the currency (along the lines of the Chilean experience).
3) The importance of specific non-traditional tradable sectors, which face the risk of shrinking and eventually disappear in a typical Dutch Disease case, needs to be assessed. A careful analysis of the degree of dynamic gains stemming from the various sectors is needed to understand whether Zambia needs to support these sectors or should just let market forces operate.
4) The opportunity of strengthening the creation of positive externalities from the copper boom, for example by facilitating the creation of forward linkages from copper extraction (e.g. engineering products), should be evaluated.
5) A closer look into the structure of the importing sector is needed to ensure that the benefits of the strong currency are fully passed on to the consumers. What are the reasons of the apparent sluggish response of prices to the appreciation of the Kwacha?

Careful consideration of these issues is crucial for long-run growth prospects. The analysis of the Zambian experience points to the importance of the ownership of natural resources (public versus private and domestic versus foreign) in shaping the potential impact of the foreign exchange inflow on the economy. This element appears to be crucial in explaining the difference in the management of the copper boom between Zambia and Chile and further research would be needed to incorporate it into the traditional Dutch Disease framework.

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